Effects of Pension Funds' Investments on Capital Market Performance in Nigeria

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Abstract
Globally pension industry had undergone a series of reforms during the last two decades, as it is considered as a catalyst of economic growth and development. These reforms are largely necessitated by the increase in the population ageing and shortcomings of old age support mechanisms. The purpose of the reforms in pension industry is to ensure income security in old age at a least cost manner and aid financial markets developments. The pension industry in Nigeria witnessed 1.75% growth in the scheme membership during the first quarter of 2016, from 6,950,503 contributors at the end of the 2015 to 7,071,791 at the end of 2016 first quarter. The total monthly pension contribution made by contributors also increased to N3.55 trillion as at the end of first quarter 2016. This study examined the impact of pension fund investments on the performance of capital market in Nigeria. The study is a time series analysis covering a period from 2009Q3 to 2016Q1 using the Autoregressive Integrated Moving Average (ARIMA) regression technique. The study concludes that there is a significant positive relationship between pension funds' investments and the performance of capital market in Nigeria after the 2004 major industry reform. Specifically, the study concludes that total pension investments in Nigeria improved the performance of the Nigerian capital market significantly in terms of depth and liquidity (market capitalization and value traded. Moreover, the study concludes that the interaction of macroeconomic indicators such as interest rate, inflation rate and GDP per capita with pension investments affect the capital market performance significantly. The study recommends that governments should ensure good and stable monetary policy in Nigeria so as to achieve the desired goal of the pension industry reforms, of investments capable of providing adequate resources to the retirees in Nigeria to cater for their old age needs. The study also recommends adequate regulations of the pension funds custodians and administrators in Nigeria, and policies that favour market structure with efficient investment of portfolios.

1.1 Introduction

Globally pension industry had undergone a series of reforms during the last two decades, as it is considered as a catalyst of economic growth and development. These reforms are largely necessitated by the increase in the population ageing and shortcomings of old age support mechanisms. The main objective of the reforms in pension industry is to ensure income security in old age at a least cost manner (Davis 1998), the also targeted some macroeconomic benefits including aiding labour and financial markets developments. The resultants quality labour and efficient capital market are expected to facilitate economic growth and provide adequate resources for the elderly population in the economy without an undue burden on the working population.

In realizing the pension goals, pension industry initially relied upon pay-as-you-go (PAYG) scheme which seems cheap as there are few retirees then; however, costs rise while the population ages and hence the dependency ratio rises faster than the passivity ratio. PAYG is

therefore criticised for being vulnerable to the effects of population ageing, this makes PAYG engender economic distortions and unsuitable for retirees situations like early retirements, disability pensions, evasion and disincentive to save (Davis, 1998). On the contrary, the current funded scheme offers better labour market incentives as well as aiding the development of financial markets.

In Nigeria, Pension Reform Act 2004 (PRA) was signed into law together with the Pension Reform Act 2014 and it is in effects. The act which introduced the New Contributory Pension Scheme and covers employees in the both public and private sector. Under the scheme, each employee and employer contribute a minimum of 7.5% of the employee's monthly emoluments but in the Military, an officer contributes 2.5% while the employer contributes 12.5%. An employer may elect to contribute on behalf of the employees provided that the total contribution shall not be less than 15% of the monthly emoluments of the employees. The scheme also allows for voluntary contributions to be made by employees (including those exempted by the Act) that could only be taxed at the point of withdrawal where the withdrawal was made before five years from the date the first voluntary contribution was made.

The new pension scheme in Nigeria is fully funded, meaning that the contribution of an employee is deducted monthly from the employee's salary while the employer will provide the counter-part contribution for the employee, which will both be transferred to the relevant retirement savings account. Thus, the pension assets are kept aside from the onset to meet future pension liabilities, and that every employee is required by law to open a Retirement Savings Account (RSA) in his name with a Pension Fund Administrator (PFA) of his choice. The act also required and specified that the pension funds assets collected are to be invested in securities and stocks from which the returns accrued to the retirees. According to the pension commission (2016), the pension industry witnessed 1.75% growth in the scheme membership during the first quarter of 2016, from 6,950,503 contributors at the end of the 2015 to 7,071,791 at the end of 2016 first quarter. The expansion in industry membership according to the commission was driven by Retirement Savings Account (RSA) Scheme. RSA scheme had an increase of 121,338 contributors representing 1.76% percent whereas membership of the Closed Pension Fund Administration Scheme (CPFA) declined by 50 representing 0.21% of the total members of the scheme, while the Approved Existing Scheme (AES) membership remained unchanged. Similarly, the total monthly pension contribution made by contributors from both the public and private sectors into their RSAs was N3.55 trillion as at the end of first quarter 2016. This shows an increase of N120.51 billion representing 3.51% over the total contributions as at the end of the 2015. A review of the aggregate total contribution shows that the Public Sector contributed 53.45 percent of the total contributions, while the Private sector contributed the remaining 46.55%.

While there is substantial amounts of pension fund assets in Nigeria, there was strong demand for investigation into how the investments of pension assets affect economic growth and development and capital market in particular. For instance, Henshaw (2012) argues that pension funds investment could provide long term funds for economic and social development of the country. In view of this, there are some challenges in respect of pension funds' assets an investment in Nigeria, which is one of this major challenges is the dearth of investment outlets. The commission also linked this challenge to the recapitalization program of the financial sector (banks, insurance companies and stock broking companies), while the Nigerian capital market is still under developed (Pencom, 2008). For example, Tsado and

Gunu (2011) pointed out that top twenty companies in the capital market have more than 70% of the total market capitalization, necessitating a pool of pension funds chasing few quality investments. However, this study is of the view that pension fund investments contribute to the capital market performance, a subject which received little attention from the academia. This therefore constituted the research gap fill by this study.

1.2 Objectives of the Study

The aim of this study is to examine the effect of pension funds investments on the performance of capital market in Nigeria. The specific objectives of the study are;

i. To examine the effect of pension fund investment on the stock market capitalization in Nigeria.
ii. To assess the effect of pension fund investment on the stock value traded in Nigeria.
iii. To evaluate the joint effect of pension fund investment and selected macroeconomic indicators on the performance of stock market in Nigeria.

1.3 Hypotheses of the Study

The following hypotheses are formulated in null form for the study;

H_{01}: Pension fund investments have no significant effect on the capital market performance in Nigeria.

H_{02}: Pension fund investments and macroeconomic has no significant effect on the capital market performance in Nigeria.

1.4 Scope and Significance of the Study

The study is a time-series analysis and it covers a period of 2009Q3 to 2016Q1. The findings from the study are expected to be of important to the government, capital market and researchers. The rest of the paper is organized as follows; section two covers literature review, section three outlined the methodology, section four covers results and hypothesis testing and section five deals with the concluding remarks.

2.1 Literature Review and Theory

The theoretical framework of the link of the secondary capital market to pension funds development, as savings and investment platform include opportunity to realize or liquidate holdings when pension liabilities crystallize. That is, such market can offer lower information and trading cost, diversified asset class and efficient clearing and settlement system. Hence, the loanable fund theory contends that ceteris paribus interest rate is determined by the interaction of savers and investors, such that investment varies inversely with the rate of interest, while savings is directly related with interest rate. Portfolio theory on the other hand contends that in the real world, financial investments are subject to systematic risk, such that there is a limit to diversification (Megginston et al., 2007). While identifying interest rate as potential pensions risk Scheuenstuhl (2012) again reviews that a prudently managed pension fund requires being consistently forward looking in managing all risk factors that drive the outcome of the pension assets and liabilities in a capital market.

Several empirical researches were carried out to find the link between pension fund investments and capital market performance. For instance, Blake (2003) examines the accumulation and distributional phases of the U.K pension system, and argued that whether a system is of the DC scheme or the DB scheme, appropriate financial instruments and investment strategy are more critical than both the financial market structure and the nature of the financial institutions in driving successful private sector pensions. The study discovered

that in many markets including the U.K, pension fund managers underperformed the market. Borsch-Supan et al. (2004) use panel data to examine how population aging and pension reform impact savings behavior in continental Europe, comprising France, Germany and Italy. These countries are noted for large and ailing pay-as-you-go public pension system; relative thin capital market and relatively low capital performance. The study found a positive link from the aging population syndrome to savings growth by young generation, passing-through to the capital market, with beneficial side effect on productivity and aggregate growth. Wang (2004) did a non-parametric study on China's pension reform and capital market development and found a correlation between a funded pension system's boost of the capital market and existence of appropriate financial infrastructure and effective financial regulations.

Megginson et al. (2007)'s findings reveal that countries that rely mainly on compulsory private financed pension tends to have larger capital market and are most efficient (e.g. United States, United Kingdom; Netherlands; and Switzerland), compared to others, such as continental European countries that rely on state run unfunded pension system, who are characterized by relatively smaller market. Davis (1998) analyzes the impact of pension reforms on the financial sector development and argues that generally the type of pension reform instituted has stronger influence on the effects of capital markets development and stronger stability support, warning that a non-competitive regulatory system that restricts portfolio investments is likely to affect adversely the beneficial effect of the funds on capital market.

Similarly, Meng and Pfau (2010) examine the role of pension fund in capital markets development among OECD using least square dummy variable (LSDVC) estimation in a panel data study. All-together the study found that the impact of pension fund on capital market differs significantly depending on the depth of financial development. Countries with well-developed financial market (i.e. well managed investment strategies in the stock and bond markets) enjoy significant growth in their pension funds than those with thin financial development.

Nwanne (2015) examined the impact of contributory pension scheme on economic growth in Nigeria for the period 2004-2012. The objectives of the study were to determine the impact of pension funds on economic growth and as well as to ascertain the impact of pension savings mobilized on economic growth. The study used Ex-post-facto research design. Ordinary Least Square Regression method was used in data analysis. The study finds that pension funds have negative and significant impact on economic growth while pension savings had positive and significant impact on economic growth. The implication of the finding is that the contributory pension scheme has achieved the objective of using pension funds to provide long term capital that will promote economic growth. It also implies that pension savings contribution is low an indication of low coverage of the scheme. It was recommended that investment outlets of pension funds should be increased and efforts should be intensified to ensure greater compliance and mobilization of savings from contributors.

Edogbanya (2013) carried out a study on the assessment of the impact of contributory pension scheme on Nigerian economic development for the period (2007-2010). The study used survey research design, and sample size of 30 and 70 for both staff and customers of Legacy Pension Ltd. It also adopted correlation analysis for testing secondary data and ANOVA for the primary data. The study revealed that risk prevalent has positive effect on

pension fund management and that the contributory pension scheme has significant positive impact on the GDP. Odia and Okoye (2012) compared the old pension scheme with the Pension Reform Act 2004. The study adopted comparative analysis method to compare and contrast the pre-2004 pension scheme with Pension Reform Act 2004. The study finds that the PRA 2004 is better than the pre-2004 pension scheme, and that the PRA 2004 is expected to help remedy the deficiencies and inadequacies prevalent in the old pension scheme. The study recommended more stringent coordination, supervision and regulation of the pension industry in Nigeria.

Gunu and Tsado (2012) studied contributory pension system as a tool for economic growth in Nigeria. The study used descriptive statistics, percentages and charts to analyze data collected. Their findings revealed that the contributory pension scheme has begun to contribute to increase in growth of the Nigerian capital market and economic growth. Dostal (2010) studied pension reforms in Nigeria for the period 2006 to 2010. The study finds that the funded pension system has not had any significant impact on the development of financial market and that real sector investment was not boosted by savings from pension scheme. Also the macroeconomic credibility of the government has declined. The implication of the findings was that the regulatory environment failed to encourage interaction between pension reform and economic reform while problems of regulation within the system have also contributed to a lack of reform credibility.

Nyong and Duze (2011) carried out a study on the Pension Reform Act 2004 and retirement planning in Nigeria. The study used survey research design and a multi-stage random sampling technique to select the sample size of 3000 from the population of serving teachers and teacher pensioners in Federal and State Public Secondary Schools between the ages of 55 and 59 years. The results revealed that the objectives of PRA 2004 were yet to be achieved since retired persons still suffered trauma, pains and even death before they received their pension packages. The study recommended e-payment of pensions to ensure easy referencing, easy update and logistics of pension scheme system.

Olanrewaju (2011) examined the Pension Reform Act 2004 and well-being of Nigerian retirees and the sociological evaluation of its provisions. The study used the Marxist theory to analyze critically the 2004 pension policy of the government on the wellbeing of Nigerian retirees. The study finds that the PRA 2004 has failed to contribute to basic social security in old age for the majority of Nigerians employed in the informal sector while the minority of covered workers is likely to experience problems. The implication of the findings is that forced savings for the future in a low income country characterized by large scale poverty might not be desirable for retirees especially in Nigeria where there is inadequate complementary social security system.

Nnanta, Okoh and Ugwu (2011) examined the implications of the new pension reform for social security planning in the Local Government in Nigeria. The study employed the techniques of content analysis to analyze and interpret the views of several studies on the old and new pension scheme. The study finds that the advantages of PRA 2004 have translated into improved social security planning for the retired workers dead or alive and for their families to achieve a degree of economic security and provision of cash payments to help income lost as a result of retirement or death.
Patrick and Akinwunmi (2015) examines empirically the causal relationship between interest rate, capital market, and pension assets in Nigeria from 1981-2013. While literature provides

preponderant evidence of transmission from pension asset to capital market growth, little evidence is available of the reverse and the interaction with interest rate. The 2014 Pension Act widens the scope of pension fund investments into real estate and infrastructure markets, which hitherto are interest rate sensitive. Nigeria's high short-term interest rate regime attracts long-term funds and can make the capital market volatile, which might pose systemic risks to pension assets. Using ordinary least square (OLS) regression technique in a recursive system, the study reveals that pension asset is directly sensitive to stock market Index, while the index is inversely sensitive to short term interest rate, implying that the high short term interest rate regime might be inimical to building 'wholesome' pension assets of the capital market. The study suggests that monetary and fiscal authorities should manage short-term interest rate to optimal lower rate to attract pension assets to the capital market, making the capital market to operate at lower volatility conducive for bi-directional growth.

Becceea (2010) compared the four pillar pension system in Mauritius against the three pillar superannuation system in Australia. The study did a random survey among three hundred (300) working adults in Mauritius on the attitude and perspective of Mauritians towards shift from pension system to a superannuation system. The findings indicate that the superannuation scheme would impact the Mauritius economy, as in Australia. Scheuenstuhl (2012), within the concept of liability driving investing (LDI), examines how to derive a prudent investment and risk management strategy for pension fund given prevailing turbulent capital market and regulatory risk of pension accounting. The study argues that one outcome of financial market crises is that the usual correlation between assets breaks down such that all asset classes show negative behavior- equity crashes, credit spread widening, interest rate dropping, and many assets becoming illiquid.

Onafalujo and Eke (2010) examine the pension risks of the DC scheme of 2004 in Nigeria and the implications of investing the funds in the capital market using simulation and trend analysis. The study establishes that the weakness in the traditional DC scheme concerning non-guaranteed pensions can be further aggravated by inherent capital market risks such as appropriate interest rate for actuarially determined annuities; minimum guaranteed returns on investment; and a DC scheme based on the risk appetite of the workers.

Enache et al. (2015) use the single equation error correction model (ECM) to investigate the impact of pension funds on capital market in a sampled ten (10) Central and Eastern European Countries from 2001 to 2010. The finding provides further evidence of short term impact and lower magnitude long term impact on market capitalization. While there are preponderant evidence of link from pension funds to capital market growth (Enache et al., 2015; Mailos, 2012; Meng and Pfau, 2010), little evidence is available of the reverse and its interaction with interest rate in the literature, which is the contest of this study. Catalan et al. (2000) find a bidirectional positive correlation between contractual savings (pensions and insurance) assets as a ratio of GDP and both market capitalization and value traded in 26 OECD countries.

3.1 Methodology

In this study, correlational research design is adopted to examine the effect pension funds investments on capital market performance in Nigeria. The choice of this design is informed by the effectiveness of the method in investigating the relationships among theoretically related variables. The study used secondary data from different sources: CBN quarterly economic reports and financial Statistical Bulletin, World Bank economic reports and the quarterly publications of the Pension Commission of Nigeria as well as the National Bureau

of Statistics Economic reports. The data collected from the sources is a time series for the period 27 quarters (2009Q3-2016Q1).

3.2 Technique of Data Analysis

The technique of data analysis adopted for the study is Autoregressive Integrated Moving Average (ARIMA) regression technique. The choice of the model is informed by the fact that the time series has unit root and the disturbances are autocorrelated; thus, OLS regression estimators' model may be biased. ARIMA model in this regard is very efficient for providing the means to fit linear models with non-stationary time series and serially correlated disturbances. The paper on the also conducted some robustness tests to ensure the reliability of the results. These tests include the test of heteroskedasticity, colinearity, and the data normality and unit root tests. The analysis is conducted using Statistics/Data Analysis Software (STATA 11.1).

3.3 Variables Measurement and Models Specification

The variables of the study are the capital market performance variables (market capitalization and total value traded) and the pension funds assets with the macroeconomic indicators (inflation, interest rate, GDP per capita and the lag performance variables). Pension funds' investments are measured using the total pension funds assets at the end of every quarter.
Therefore, the econometric models of the study are mathematically expressed as follows;

$$MCAP_t = \gamma_0 + \gamma_1 INFR_t + \gamma_2 INTR_t + \gamma_3 GDPP_t + \gamma_4 PFA_t + \gamma_5 MCAP_{t-1} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots i$$

$$VTRD_t = \gamma_0 + \gamma_1 INFR_t + \gamma_2 INTR_t + \gamma_3 GDPP_t + \gamma_4 PFA_t + \gamma_5 VTRD_{t-1} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots ii$$

Where; $MCAP_t$ is the total market capitalization in time t; $VTRD_t$ is the total value of stock traded at time t; $INFR_t$ is the inflation rate at time t; $INTR_t$ is the interest rate at period t; $GDPP_t$ is the real GDPP per capita at period t; PFA_t is the total pension funds assets at period t; $MCAP_{t-1}$ is the market capitalization at a period before period t; $VTRD_{t-1}$ is the total stock value traded at a period before period t; γ_0 is the intercept, γ_1 to γ_5 are the coefficients and μ_t is the stochastic error term/disturbances.

4.1 Results and Discussions

This section presents and discusses the results obtained from the tests conducted on the data collected for the study. The section begins with the description of the data collected for the study and then the inferential statistics.

4.2 Descriptive Statistics

The descriptive statistics of the data collected for the study is presented in Table 2;

Table 2: Descriptive Statistics

Variables	Mean	SD	Min	Max	N
MCAP	19.415	4.6782	14.283	35.492	27
VTRD	0.3295	0.1524	0.1582	0.8353	27
INFL	10.607	2.2431	7.8000	14.800	27
INTR	11.504	1.9154	6.2000	14.000	27
GDPP	2426.1	108.32	2205	2548.4	27
PFA	4.4291	0.8745	3.0789	6.1692	27
lgMCAP	20.104	5.5752	14.283	35.492	27
lgVTRD	0.3246	0.1768	0.1827	0.8353	27

Source: STATA Output (Appendix)

Table 2 presents the descriptive statistics of the capital market variables and the pension funds' investments in Nigeria during the period (third quarter of 2009 to first quarter of 2016). The table shows that the total market capitalization (equity and debt) has a mean of 19.42% of GDP with a standard deviation of 4.678 and the minimum and maximum values of 14.28% and 35.49% of the GDP respectively. Although the range between the minimum and maximum is wide, it implies a stable performance as the standard deviation indicated that there is no wide dispersion of the data from the mean value. From the other measure of capital market performance, total value traded (VTRD) the table shows a mean of 0.33% of GDP with standard deviation of 0.1524 and the minimum and maximum values of 0.16% and 0.84% of GDP respectively. This implies that capital market performance in terms of total value traded is volatile during the period, as the standard deviation is large compared to the mean, together with the wide range between the minimum and maximum values.

The descriptive results from table 2 indicate that the average value of inflation rate (INFL) during the period is 10.61% (consumer price index) with a standard deviation of 2.243 and the minimum and maximum values of 7.8% and 14.8% respectively. This implies an increasing inflation trend during the period under review, as the analysis indicated that there was an increase in inflation of about 50% during the period (i.e. 7.8% to 14.8%), which usually affects savings and consequently investments. Moreover, the table shows that the interest rate (INTR) as a measure of the country's monetary policy rate has an average value 11.50% with a standard deviation of 1.915 and the minimum and maximum values of 6.2% and 14.0% respectively. This suggests that investments opportunities are likely discouraged during the period as the interest rate increased from 6.2% in 2009 to 14% in the first quarter of 2016. Another macroeconomic indicator that is linked to investments is the country's GDP per capita (GDPP), the table shows that the average GDPP during the period is USD2426.07 with standard deviation of 108.319, and the minimum and maximum values of USD2205 and USD2548.4 respectively. The analysis revealed that GDPP falls from USD2548.4 to USD2205 during the period under review, which implies low productivity and hence low investments.

Similarly, table 2 shows that the pension investments (PFA) during the period has an average value of 4.429% of GDP with standard deviation of 0.8745 and the minimum and maximum values of 3.078% and 6.169% of the GDP respectively. This implies a tremendous increase in the pension fund assets during the period from 3.078% of GDP in 2009 to 6.169% in the first quarter of 2016. On the other hand, the table shows that the lag market capitalization (lgMCAP) has a mean of 20.10% of GDP with a standard deviation of 5.575 and the minimum and maximum values of 14.28% and 35.49% of the GDP respectively. Lastly, the table shows that the lag value traded (lgVTRD) during the period has a mean of 0.354% of GDP with a standard deviation of 0.354 and the minimum and maximum values of 0.183% and 0.835% of the GDP respectively.

Preliminary evidences from the analysis of the descriptive statistics of the data collected for the study suggested that the data is widely dispersed which is an indication that the data is not normally distributed, as pointed by the values of standard deviation in most of the variables. However, the study employed Shapiro Wilk Test for Normal Data as in the following table;

Table 3: Normal Data Test

Variables	W	V	Z	p-values	N
MCAP	0.7596	7.068	4.017	0.0000	27

VTRD	0.7899	0.1524	3.740	0.0001	27
INFL	0.9169	2.2431	1.834	0.0333	27
INTR	0.7711	1.9154	3.917	0.0000	27
GDPP	0.9198	108.32	1.762	0.0390	27
PFA	0.9535	0.8745	0.642	0.2604	27
lgMCAP	0.7559	5.5752	4.048	0.0000	27
lgVTRD	0.7626	0.1768	3.991	0.0000	27

Source: STATA Output (Appendix)

The test is designed to test the null hypothesis that, the data came from a normal distribution population. The results from table 3 indicates that the data from MCAP, GDPP, VTRD, INFR, INTR, lgMCAP AND lgVTRD do not follow the normal curve, because the null hypothesis that the data is normally distributed is rejected at 1% level of significance (from their p-values). However, the table show that data from PFA follows the normal distribution as indicated by the p-value of 0.2604, implying that the null hypothesis that the data is normal is not rejected. Normal distribution is part of the requirements of most parametric tools of analysis especially the OLS regression technique, failure to meet the normal distribution assumption could affect OLS estimators and necessitate the use of other techniques.
On the other hand, the study adopted Dickey-Fuller unit root test to investigate the stationary process of the data; the results are presented in table 4 as follows;

Table 4: Dicky-Fuller Test for Unit Root

Variables	T-Statistic	P-Values
MCAP	-4.670	0.0001
VTRD	-4.125	0.0009
INFR	-1.412	0.5767
INTR	-2.764	0.0637
GDPP	-1.988	0.2920
PFA	-1.995	0.2888
lgMCAP	-3.296	0.0151
lgVTRD	-3.017	0.0334

Source: STATA Output (Appendix)

Dickey fuller test of unit root also employed the test of null hypothesis technique (that the variable has unit root, i.e non-stationary). Table **4** indicates the presence of unit root in the time series for INFR, INTR, GDPP, and PFA because all the p-values of the t-statistics are not statistically significant. On the other hand, the table shows the absence of unit root in the MCAP, VTRD, lgMCAP and lgVTRD as the p-values of the test-statistic are significant. Thus, the null hypothesis that the data has unit root is rejected. The problem of unit root in the time series affect the OLS results, as such the study might use a more generalized techniques to address the problem.

4.3 Inferential Statistics

Correlation Results

The correlations of the variables of the study are presented in Table 4 as follows;

Table 4: Correlation Matrix

Variables	MCAP	VTRD	INFR	INTR	GDPP	PFA	lgMCAP	lgVTRD
MCAP	1.0000							

VTRD	0.7767	1.0000						
	(0.0000)							
INFR	-0.1026	0.1608	1.0000					
	(0.6105)	(0.4228)						
INTR	0.1624	0.0277	-0.2535	1.0000				
	(0.4183)	(0.8909)	(0.2020)					
GDPP	-0.3384	-0.5352	-0.7187	0.3282	1.0000			
	(0.0842)	(0.0040)	(0.0000)	(0.0947)				
PFA	0.4545	0.1412	-0.4424	0.3870	0.5096	1.0000		
	(0.0175)	(0.4823)	(0.0208)	(0.0461)	(0.0066)			
LgMCA	0.7542	0.7545	0.1423	0.1551	-0.3903	0.2857	1.0000	
P	(0.0000)	(0.0000)	(0.4788)	(0.4397)	(0.0442)	(0.1485)		
lgVTRD	0.6132	0.8026	0.0660	-0.5785	0.0644	0.8435	0.8435	1.0000
	(0.0007)	(0.0000)	(0.7438)	(0.0016)	(0.7496)	(0.0000)	(0.0000)	

P-Values in Parentheses

Source: STATA Output (Appendix)

Table 4 shows the degree of association between pension fund investments together with the macroeconomic indicators and the capital market performance variables in Nigeria. The table shows that there is a statistical negative relationship between inflation rate (INFR) and stock market capitalization (MCAP) during the period of the study, from the correlation coefficient of -0.1026, which is not statistically significant at all levels of significance (p-value of 0.6105). This implies that lower levels of inflation are associated with higher capital market performance in Nigeria. The table also shows that there is a statistical positive relationship between interest rate (INTR) and stock market capitalization (MCAP) during the period of the study, from the correlation coefficient of 0.1624, which is not statistically significant at all levels of significance (p-value of 0.4183). This implies that high interest rates are associated with higher capital market performance in Nigeria.

Table 4 shows that there is a significant statistical negative relationship between GDP per capita (GDPP) and stock market capitalization (MCAP) during the period of the study, from the correlation coefficient of -0.3384, which is statistically significant at 10% level of significance (p-value of 0.0842). This implies that lower levels of per capita are associated with higher capital market performance in Nigeria. The table indicates that pension funds investments (PFA) is significantly and positively related with stock market capitalization (MCAP) during the period of the study, from the correlation coefficient of 0.4545, which is statistically significant at 5% level of significance (p-value of 0.0172). This implies that high investments of pension assets are associated with higher capital market performance in Nigeria. Lastly, the table support that lag capital market performance is positively related with next period performance, from the coefficient of 0.7542 with p-value of 0.0000.

On the other hand, Table 4 shows that there is a statistical positive relationship between inflation rate (INFR) and total stock market value traded (VTRD) during the period of the study, from the correlation coefficient of 0.1608, which is not statistically significant at all levels of significance (p-value of 0.4228). This implies that higher levels of inflation are associated with higher capital market performance i.e. value traded in Nigeria. The table also shows that there is a statistical positive relationship between interest rate (INTR) and stock value traded (VTRD) during the period of the study, from the correlation coefficient of 0.0277, which is not statistically significant at all levels of significance (p-value of 0.8909).

This implies that high interest rate is associated with higher capital market performance in Nigeria.

Moreover, Table 4 shows that there is a significant statistical negative relationship between GDP per capita (GDPP) and stock market value traded (VTRD) during the period of the study, from the correlation coefficient of -0.5352, which is statistically significant at 1% level of significance (p-value of 0.0040. This implies that lower levels of per capita are associated with higher capital market performance in terms of the total value traded in Nigeria. The table indicates that pension funds investments (PFA) is positively related with stock market value traded (VTRD) during the period of the study, from the correlation coefficient of 0.7545, which is not statistically significant at all levels of significance (p-value of 0.4823). This implies that high investments of pension assets are associated with higher capital market performance in Nigeria. Lastly, the table support that lag capital market performance is positively related with next period performance, from the coefficient of 0.8026 with p-value of 0.0000.

However, to conclude the effect of pension funds investments on the performance of capital market in Nigeria the study estimate the models of the study, the results are presented and discuss in the following section.

4.4 Regression Results and Hypotheses Testing

In this section, the hypothesis formulated for the study is tested; the section begins with the discussion of the regression model as presented in table 5;

Table 5: Regression Model Summary

Model One: Market Capitalization			**Model Two: Total Value Traded**		
Variables	**Statistics**	**P-Value**	**Variables**	**Statistics**	**P-Value**
R Square	0.8641		**R Square**	0.7359	
Adj. R Square	0.8317		**Adj. R Square**	0.6730	
Wald Chi2	332.62	0.0000	**Wald Chi2**	69.26	
Durbinalt: Chi2	0.244	0.6212	**Durbinalt: Chi2**	0.535	0.4647
Mean VIF	2.31		**Mean VIF**	2.31	
Hettest: Chi2	5.46	0.0195	**Hettest: Chi2**	0.94	0.3325
Archlm: Chi2	3.366	0.0666	**Archlm: Chi2**	0.018	0.8920

Source: STATA Output (Appendix)

Table 5 presents the regression results of the models of the study; for the model one (market capitalization), the Engle's LM test for the presence of autoregressive conditional heteroskedasticity (ARCH) provides evidence of the presence of ARCH (Archlm Chi2 of 3.366 with p-value of 0.0666. Moreover, this also support the result of heteroskedasticity test (Hettest Chi2 of 5.46 with p-value of 0.0195), which implies that the variance of the residuals is not constant (heteroskedastic). To fit the model, the paper employed autoregressive conditional heteroskedasticity regression model. The table on the Durbin's alternate test for higher orders of autocorrelation (Durbinalt) indicated that the disturbances are not serially correlated (Chi2 of 0.244 with p-value of 0.6212). The results from the table also show the absence of perfect multicollinearity among the independent variables, as indicated by the mean Variance Inflation Factor (VIF) of 2.31. However, the table shows that the explanatory variables (INFR, INTR, PFA, GDPP, and lgMCAP) explained 83.17% of the total variations in the dependent variable, total stock market capitalization in Nigeria during the period of the

study, from the coefficient of multiple determinations (adjusted R square of 0.8317). The table also shows that the model is fit at 1% level of significance as indicated by the Wald Chi2 of 332.62 with the P-value of 0.0000.

For the model two, the Engle's LM test for the presence of autoregressive conditional heteroskedasticity (ARCH) provides evidence of the absence of ARCH (Archlm Chi2 of 0.018 with p-value of 0.8920. Similarly, the result of heteroskedasticity test (Hettest Chi2 of 0.94 with p-value of 0.3325) implies that the variance of the residuals is constant (homoscedastic). Table 5 shows that the disturbances are not correlated (independent) as indicated by the Durbin's alternate test for higher orders of autocorrelation (Durbinalt), Chi2 of 0.535 with p-value of 0.4647 suggesting that the disturbances are not serially correlated. To fit the model, the paper employed Autoregressive Integrated Moving Average (ARIMA) regression model, which is very efficient for providing the means to fit linear models with auto correlated disturbances and non-stationary time series. The results from the table also show the absence of perfect multicollinearity among the independent variables, as indicated by the mean Variance Inflation Factor (VIF) of 2.31. However, the table shows that the explanatory variables (INFR, INTR, PFA, GDPP, and lgMCAP) explained 67.3% of the total variations in the dependent variable, total value traded in Nigeria during the period of the study, from the coefficient of multiple determinations (adjusted R square of 0.6730). The table also shows that the model is fit at 1% level of significance as indicated by the Wald Chi2 of 69.26 with the P-value of 0.0000.

Hypotheses Testing

In this section, the hypothesis formulated is tested to draw conclusions about the effect of pension funds investments on capital market performance in Nigeria. Table 6 present the regression coefficient for the analysis;

Table 6: Regression Coefficients: ARIMA

Model One: Market Capitalization				**Model Two: Total Value Traded**			
Variables	**Coef.**	**Z**	**P-Value**	**Variables**	**Coef.**	**Z**	**P-Value**
INFR	-0.0112	-4.40	0.000	**INFR**	-0.0002	-1.52	0.128
INTR	0.0014	0.51	0.608	**INTR**	-9.46e07	-0.01	0.993
GDPP	-0.9606	-7.10	0.000	**GDPP**	-0.0191	-2.43	0.015
PFA	3.1094	6.17	0.000	**PFA**	0.0449	1.08	0.281
lgMCAP	0.2468	3.01	0.003	**LgVTRD**	0.4791	3.16	0.002
CONST.	7.5956	7.05	0.000	**CONST.**	0.1508	2.45	0.014

Source: STATA Output (Appendix)

The result in table 6 shows that the effects of pension funds investment together with the selected macroeconomic indicators on the stock market performance in Nigeria. The table shows that the effect of inflation rate (INFR) on the stock market capitalization in Nigeria is negative from the coefficient of -0.0112 with z-value of -4.40 and is statistically significant at 1% level of significance (p-value of 0.0000). That is a 1% decrease in inflation leads to a 1.12% increase in the total capital market capitalization (debt and equity) in Nigeria. On the other hand, the results indicates that a 1% decrease in inflation rate leads to a 0.02% increase in the total stock value traded, but is not statistically significant at all level (p-value of 0.128). The table shows that the effect of interest rate (INTR) on the stock market capitalization in Nigeria is positive from the coefficient of 0.0014 with z-value of 0.51 but is not statistically significant at all levels of significance (p-value of 0.608). That is a 1% increase in monetary

policy rate leads to a 0.14% increase in the total capital market capitalization (debt and equity) in Nigeria. On the other hand, the results indicates that a 1% decrease in interest rate leads to a 0% increase in the total stock value traded, but is also not statistically significant at all levels (p-value of 0.993).

The result from table 6 shows that the effect of GDP per capita (GDPP) on the stock market capitalization in Nigeria is negative from the coefficient of -0.9606 with z-value of -7.10 and is statistically significant at 1% level of significance (p-value of 0.000). That is a 1% decrease in GDP per capita leads to an increase of USD0.96 in the total capital market capitalization (debt and equity) in Nigeria. On the other hand, the results indicates that a 1% decrease in GDP per capita leads to an increase of USD0.019 in the total stock value traded, and is statistically significant at 5% level (p-value of 0.015).

Moreover, the table indicated that the effect of pension fund investments (PFA) on the stock market capitalization in Nigeria is positive from the coefficient of 3.1094 with z-value of 6.17 and is statistically significant at 1% level of significance (p-value of 0.000). That is a 1% increase in pension funds investments leads to a 3.11% increase in the total capital market capitalization (debt and equity) in Nigeria. On the other hand, the results indicates that a 1% increase in pension fund investment leads to a 0.044% increase in the total stock value traded, but is not statistically significant at all level (p-value of 0.281).

Lastly, the table shows that the capital market performance in Nigeria is significantly affected by the previous period performance. The effect of lag market capitalization on the stock market capitalization in Nigeria is positive from the coefficient of 0.2468 with z-value of 3.01 and is statistically significant at 1% level of significance (p-value of 0.003). That is a 1% increase in the lag market performance leads to a 0.246% increase in the total capital market capitalization (debt and equity) in Nigeria. On the other hand, the results also indicates that a 1% increase in lag market performance leads to a 0.479% increase in the total stock value traded, and is statistically significant at 1% level (p-value of 0.002).

Based on the analysis of the results obtained, the study rejects the null hypothesis one (H01), which states that pension funds investment has no significant effects on the capital market performance in Nigeria. The study therefore infers that pension funds positively affected the performance of capital market in Nigeria during the period under review, especially in terms of market depth (total debt and equity capitalization). Moreover, the study rejects the null hypothesis two (H02), which states that macroeconomic indicators and pension funds investment has no significant joint effects on the capital market performance in Nigeria. The study infers that the interaction of investments and macroeconomic indicators has significant influence on the stock market performance in Nigeria during the period under review, especially the GDP per capita.
These findings implied that the goal of pension industry reforms is not likely going to be achieved if the monetary policy committee did not statblize the macroeconomic indicators in Nigeria.

5.1 Conclusion and Recommendations

Consistent with the findings from the analysis conducted and the hypothesis, the study concludes that there is a significant positive relationship between pension funds' investments and the performance of capital market in Nigeria after the 2004 major industry reform. Specifically, the study concludes that total pension investments in Nigeria improved the

performance of the Nigerian capital market significantly. Moreover, the study concludes that the interaction of macroeconomic indicators such as interest rate, inflation rate and GDP per capita with pension investments affect the capital market performance significantly. The study recommends that governments should ensure good and stable monetary policy in Nigeria so as to the desired goal of the pension industry reforms, of investments capable of providing adequate resources to the retirees in Nigeria to cater for their old age needs. The study also recommends adequate regulations of the pension funds custodians and administrators in Nigeria, and policies that favour market structure with efficient investment of portfolios.

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APPENDIX

```
. tsset periods, quarterly
        time variable:  periods, 2009q3 to 2016q1
                delta:  1 quarter
. summarize mcap vtrd infr intr gdpp pfa lgmcap lgvtrd
```

Variable	Obs	Mean	Std. Dev.	Min	Max
mcap	27	19.41506	4.67817	14.28251	35.49212
vtrd	27	.3295415	.1523807	.1581604	.8352746
infr	27	10.60741	2.243096	7.8	14.8
intr	27	11.5037	1.91542	6.2	14
gdpp	27	2426.067	108.3194	2205	2548.4
pfa	27	4.429097	.8745483	3.078997	6.169296
lgmcap	27	20.10485	5.575194	14.28251	35.49212
lgvtrd	27	.3546198	.1768453	.182697	.8352746

```
. swilk mcap vtrd infr intr gdpp pfa lgmcap lgvtrd
```

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
mcap	27	0.75960	7.068	4.017	0.00003
vtrd	27	0.78993	6.176	3.740	0.00009
infr	27	0.91695	2.441	1.834	0.03336
intr	27	0.77106	6.730	3.917	0.00004
gdpp	27	0.91980	2.358	1.762	0.03904
pfa	27	0.95350	1.367	0.642	0.26042
lgmcap	27	0.75598	7.174	4.048	0.00003
lgvtrd	27	0.76261	6.979	3.991	0.00003

```
. dfuller mcap

Dickey-Fuller test for unit root                    Number of obs   =        26
```

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.670	-3.743	-2.997	-2.629

```
MacKinnon approximate p-value for Z(t) = 0.0001

. dfuller vtrd

Dickey-Fuller test for unit root                    Number of obs   =        26
```

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.125	-3.743	-2.997	-2.629

```
MacKinnon approximate p-value for Z(t) = 0.0009
. dfuller pfa

Dickey-Fuller test for unit root                    Number of obs   =        26
```

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.995	-3.743	-2.997	-2.629

```
MacKinnon approximate p-value for Z(t) = 0.2888
```

```
. dfuller infr

Dickey-Fuller test for unit root                   Number of obs   =        26

                                 ------------ Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)             -1.412            -3.743            -2.997           -2.629
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.5767

. dfuller intr

Dickey-Fuller test for unit root                   Number of obs   =        26

                                 ------------ Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)             -2.764            -3.743            -2.997           -2.629
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0637


. dfuller gdpp

Dickey-Fuller test for unit root                   Number of obs   =        26

                                 ------------ Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)             -1.988            -3.743            -2.997           -2.629
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.2920

. dfuller lgvtrd

Dickey-Fuller test for unit root                   Number of obs   =        26

                                 ------------ Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)             -3.017            -3.743            -2.997           -2.629
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0334

. dfuller lgmcap

Dickey-Fuller test for unit root                   Number of obs   =        26

                                 ------------ Interpolated Dickey-Fuller ---------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)             -3.296            -3.743            -2.997           -2.629
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0151
```

```
. pwcorr mcap vtrd infr intr gdpp pfa lgmcap lgvtrd, star (0.05) sig
```

	mcap	vtrd	infr	intr	gdpp	pfa	lgmcap
mcap	1.0000						
vtrd	0.7767*	1.0000					
	0.0000						
infr	-0.1026	0.1608	1.0000				
	0.6105	0.4228					
intr	0.1624	0.0277	-0.2535	1.0000			
	0.4183	0.8909	0.2020				
gdpp	-0.3384	-0.5352*	-0.7187*	0.3282	1.0000		
	0.0842	0.0040	0.0000	0.0947			
pfa	0.4545*	0.1412	-0.4424*	0.3870*	0.5096*	1.0000	
	0.0172	0.4823	0.0208	0.0461	0.0066		
lgmcap	0.7542*	0.7545*	0.1423	0.1551	-0.3903*	0.2857	1.0000
	0.0000	0.0000	0.4788	0.4397	0.0442	0.1485	
lgvtrd	0.6132*	0.8026*	0.3160	0.0660	-0.5785*	0.0644	0.8435*
	0.0007	0.0000	0.1083	0.7438	0.0016	0.7496	0.0000

	lgvtrd
lgvtrd	1.0000

```
. reg mcap infr intr gdpp pfa lgmcap
```

Source	SS	df	MS		
Model	.049167766	5	.009833553	Number of obs	= 27
Residual	.007733955	21	.000368284	F(5, 21)	= 26.70
				Prob > F	= 0.0000
Total	.056901721	26	.002188528	R-squared	= 0.8641
				Adj R-squared	= 0.8317
				Root MSE	= .01919

mcap	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
infr	-.0112095	.002474	-4.53	0.000	-.0163545	-.0060646
intr	.0014484	.0022124	0.65	0.520	-.0031526	.0060494
gdpp	-.960671	.1648833	-5.83	0.000	-1.303565	-.6177774
pfa	3.10943	.6351202	4.90	0.000	1.788625	4.430235
lgmcap	.2468657	.0964033	2.56	0.018	.046384	.4473473
_cons	7.595603	1.292805	5.88	0.000	4.907067	10.28414

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of mcap

         chi2(1)      =     5.46
         Prob > chi2  =   0.0195
```

```
. vif
```

Variable	VIF	1/VIF
gdpp	3.90	0.256474
pfa	2.18	0.459124
infr	2.17	0.459954
lgmcap	2.04	0.490349
intr	1.27	0.788753
Mean VIF	2.31	

```
. estat durbinalt
```

Durbin's alternative test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
1	0.244	1	0.6212

H0: no serial correlation

```
. estat archlm
```

LM test for autoregressive conditional heteroskedasticity (ARCH)

lags(*p*)	chi2	df	Prob > chi2
1	3.366	1	0.0666

H0: no ARCH effects *vs.* H1: ARCH(*p*) disturbance

```
. arima mcap infr intr gdpp pfa lgmcap

(setting optimization to BHHH)
Iteration 0:   log likelihood =  71.821278
Iteration 1:   log likelihood =  71.821278

ARIMA regression

Sample:  2009q3 - 2016q1                        Number of obs      =         27
                                                Wald chi2(5)       =     332.62
Log likelihood =  71.82128                      Prob > chi2        =     0.0000
```

mcap	Coef.	OPG Std. Err.	z	P>|z|	[95% Conf.	Interval]
mcap						
infr	-.0112095	.0025475	-4.40	0.000	-.0162026	-.0062165
intr	.0014484	.002825	0.51	0.608	-.0040885	.0069853
gdpp	-.960671	.1352932	-7.10	0.000	-1.225841	-.6955012
pfa	3.10943	.5039183	6.17	0.000	2.121768	4.097092
lgmcap	.2468657	.081979	3.01	0.003	.0861899	.4075415
_cons	7.595603	1.077045	7.05	0.000	5.484634	9.706572
/sigma	.0169246	.0038736	4.37	0.000	.0093326	.0245167

```
. reg vtrd infr intr gdpp pfa  lgvtrd
```

Source	SS	df	MS		
Model	.000044425	5	8.8850e-06	Number of obs	= 27
Residual	.000015947	21	7.5936e-07	F(5, 21)	= 11.70
				Prob > F	= 0.0000
				R-squared	= 0.7359
				Adj R-squared	= 0.6730
Total	.000060372	26	2.3220e-06	Root MSE	= .00087

vtrd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
infr	-.0002089	.0001115	-1.87	0.075	-.0004408	.000023
intr	-9.46e-07	.000101	-0.01	0.993	-.000211	.0002091
gdpp	-.0191216	.0078561	-2.43	0.024	-.0354594	-.0027839
pfa	.0449624	.0266729	1.69	0.107	-.0105069	.1004317
lgvtrd	.4790814	.143165	3.35	0.003	.1813535	.7768094
_cons	.1508476	.061392	2.46	0.023	.0231761	.2785192

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of vtrd

         chi2(1)      =     0.94
         Prob > chi2  =   0.3325
. estat durbinalt

Durbin's alternative test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	0.535	1	0.4647

H0: no serial correlation

```
. estat archlm
LM test for autoregressive conditional heteroskedasticity (ARCH)
```

lags(*p*)	chi2	df	Prob > chi2
1	0.018	1	0.8920

H0: no ARCH effects *vs.* H1: ARCH(*p*) disturbance

```
. arima vtrd infr intr gdpp pfa  lgvtrd

(setting optimization to BHHH)
Iteration 0:   log likelihood =  155.30702
Iteration 1:   log likelihood =  155.30702

ARIMA regression

Sample:  2009q3 - 2016q1                        Number of obs      =        27
                                                Wald chi2(5)       =     69.26
Log likelihood =   155.307                      Prob > chi2        =    0.0000
```

vtrd	Coef.	OPG Std. Err.	z	P>|z|	[95% Conf.	Interval]
vtrd						
infr	-.0002089	.0001371	-1.52	0.128	-.0004775	.0000598
intr	-9.46e-07	.0001101	-0.01	0.993	-.0002168	.0002149
gdpp	-.0191216	.0078671	-2.43	0.015	-.0345409	-.0037024
pfa	.0449624	.0417175	1.08	0.281	-.0368025	.1267273
lgvtrd	.4790814	.1518467	3.16	0.002	.1814673	.7766956
_cons	.1508476	.0614488	2.45	0.014	.0304103	.271285
/sigma	.0007685	.0001315	5.84	0.000	.0005108	.0010263