Pension Fund Investment and Capital Market in Nigeria

Yinusa, O. G., Folami, R.A., Mamadelo, A. M., and Tiamiyu, H. O.
Olabisi Onabanjo University,
Ago Iwoye Ogun State, Nigeria
Yinusa.Ganiyu@Oouagoiwoye.Edu.Ng

Abstract: *The paper examines the dynamic and causal relationship between pension fund investment and capital market development in Nigeria. The paper employed the Autoregressive distributed lag model to estimate the cointegration relationship between the variables. The results indicate that in the long-run, the impact of local ordinary share (LOC) on total market capitalization was positive and statistically significant while Pension fund investment asset (PFI) and monetary policy rate (MPR) were positive and statistically insignificant. Also, when the total value of shares traded was used as a measure of capital market development, the results indicate that increase in lag one and lag three of the total value of stock traded and lag one of pension fund investment results in an increase in the total value of stock traded. In terms of which variable granger causes the other, the results indicate that none of the variable Granger causes each other meaning that both variables (Pension fund investment and Market Capitalization) are determined independently. That is, neither pension fund investment causes total market capitalization nor Total Market Capitalization granger cause Pension fund investment. Based on the findings of the study the paper, therefore, concludes that over the years the investment of pension funds into the capital market has assisted to engender the development of the Nigeria Capital market. The paper recommends that more pension fund investment should be channeled to the capital market to develop and strengthen the Nigerian capital market and make the market more competitive.*

Key words: Pension Fund Investment, Capital Market Development, Market Capitalization, Nigeria

Introduction

The link between pension fund investment and capital market development is a topical issue among scholars and policymakers. The issue of pension has received much attention in many countries over the past decades. In fact, in recent times, the pension has increasingly attracted the attention of policymakers in many countries as a means of facilitating privately funded

retirement income savings by an aging workforce (World Bank, 2008). Many countries have opted for various forms of contributory pension scheme where employers and their employees are supposed to pay a certain percentage of the employee's monthly earnings to retirement savings accounts from which they would be drawing their pension benefits after retirement. Besides pension funds are now among the most important institutional investors in the world capital markets (Klumpes and Mason, 2000).

Banwo and Ighodalo (2015) report that before 2004, the Nigerian pension industry under the old defined-benefit system had a deficit of about $12.9 billion. And since the 2004 reforms introduced the Contributory Pension Scheme (**"CPS"**), the industry has witnessed exponential growth. As at the end of September 2015, total pension contribution in the custody of Pension Fund Custodians (**"PFCs"**) and under the management of Pension Fund Administrators (**"PFAs"**) including Closed Pension Fund Administrators, was more than N4.8 trillion (about$26 billion).

In Nigeria, investment of pension fund assets is regulated by a government agency named the National Pension Commission (PENCOM). The commission derives its power from the Pension Act 2004 which stipulates how the assets shall be invested. Section 86 of the act highlights the types of investment of pension funds which include bonds, bills, and other securities in the capital market.

To guarantee future income through savings in a pension scheme particularly a contributory pension scheme, such savings must be efficiently invested through investment outlets that can ensure minimal risk, the security of fund, and greater returns. One such investment platform is the capital market. The Capital market is an indispensable tool for enhancing productivity, investment activities stimulating rapid industrial as well as economic development (Ogege and Ezike,2012). The most important role of the Nigerian Capital Market is the mobilization and efficient allocation of capital for investment purposes. The market puts in place structures for the mobilization of savings from numerous surplus economic units for the production process and thus enhances economic growth and development.

The nexus between pension fund investment and capital market development has been a subject of interest among researchers. It is often argued that the creation of funded pension plans has major long-term implications for the functioning and growth of the financial market. As noted by Vittas (1996), the question of the links between pension fund investment and financial markets has two aspects. One concerns the preconditions in terms of financial sector development for the successful implementation of pension reform, while the other refers to the long-term impact of pension reform on the development of financial markets. He argued that pension reform and the promotion of private pension funds requires a small core of sound, prudent and efficient financial institutions, such as banks and insurance companies, but does not depend on the prior existence of well-developed securities markets but he opined that private pension funds and insurance companies may have a beneficial impact on

financial market development once they reach critical mass and provided they operate in a conducive regulatory environment.

The findings of past studies such as Babalos and Stavroyiannis(2019), Alda (2017) Zubair (2016), Enache, Milos & Milos (2015), Eke and Onafalujo (2015, Channarith and Wade (2010) have been mixed and conflicting. The mixed and conflicting findings may be a result of the static approach used by most of the studies. The past studies overlooked the dynamic relationship between pension investment and capital market development. Pension fund investment and capital market development are dynamic phenomena rather than static variables, this paper, therefore examines the dynamic impact of pension investment on capital market development. This paper is a departure from other existing studies in the literature that ignored the dynamic and causal relationship between pension fund investment and capital market. Apart from the introduction section, the paper is further divided into three other sections. Section two is a review of the literature. Section three is the methodology and discussion of findings and results while section four concludes the paper.

Literature Review

An emerging body of empirical literature beginning two decades ago has had the motive of examining the kind of relationship that exists between pension funds and capital market as well as establishing the theoretical connection between the two variables and other control variables determining the growth of each and how they affect each other. The growth of the pension fund industry and development of the domestic capital market has become a great concern and point of research in the financial circle to empirically document the correlation in existence. Enache et al. (2016) noted that private pension funds have an important role to play within institutional investors because it has a high-risk appetite in portfolio diversification. Pension Funds have also been reported that they enhance financial innovation. Particularly, the deepening of capital markets has been produced by the development of the activity of pension funds. (Catalán, 2004; Corbo & Schmidt-Hebbel, 2003; Davis, 1998a; Vittas, 1999).

In establishing the influence of financial institutions on capital market development, Briston and Dobbins (2007) opined that institutional investors such as insurance companies, pension funds, investment trust companies, etc., have influenced greatly the growth of the UK Stock Market. And their participation in the market has also enhanced the growth of share price as well as partaking in the decision making of the market.

Pension funds are regarded as savings for future use and something must drive the use of these funds in the capital market that will motivate the managers of these funds to invest the capital in the market. This takes us to the loanable fund's theory which explains the determination of interest in terms of demand and supply of loanable funds or credit. According to this theory, the rate of interest is the price of credit, which is determined by the demand and supply for loanable funds. (Jhingan, 2010). In other words, the theory argues that

all things being equal, the interaction of savers (pension contributors) and investors determine the rate of interest. However, in reality, financial investments are subject to systematic risk as argued by portfolio theory such that there is a limit to diversification. While identifying interest rate as a potential pension 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. Whether a pension fund is privately or publicly funded, what matters are the investment opportunities available for the funds and how the funds could be used as loanable funds in the capital market as well as taking into consideration the motivating factor which is the return on investment. Davis (1998a) confirms that pension funds bring about short-term biases in the capital market and this is entrenched in the modern portfolio theory and perfect capital market theory. The institutional investors themselves must act to nurture long term biases for the pension policy to confront these theories.

In general, theoretical postulations and empirical findings support the positive impact of pension funds on the capital market. However, most of the empirical studies in the literature focused on developed economies while few have attempted to study emerging economies such as Nigeria. However, some of their findings are discussed as follows.

Wang (2004) conducted a non-parametric study on Pension Reform and Capital Market Development in China. The study discovered that there is a positive and significant relationship between Pension funds investment and the development of the Chinese capital market in a well-developed and regulated financial market. In a similar study by Davis (1998b) where the impact of pension reforms on development of financial development was examined, the author concludes that portfolio investment of the pension system greatly influenced the development of the financial sector provided that government or pension regulators do not restrict future pension fund portfolio investment. A subsequent study by Milos (2012) examines the relationship between pension reform and domestic stock market development in the European Union. The study shows a positive and significant relationship. The study concludes that a positive connection between the capital market and private pension funds started manifesting after the year 2000.

Adami *et al.* (2014) examined the investment performance of pension funds in the UK using the three standard performance measurement models which are CAPM, Fama-French Model, and Carhart. The authors show that the abnormal returns of pension funds cannot be fully explained by size, book-to-market values, market returns, momentum, and the term spread. They find larger abnormal returns in bond than in equity portfolios and that smaller funds outperform the larger funds.

Enache *et al.* (2015) investigate the impact of pension funds on the 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. The findings were in support of the (Milos, 2012; Channarith and Wade (2010).

Shen *et al*. (2020) in their study on the Stock Investment Performance of Pension Funds in China discovered that a social security fund is better than that of direct investment by China's National Council for Social Security Fund. The annual risk-adjusted return on entrusted investment is 9.54% higher than that of direct investment.

In the context of Nigeria, the study of Ezugwu and Alex (2014) provides answers to the question of whether the regulatory body for Pension Funds allows portfolio investment. Their study centres on the portfolio of pension fund investment in Nigeria and discovers that pension funds are invested in more equity than the bond market in Nigeria. This suggests the level of development in the Nigerian equity market which is more developed than the bond market and the institutional investors will be looking at the risk-reward profile of any market to invest.

Other studies in the Nigerian context include the work of Adeoti, Gunu & Tsado (2012) that evaluated the determinants of pension funds investment in Nigeria. Factors such as economic, risk, and security of real estate factors were identified as the major determinants of pension fund investment while variables such as interest rate, internal control system, etc, are not critical in determining investment of pension funds in Nigeria. The result of their study is consistent with the nature of pension in Nigeria which is a compulsory contributory pension scheme, not a choice based scheme where the consideration for an interest rate would have been a concern. The study of Nwanne (2015) was not limited to the capital market alone but extended to examine the impact of contributory pension scheme on economic growth in Nigeria for the period 2004-2012. The study discovered that although pension savings positively influenced economic growth during the period under review, pension fund negatively impacts economic growth. His findings were supported by Gunu and Tsado (2012) and Edogbanya (2013). However, Dostal (2010) reported a negative impact of the pension reforms on the development of the financial market and real sector economy. His argument was based on the failure of the regulatory bodies to encourage the alignment of the pension fund with economic programs capable of propelling the growth and development in different sectors of the economy.

As the interest rate is very key to attract investment, Eke and Onafalujo (2015) investigated empirically the causal relationship between interest rate, capital market, and pension assets in Nigeria from 1981-2013. Their study reveals that pension asset is directly sensitive to the stock market index, while the index is inversely sensitive to short term interest rate. This implies that an increase in the short-term interest rate will reduce the pension fund investment in the capital market and to attract more pension fund portfolio investment, regulatory bodies and markets must operate at an optimal level by making a return on investment an attractive tool to drive investments in the capital market.

Zubair (2016) established that countries with well developed financial market enjoy significant development in their pension funds than those with the emerging financial market. This suggests that financial development is a function of pension fund investment such that the level of significance is determined by the development of the financial market in which both the pension and capital market operates and when this happens, the development will be vice-versa.

Many authors have tried to establish the empirical connection between pension funds and capital market development using different samples of countries and methodology. The studies of Alda, (2017), Qureshi et al. (2017), and Babalos and Stavroyiannis (2020) all established a positive relationship between pension funds investment and capital market development but in a static approach rather than a dynamic relationship considering the fact that pension fund investment and capital market development are a dynamic phenomenon. We, therefore extended the methodology of previous studies to incorporate other market variables in our models to test the dynamic relationship between pension fund investment and capital market development.

Methodology

This study aims at examining the relationship which exists between Pension Funds Investment (PFI) and Capital Market (CM). In order to achieve the objectives of the study, different econometric techniques were adopted including trend analysis to establish the correlation between the variables and the intervening variables. Secondary data were collected from CBN Quarterly Economic Reports and Financial Statistical Bulletin, World Bank Economic Reports, NBS Economic Reports and PENCOM Quarterly Publications. The data collected is a time series for the period of 45 quarters (2007Q1-2018Q4).

The choice for Autoregressive Distributed Lag Model (ARDL) was necessitated by the results of our pre-analysis estimation which was done prior to the development of an appropriate structure of the econometric model to investigate the univariate characteristics of all data series and ascertain the degree to which they are integrated. The Augmented Dickey-Fuller (ADF, 1979) and Phillip Perron (PP) were used for and the result of the unit root test is presented to show the level of stationarity of each variable.

ARDL (Autoregressive Distributed Lag Model)

To investigate the existence of a long-term relationship (cointegration) in our analysis we used the testing and estimation procedure advanced in Pesaran *et al.* (1997) and Pesaran and Shin (1999). The motivation for using ARDL technique and not the other cointegration methods such as the Johansen (1998) Maximum Likelihood test reside in the fact that it does not entail all the variables in the model to be I (1), or of the same order.

Model Specifications

We specify two models to examine the dynamic relationship and the direction of causality between pension fund investment and capital market development. Model one measures the impact of PFI on TMC and Model two measures the impact of PFI on TVS.

Model 1: Modelling the impact of PFI on TMC

The ARDL model formulated to determine the impact of PFI on TMC is stated as follows:

$$TMC_t = \beta_{1i} + \alpha_{1i}TREND_t + \sum_{n=0}^{a}\delta_{11kl}TMC_{t-1} + \sum_{n=0}^{b1}\delta_{12kl}PFI_{t-1} + \sum_{n=0}^{b2}\delta_{13kl}RGDP_{t-1} + \sum_{n=0}^{b3}\delta_{14kl}MPR_{t-1} + \sum_{n=0}^{b4}\delta_{15kl}LOC_{t-1} + \sum_{n=0}^{b5}\delta_{16kl}IR_{t-1} + \sum_{n=0}^{b6}\delta_{17kl}GFCF_{t-1} + \sum_{n=0}^{b7}\delta_{18kl}FS_{t-1} + \mu_{1t} \quad (1)$$

Where

TMC =	*Total Market Capitalization*
TVS =	*Total Value of Stock traded*
PFI =	*Pension Fund Investment Asset*
RGDP =	*Real Gross Domestic Products*
MPR =	*Monetary policy rate*
LOC =	*Local Ordinary share*
IR =	*Interest rate*
GFCF =	*Gross fixed capital formation*
FS =	*Federal Government Securities*

Re-writing equation (1) in general VECM form to capture the dynamic relationship among the variables in the short and long-run, the model becomes:

$$TMC_t = \beta_{1i} + \alpha_{1i}TREND_t + \sum_{n=0}^{a}\delta_{11kl}TMC_{t-1} + \sum_{n=0}^{b1}\delta_{12kl}PFI_{t-1} + \sum_{n=0}^{b2}\delta_{13kl}RGDP_{t-1} + \sum_{n=0}^{b3}\delta_{14kl}MPR_{t-1} + \sum_{n=0}^{b4}\delta_{15kl}LOC_{t-1} + \sum_{n=0}^{b5}\delta_{16kl}IR_{t-1} + \sum_{n=0}^{b6}\delta_{17kl}GFCF_{t-1} + \sum_{n=0}^{b7}\delta_{18kl}FS_{t-1} + \delta_{21i}TMC_{t-1} + \delta_{22i}PFI_{t-1} + \delta_{23i}RGDP_{t-1} + \delta_{24i}MPR_{t-1} + \delta_{25i}LOC_{t-1} + \delta_{26i}IR_{t-1} + \delta_{27i}GFCF_{t-1} + \delta_{28i}FS_{t-1} + \mu_{1t} \quad (2)$$

Model 2: Modelling the impact of PFI on TVS

$$TVS_t = \beta_{1i} + \alpha_{1i}TREND_t + \sum_{n=0}^{a}\delta_{11kl}TVS_{t-1} + \sum_{n=0}^{b1}\delta_{12kl}PFI_{t-1} + \sum_{n=0}^{b2}\delta_{13kl}RGDP_{t-1} + \sum_{n=0}^{b3}\delta_{14kl}MPR_{t-1} + \sum_{n=0}^{b4}\delta_{15kl}LOC_{t-1} + \sum_{n=0}^{b5}\delta_{16kl}IR_{t-1} + \sum_{n=0}^{b6}\delta_{17kl}GFCF_{t-1} + \sum_{n=0}^{b7}\delta_{18kl}FS_{t-1} + \mu_{1t} \quad (3)$$

Re-writing equation (3) in general VECM form to capture the dynamic relationship among the variables in the short and long-run, the model becomes:

$$TVS_t = \beta_{1i} + \alpha_{1i}TREND_t + \sum_{n=0}^{a}\delta_{11kl}\,TVS_{t-1} + \sum_{n=0}^{b1}\delta_{12kl}\,PFI_{t-1} + \sum_{n=0}^{b2}\delta_{13kl}\,RGDP_{t-1} + \sum_{n=0}^{b3}\delta_{14kl}\,MPR_{t-1} + \sum_{n=0}^{b4}\delta_{15kl}\,LOC_{t-1} + \sum_{n=0}^{b5}\delta_{16kl}\,IR_{t-1} + \sum_{n=0}^{b6}\delta_{17kl}\,GFCF_{t-1} + \sum_{n=0}^{b7}\delta_{18kl}\,FS_{t-1} + \delta_{21i}TVS_{t-1} + \delta_{22i}PFI_{t-1} + \delta_{23i}RGDP_{t-1} + \delta_{24i}MPR_{t-1} + \delta_{25i}LOC_{t-1} + \delta_{26i}IR_{t-1} + \delta_{27i}GFCF_{t-1} + \delta_{28i}FS_{t-1} + \mu_{1t} \quad (4)$$

Data Analysis

We carried out preliminary test as mentioned earlier to evaluate the nature of the distribution of the dataset. This test comprises of the unit root test, cointegration tests and trend analysis. Thereafter, the actual estimation was carried out using Autoregressive Distributed Lag (ARDL) approach and Granger causality test for the two models. Table 1 presents the result of the stationary tests of the variables in the model based on the Augmented Dickey Fuller (ADF) and Phillip Perron (PP) unit root tests. The tests were carried out at level and first differences.

Table 1: Unit Root test

	Level		**First difference**		
Variables	**ADF**	**PP**	**ADF**	**PP**	**I(d)**
FS	-2.201307	-2.413839	-5.716364*****	-5.629442*****	I(1)
GFCF	-5.181708*****	-5.196069*****	-	-	I(0)
IR	-1.850066	-2.359728	-2.777683*******	-2.919307*******	I(1)
LOC	-1.086518	-1.094125	-6.593149*****	-6.593149*****	I(1)
MPR	-1.643997	-1.313966	-3.893772*****	-2.303103******	I(1)
PFI	6.298268	5.472232	3.542252******	-3.543046*****	I(1)
RGDP	-1.503391	-1.143849	-12.29850*****	-11.18383*****	I(1)
TMC	-1.774602	-2.069991	-5.598942*****	-5.598942*****	I(1)
TVS	-1.839078	-2.364533	-2.925486******	-2.219061******	I(1)

Note: * represents 1% significant level; ** represents 5% significant level and *** represents 10% significant level. Calculated at trend and lag lengths selected automatically using the Schwarz Info Criterion (SIC).

From Table 1, the results of the unit root tests under the two conventional methods have the same results on the stationary level of the variables of interest at varying significant levels except for the gross fixed capital formation (GFCF) which was stationary at levels at 1% significant level.

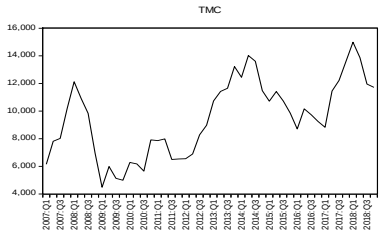
Table 2: Johansen Cointegration Test

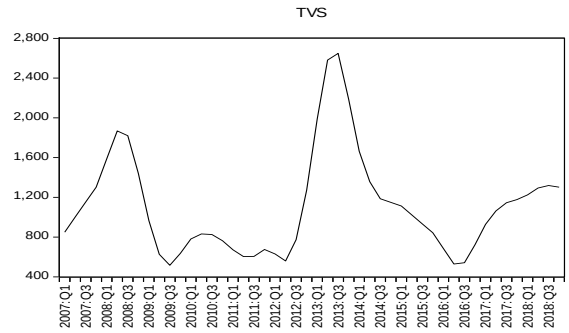
Lags interval (In first difference) : 1 to 2						
Trend assumption: Linear deterministic trend						
Hypothesized No. of Cointegrating Equations (CEs)	**Eigen value**	**Trace Statistic**	**0.05 Critical Value**	**Hypothesized No. of CE(s)**	**Max-Eigen Statistic**	**0.05 Critical Value**
r = 0*	0.993363	628.4074	228.2979	r = 0*	225.6783	62.75215
r ≤ 1*	0.900297	402.7291	187.4701	r ≤ 1*	103.7503	56.70519
r ≤ 2*	0.807903	298.9788	150.5585	r ≤ 2*	74.23892	50.59985
r ≤ 3*	0.786418	224.7399	117.7082	r ≤ 3*	69.46808	44.49720
r ≤ 4*	0.722178	155.2718	88.80380	r ≤ 4*	57.63489	38.33101
r ≤ 5*	0.578052	97.63691	63.87610	r ≤ 5*	38.82930	32.11832
r ≤ 6*	0.491321	58.80762	42.91525	r ≤ 6*	30.41719	25.82321
r ≤ 7*	0.409673	28.39042	25.87211	r ≤ 7*	23.71857	19.38704
r ≤ 8	0.098611	4.671852	12.51798	r ≤ 8	4.671852	12.51798

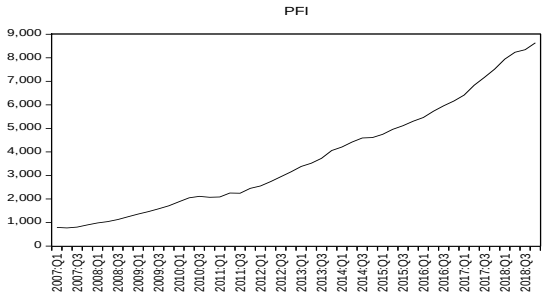
Source: Author, 2020

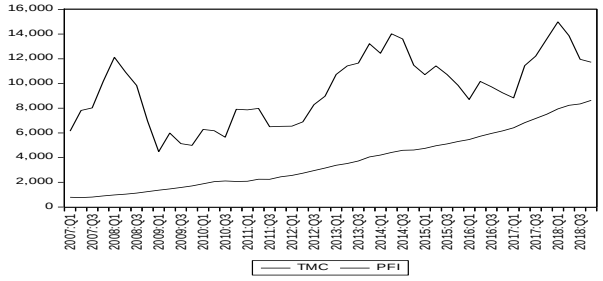
The long run relationship test was conducted using Johansen cointegration test. The purpose of this was to ascertain whether the variables of interest are related and can be combined in a linear version. The results, in Table 2 indicate that at 5% significant level, there were agreements between the Trace and Max Eigen statistics. Both Trace and Max Eigen tests suggested that there are long run relationships between the variables of the interest, that is, there are co-integrated. The Trace and Max Eigenvalue test predicted that at most they are 8 cointegrating equations (CEs) at the 5% level.

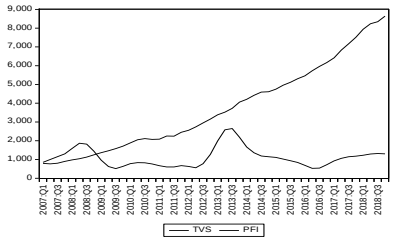
Trend analysis

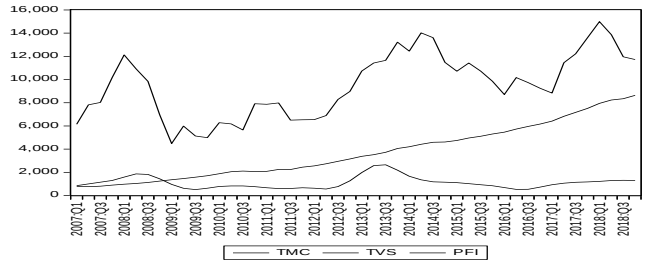












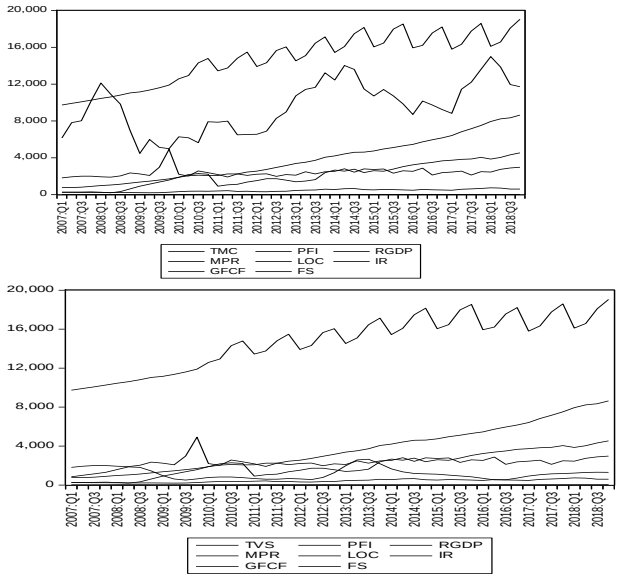


Figure 1: Trend in level of Total market capitalization (TMC), Total volume of stock traded (TVS) and Pension fund investment Assets (PFI).

Figure 1 shows a trend in level of total market capitalization. It increased steadily from 6,150/2007Q1 to 12125.9/2008Q1. This could be as a result of change in government from Obasanjo led government to a Yaradua led government coupled with the introduction of new policy. There was a sharp decrease in total market capitalization level from 10920.32 billion/2008Q2 to 4989.39 billion/2009Q4. There is volatility (up and down) in the level of total market capitalization 2010Q1 to 2018Q4 showing that there was no upward consistency in the level of total market capitalization from 2007 to 2018. Total value of stock traded increased sharply from 2007Q1 to 2008Q3 after which it maintained an up and down at a decreasing rate. It started increasing again until it reached its peak at 2013Q3. It maintained its volatility at a decreasing rate till 2018Q4. There was a sharp and steady increase in the level of pension fund investment assets from 2007Q1 to 2018Q4 indicating that government are committed to with good pension policy which encourage more people to save more for their pension.

When there was a co-movement between total market capitalization (TMC) and Pension Fund Investment Assets (PFI), there was a sharp decrease in the level of pension fund investment assets while total market capitalization does not behave differently. As showed from the graph, pension fund investment affect the level of total value of stock traded when both variables move together. The level of TVS decreases while PFI maintained its increase level. Both TVS and PFI behaved the same way when both have co-movement with TMC and other explanatory variables. There was decrease in the levels of TVS and PFI.

Table 3: Long run relationship using ARDL bound test using TMC as the dependent variable

F-Bound Test (TMC \ PFI RDGP MPR LOC IR GFCF FS)				
Test statistic	Value	Significant	I(0) Bound	I(1) Bound
F-statistic	14.43343	10%	1.95	3.06
K	8	5%	2.22	3.39
		2.5%	2.48	3.7
		1%	2.79	4.1
t-Bound Test				
t-statistic	-4.659511	10%	-2.57	-4.4
		5%	-2.86	-4.72
		2.5%	-3.13	-5.02
		1%	-3.43	-5.37

When Total Market Capitalization is used as the dependent variable, the F-statistic value (F_{tmc} = 14.43343) and t-statistic value (t_{tmc} = -4.659511) are greater than the lower (I(0) bound at 5% significance level. It indicates that the null hypothesis of no level of relationship is rejected and accepts the alternate hypothesis of there is long run relationship among the variables. Thus, when total market capitalization is the dependent variable, there is long run convergence between the dependent and independent variables.

Table 4: Long run relationship using ARDL bound test using TVS as the dependent variable

F-Bound Test (TVS \ PFI RDGP MPR LOC IR GFCF FS)				
Test statistic	Value	Significant	I(0) Bound	I(1) Bound
F-statistic	9.812770	10%	1.95	3.06
K	8	5%	2.22	3.39
		2.5%	2.48	3.7
		1%	2.79	4.1
t-Bound Test				
t-statistic	-8.943175	10%	-2.57	-4.4

		5%	-2.86	-4.72
		2.5%	-3.13	-5.02
		1%	-3.43	-5.37

Also, When total value of stock traded becomes the dependent variable, both the F-statistic value (F_{tmc} = 9.812770) and t-statistic value (t_{tmc} = -8.943175) are greater than the lower (I(0) and upper bound at 5% significance level indicating that there is a long run relationship among the variables of interest. The null hypothesis of no levels relationship is rejected and the alternate hypothesis of there is long run relationship among the variables is accepted. Thus, there is a long run relationship between the total value of stock traded and other stated explanatory variables which are PFI, RDGP, MPR, LOC, IR, GFCF and FS.

Table 5. Results of Estimated ARDL model of TMC

Dependent Variable: TMC				
Selected Model: ARDL(1, 0, 3, 3, 0, 2, 0, 0)				
Included observations: 45 after adjustments				
Short-run estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TMC(-1)	0.200417	0.106895	1.874901***	0.0713
RGDP(-1)	-0.204952	0.168515	-1.216219	0.2341
RGDP(-2)	-0.190235	0.195222	-0.974453	0.3382
RGDP(-3)	-0.335821	0.159877	-2.100498**	0.0448
MPR(-1)	35.05257	886.2589	0.039551	0.9687
MPR(-2)	-1144.914	872.7030	-1.311918	0.2002
MPR(-3)	1158.029	371.2313	3.119427**	0.0042
IR(-1)	412.5260	349.5205	1.180262	0.2478
IR(-2)	-375.0407	213.0972	-1.759952***	0.0893
CointEq(-1)*	-0.799583	0.075635	-10.57160*	0.0000
Long-run Estimates				

PFI	0.099628	0.333268	0.298942	0.7672
RGDP	-0.231980	0.174187	-1.331786	0.1937
MPR	530.0647	383.0958	1.383635	0.1774
LOC	21.09048	3.328742	6.335870*	0.0000
IR	-144.6342	209.1285	-0.691604	0.4949
GFCF	-0.553828	0.276149	-2.005542***	0.0547
FS	-0.424630	0.522862	-0.812125	0.4236
R-squared		0.956579		
Adjusted R-squared		0.931768		
F-statistic		16.21825*		
Durbin-Watson stat		1.847532		

Note: *, ** and *** signify significance level at 1%, 5% and 10% respectively.

The estimated ARDL approach is a composite of short-run and Long-run estimates of the relationships among the variables used in this study. The empirical result of the impacts of pension fund investment assets (PFI), real gross domestic products (RGDP), monetary policy rate (MPR), local ordinary share (LOC), interest rate (IR), Gross fixed capital formation (GFCF) and Federal government Securities (FS) on Total market capitalization (TMC) are presented in Table 5. The ARDL test automatically choose the lag length for all the variables based on automatic selection of Schwarz criterion (SIC) though the model lag was set at three for sufficient degree of freedom.

From Table 5, the coefficients of short-run lag one of total market capitalization and lag three of monetary policy rate have positive and significant impact on the total market capitalization level at 10% and 5% respectively. It indicates that as total market capitalization in the short-run lag one and monetary policy rate in lag three increase, current total market capitalization also increase. The short-run lag one estimate of both interest rate and monetary policy rate were positive and statistically insignificant at 5% indicating that an increase in short-run lag one of interest rate and monetary policy rate have no influence on changes in total market capitalization. However, the coefficients of RGDP(-3) and MPR(-3) were negative and statistically significant at 5% while IR(-2) was negative and statistically significant at 10% meaning that they all influence changes in total market capitalization in the short-run. Similar findings were reported for RGDP(-1), RGDP(-2), and MPR(-2) but were statistically insignificant. The ECM was negative and statistically significant at 1%. The value of Error Correction Model (ECM) (-0.799583) indicated that the previous years' errors will be corrected in the current year at an adjustment speed of 79.96%. Thus, the model corrects its disequilibrium in the short-run at an adjustment speed of 79.96% in order to return to the long-run equilibrium.

In the long-run, the impact of local ordinary share (LOC) on total market capitalization was positive and statistically significant at 1% while Pension fund investment asset (PFI) and monetary policy rate (MPR) were positive and statistically insignificant. In other word, the impact of gross fixed capital formation (GFCF) on total market capitalization was negative and statistically significant at 10% while RGDP, IR and FS were negative and statistically insignificant. On magnitude, a 1% increase in PFI, MPR, and LOC positively influence changes in total market capitalization by 0.1%, 530.1% and 21.1% respectively. Also, 1% increase in RGDP, IR, GFCF and FS reduce total market capitalization by approximately 0.2%, 144.6%, 0.6% and 0.4% respectively. The value of Adjusted R-squared of 93.2% implying that 93.2% variations in total market capitalization is jointly explained by all the variables in the model. The model is well specified and statistically significant. This is shown by the value of F-statistic (16.21825), which is statistically significant at 1% level of significance. The Durbin Watson Statistic (1.847532) shows that there is no problem of auto serial correlation in the model.

Table 6: Post estimation test for TMC

Test	**Coefficient**	**Prob.**
Normality Test (Jarque-Bera stat)	0.016420	0.991824
Serial Correlation LM Test	0.237869	0.8691
Heteroskedasticity Test	0.845363	0.6297

From Table 6 6, the coefficient of Jarque-Bera statistic (0.016420) and its corresponding probability (0.991824) indicated that the model is normally distributed. The result of serial correlation LM test with a coefficient of 0.237869 and corresponding probability (0.8691) confirmed that the model is free from the problem of serial autocorrelation. The outcome of residual heteroskedasticity test confirmed that the model is homoskedasticity.

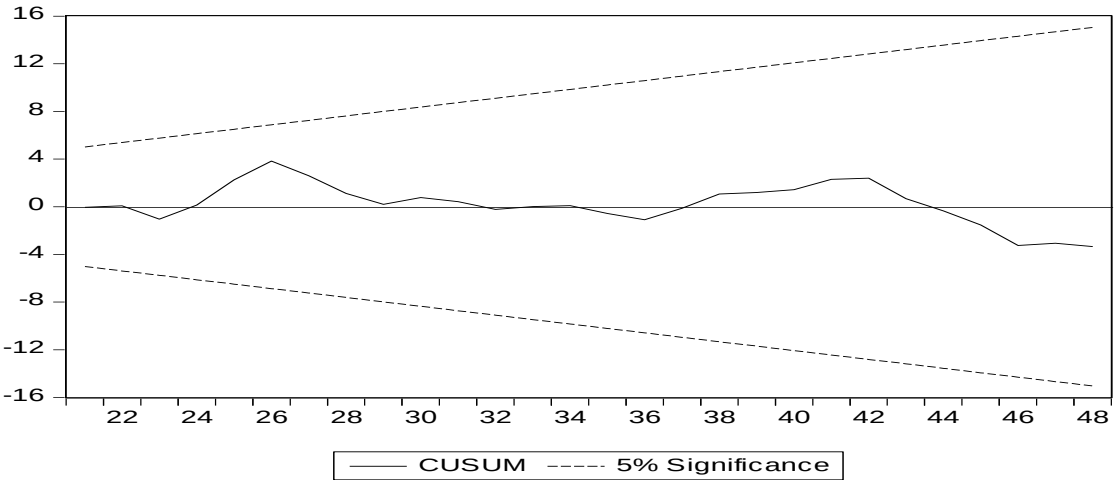


Figure 2: Cusum stability Test

The Cusum series in Figure 2 lies between the lower and upper critical limit value of 5% indicating that the model is stable.

Table 7: Estimated ARDL model of TVC

Dependent Variable: TVS				
Selected Model: ARDL(3, 3, 0, 0, 1, 0, 0, 0)				
Included observations: 45 after adjustments				
Short-run estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TVS(-1)	1.993923	0.123529	16.14128*	0.0000
TVS(-2)	-1.727411	0.199104	-8.675940*	0.0000
TVS(-3)	0.603803	0.116060	5.202485*	0.0000
PFI(-1)	1.107957	0.461618	2.400162**	0.0228
PFI(-2)	-0.270934	0.313602	-0.863940	0.3945
PFI(-3)	-0.399233	0.207063	-1.928076***	0.0634
LOC(-1)	-1.412638	0.618856	-2.282661**	0.0297
CointEq(-1)*	-0.129685	0.022452	-5.776041	0.0000
Long-run Estimates				
PFI	-0.388383	0.327254	-1.186794	0.2446
RGDP	0.002572	0.013190	0.194959	0.8467
MPR	17.94386	10.51711	1.706158***	0.0983
LOC	0.640557	0.462354	1.385426	0.1761
IR	-14.05848	6.654744	-2.112550**	0.0431
GFCF	-0.018933	0.032633	-0.580194	0.5661
FS	-0.076213	0.057596	-1.323235	0.1958
R-squared		0.925049		
Adjusted R-squared		0.910869		
F-statistic		65.23629*		
Durbin-Watson stat		1.575982		

Note: *, ** and *** signify significance level at 1%, 5% and 10% respectively.

The empirical findings of the impacts of pension fund investment assets (PFI), real gross domestic products (RGDP), monetary policy rate (MPR), local ordinary share (LOC), interest rate (IR), Gross fixed capital formation (GFCF) and Federal government Securities (FS) on Total value of stock traded (TVS) are illustrated in Table 7. The ARDL test automatically choose the lag length for all the variables based on automatic selection of Schwarz criterion (SIC) though the model lag was set at three for sufficient degree of freedom.

From Table 7, the coefficients of TVS(-1), and TVS(-3) were positive and statistically significant at 5% respectively while PFI(-1) was at 10% significance level. It indicates that increase in the lag one and lag three of total value of stock traded and lag one of pension fund investment result to increase in total value of stock traded. However, the coefficients of TVS(-2), was negative and statistically significant at 1%, LOC(-1) was negative and statistically significant at 5% while PFI(-3) was negative and statistically significant at 10% significance level meaning that they all have negative influence on total value of stock traded in the short-run. Similar result was reported for PFI(-2) but statistically insignificant. The ECM was negative and statistically significant at 1%. The value of ECM (-0.129685) indicated that the previous years' errors will be corrected in the current year at an adjustment speed of 12.97%. Thus, the model corrects its disequilibrium in the short-run at an adjustment speed of 12.97% in order to return to the long-run equilibrium.

In the long-run, the impact of monetary policy rate on total value of stock traded was positive and statistically significant at 10% significance level while real gross domestic product (RGDP) and local ordinary share (LOC) were positive and statistically insignificant. In other word, the impact of interest rate on total value of stock traded was negative and statistically significant at 5% while GFCF and FS were negative and statistically insignificant. On magnitude, a 1% increase in RGDP, MPR, and LOC positively influence changes in total value of stock traded by 0.003%, 17.944% and 0.641% respectively. Also, 1% increase in PFI, IR, GFCF and FS reduce total market capitalization by approximately 0.388%, 14.059%, 0.019% and 0.076% respectively. The value of Adjusted R-squared of 91.1% implying that 91.1% variations in total market capitalization is jointly explained by all the variables in the model. The model is well specified and statistically significant. This is shown by the value of F-statistic (65.23629), which is statistically significant at 1% level of significance. The Durbin Watson Statistic (1.575982) shows that there is no problem of serial autocorrelation in the model.

Table 8: Post estimation test for TVS

Test	**Coefficient**	**Prob.**
Normality Test (Jarque-Bera statistic)	1.628557	0.442959
Serial Correlation LM Test	1.501468	0.2366
Heteroskedasticity Test	0.2366	0.2858

Table 8 showed that the residual in the model is normally distributed. This was confirmed by the coefficient of its Jarque-Bera statistic (1.628557) and corresponding probability (0.442959). The result of serial correlation LM test with a coefficient of 1.501468 and corresponding probability (0.2366) confirmed that the model is free from the problem of serial autocorrelation. The outcome of residual heteroskedasticity test confirmed that the model is homoscedastic. This was showed by the coefficient (0.2366) and its probability (0.2858)

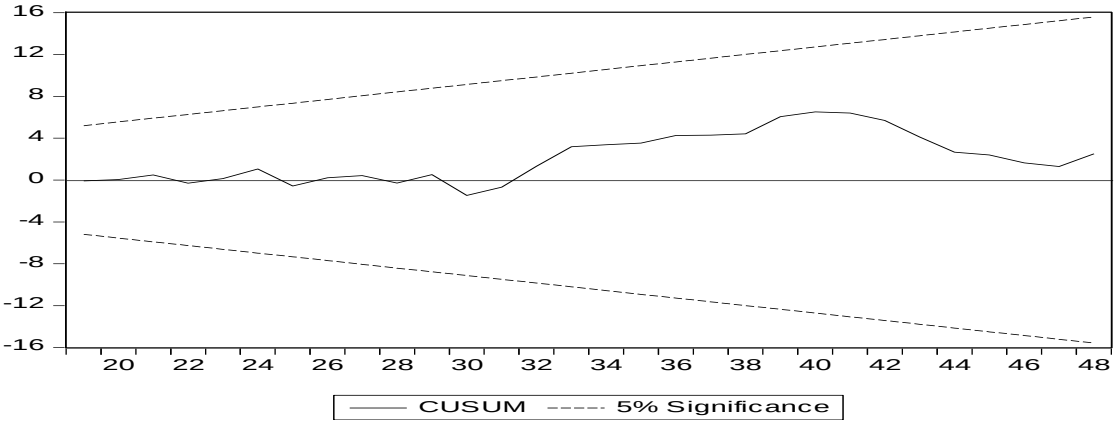


Figure 3: Cusum stability Test

The Cusum series in Figure 3 lies between the lower and upper critical limit value of 5% indicating that the model is stable.

Table 9: Granger Causality test

Short run Causality					
Null Hypothesis	No. of obs	No. of lag	F-Stats	Prob.	Decision Rule
PFI does not Granger Cause TMC	47	1	1.34791	0.2519	Do not reject
TMC does not Granger Cause PFI			0.98073	0.3274	Do not reject
PFI does not Granger Cause TMC	46	2	1.58311	0.2176	Do not reject
TMC does not Granger Cause PFI			0.85026	0.4347	Do not reject
PFI does not Granger Cause TMC	45	3	1.21273	0.3183	Do not reject
TMC does not Granger Cause PFI			0.57032	0.6380	Do not reject
PFI does not Granger Cause TMC	44	4	1.69005	0.1743	Do not reject
TMC does not Granger Cause PFI			0.46173	0.7633	Do not reject

Source: Author, 2020

Table 9 indicate that none of the variable Granger cause each other meaning that both variables are determined independently. That is, neither pension fund investment cause total market capitalization nor total market capitalisation granger cause PFI

Table 10: Granger Causality test for Total value of stock traded and Pension Fund Investment Assets

Short run Causality					
Null Hypothesis	No. of obs	No. of lag	F-Stats	Prob.	Decision Rule
PFI does not Granger Cause TVS	47	1	1.6E-05	0.9968	Do not reject
TVS does not Granger Cause PFI			0.70293	0.4063	Do not reject
PFI does not Granger Cause TVS	46	2	0.86379	0.4291	Do not reject
TVS does not Granger Cause PFI			0.53970	0.5870	Do not reject
PFI does not Granger Cause TVS	45	3	2.39956	0.0829	Do not reject
TVS does not Granger Cause PFI			0.88617	0.4570	Do not reject
PFI does not Granger Cause TVS	44	4	0.98048	0.4308	Do not reject
TVS does not Granger Cause PFI			0.67348	0.6148	Do not reject

Source: Author, 2020

Also, from Table 10, neither pension fund investment granger cause total volume of stock traded nor total stock traded granger cause pension fund investment, meaning that both variables are determined independently.

Discussion of Findings

Having presented the results using different econometric techniques, the implications of the results are discussed based on the objectives of the study. The trend analysis shows that there was a significant increase in the total market capitalization from the first quarter of 2007 to the first quarter of 2008. There was a consistent growth in the trend of the variable. Although, the sharp increase might be attributed to the transition of government between Obasanjo led administration and Yar'adua led administration cum new regulation on the market variables. However, inconsistency swings into action from the end of 2008Q1 to 2018 resulting in a high level of volatility. The persistent volatility in the TMC for a period of not less than 10 years was attributed to different factors such as political, economical, and legal frameworks.

The trend analysis depicts that the stock traded moved in the same direction with the TMC in the periods from 2007 to 2008. However, the volatility emerged but not an increasing one and this was experienced up to the last quarter in 2018. Our results also reveal that there was a sharp and steady increase in the level of PFI from 2007Q1 to 2018Q4 suggesting that government at all levels are committed to the effectiveness of the Pension Act 2004 as amended by encouraging and mandating contributory pension scheme.

An attempt was made to check the trend for their co-movement between TMC with PFI and PFI and TVS respectively. The graphs show that there was a sharp decrease in the level of PFI while TMC remained unaffected. The results reveal however that when the level of TVS reduced a little bit the TMS remains unaffected. There was a similar co-movement in both the TVS and PFI and this suggests a positive relationship between the two variables and how they influence the total market capitalization.

The analysis of the impact of PFI on TMC based on Johasen cointegration suggests that there are long-run relationships between the variables which imply that the variables are cointegrated. Also since the bound test F-statistic value (Ftmc = 14.43343) and t-statistic value (ttmc = -4.659511) are greater than the lower (I(0) bound which suggests that there is long-run convergence between Total market capitalization (TMC) and pension fund investment assets (PFI). The TVS and other explanatory variables show a long-run relationship.

The first model empirically reveals that an increase in PFI, MPR, and LOC will have a positive and significant influence on TMC while an increase in RGDP, IR, GFCF, and FS will have an insignificant negative impact on the TMC. The study reveals that pension funds investment impacts capital market development positively. This result is in conformity with the findings of (Millos, 2012; Enache et al., 2015; Eke and Onafalujo, 2015; Alda, 2017 and Shen et al., 2020). An investment in the pension has greatly influenced the development of

the Nigerian capital market and still has a long-run positive effect on the market. The government must provide necessary regulations to sustain and strengthen pension policy in the country so as to increase portfolio investment of the funds.

The macroeconomic variables such as RGDP, GFCF, IR and FS in accordance with the result will have a negative impact but insignificant on the total market capitalization. This result indicates the interaction of pension funds investment with selected macroeconomic variables does not statistically reduce the development of the capital market. This result upholds our theoretical postulation of Loan Theory which we discussed in the literature review that that interest rate in the market as the price is determined by the forces of demand and supply and also reveals that there is some element of efficiency in the market.

The second model measures the impact of pension fund investment assets onthe total value of stock traded. The result reveals that there is a long-run relationship among the variables evidenced by both the F-statistic value (Ftmc = 9.812770) and t-statistic value (ttmc = -8.943175) which are greater than the lower (I(0) and upper bound at 5% significance level.
The results indicate that RGDP, MPR, and LOC have positive and significant effects on the Total Value of Stock traded in the Nigerian Capital Market during the period under review. Variables such as PFI, IR, GFCF, and FS have negative influence although insignificant on the changes in the TVS. Our results support the position of Eke and Onafalujo (2015) on the interaction between the interest rate and pension fund investment as well as the total volume of stock traded. Our study extended further the methodology by including variables like Monetary Policy Rate, Local Ordinary Share, Gross Fixed Capital Formation, and Federal Government Securities which previous studies did not capture, hence, our contributions to knowledge because their inclusion was able to add values to the empirical results which have economic implications for the country.

The Cusum tests established stability in the parameters of the two models as well as the results of the Granger Causality test which provide shreds of evidence that neither pension fund investment granger causes the total volume of stock traded nor total stock traded granger causes pension fund investment, meaning that both variables are determined independently.

Conclusion

This paper examines the dynamic and causal relationship between pension fund investment and Capital market development in Nigeria. Based on the findings, the paper, therefore concludes that pension fund investment impacts capital market development positively. The investment of pension funds into the capital market over the years has assisted to engender the development of the Nigeria Capital market and the impact would be more significant in the long run. The paper recommends that more pension fund investment should be channeled to the capital market investment with a view to develop and strengthen the Nigerian capital market and make the market more competitive.

References

Adami, R., Gough, O., Mukherjee, S., and Sivaprasad, S. (2014). An empirical analysis of the performance of pension funds: evidence from UK. *Studies in Economics and Finance, 31*(2), 141-155

Adeoti, J.O., Gunu, U., and Tsado, E. (2012). Determinants of pension fund investment in Nigeria: The critical factors. *International Journal of Human Resources Studies, 2*(4), 1-23.

Alda, M. (2017). The relationship between pension funds and stock market: Does the aging population of Europe affect it? *International Review of Financial Analysis*, 83-97.

Babalos, V., and Stavroyiannis, S. (2020). Pension funds and stock market development in OECD countries: Novel evidence from a panel VAR. *Finance Research Letters, 34*, 101247.

Briston, R.J., and Dobbins, R. (2007). Financial institutions and the stock market. *Managerial Finance*, 87-107.

Catalán, M. (2004). Pension funds and corporate governance in developing countries: What do we know and what do we need to know? *Journal of Pension Economics and Finance*, 197–232.

Corbo, V., and Schmidt-Hebbel, K. (2003). Macroeconomic effects of the pension reform in Chile, in pension reforms: Results and Challenges. *International Federation of Pension Fund Administrators*, 241–329.

Davis, E. P. (1998a). Pension funds: Retirement-income security and capital markets: An International perspective. *OUP Catalogue*, Oxford University Press, number 9780198293040.

Davis, E. P. (1998b). Pension fund reform and European financial markets - A reappraisal of potential effects in the wake of EMU. *LSE Financial Markets Group Special Paper.*

Dostal, M. J. (2010). Pension reform in Nigeria five years on: Great leap or inappropriate policy design? *Paper presented at 60th conference of Political Studies Association (PSA)*, University of Edinburgh, Scotland.

Edogbanya, A. (2013). An assessment of the impact of contributory pension scheme to Nigerian economic development. *Global Journal of Management and Business Research*, 47-59.

Eke, P.O., and Onafalujo, A.K. (2015). Interest rate, capital market and pensions management: Lessons from Nigeria. *African Journal of Business Management*, 542-552.

Enache, C., Milos, L.R., and Milos, M.C. (2015). Pension reform and capital market development in central and eastern European countries. *Economic Research-Ekonomska Istrazivanja*, 77-84.

Ezugwu, C. I., and Alex, A. I. (2014). Portfolio analysis of pension funds investment in Nigeria. *Kuwait Chapter of Arabian Journal of Business and Management Review, 3 (12), 41-58.*

Gunu, U., and Tsado, E. (2012). Contributory pension system as a tool for economic growth in Nigeria. *International Journal of Business and Behavioural Sciences, 6 -13.*

Jhingan, M.L. (2010). Macro-economic theory. *12th Edition*, Vrinda Publications (P) Ltd, 357-358.

Klumpes, P.S.M., and Mason, S. (2000): Fair value reporting by pension fund managers: UK evidence, *Research Report ACCA.*

Meng, C., and Pfau, W.D. (2010). The role of pension funds in capital market development. *GRIPS Policy Research Centre Discussion Paper*, 10-17.

Meng, C., and Pfau, W.D. (2010). The role of pension funds in capital market development. *International Journal of Economics and Business Management*. www.iiardpub.org

Milos, R. L. (2012). Spillover effects of pension funds on capital market: The EU countries case. *Economy Series Issue,* 164-170.

Nwanne, T.F.I. (2015). Impact of contributory pension scheme on economic growth in Nigeria. *Global Advanced Research Journal of Management and Business Studies*, 333-337.

Ogege, S., and Ezike, J. E. (2012). The Nigerian capital market and economic development: A critical appraisal. *International Business Research, 5*(8), 228-236.

Ogege, S., and Ezike, J.E. (2012). The Nigerian capital market and economic development: A critical appraisal. *International Business Research.*

Qureshi, F., Kutan, A., Ismail, I., and Gee, C.S. (2017). Mutual funds and stock market volatility: An empirical analysis of Asian emerging markets. *Emerging Market Reviews*, 176–192.

Scheuenstuhl, G. (2012). Liability driven investment strategies-for prudent pension investing in turbulent capital markets. *Asset Management,* www.risklab.com/Dokumente

Shen, Y., Zhu, K., Wu, F., & Chen, P. (2020). The Stock Investment Performance of Pension Funds in China. *Emerging Markets Finance and Trade*, *56*(12), 2732-2748.

Vittas, D. (1996). Pension funds and capital markets: Investment regulation, financial innovation, and governance. World Bank, Financial Sector Development, Note no. 71(71).

Vittas, D. (1999). Pension reform and financial markets. *Development Discussion Paper* 697, Harvard Institute for International Development.

Wang, X. (2004). China's pension reform and capital market development. *China & World Economy*, 3-16.

World Bank. (2008). The world bank pension conceptual framework. *World Bank Pension Reform Primer*. www.worldbank.org/pensions

Zubair, A. K. (2016). Effects of pension funds' investments on capital market performance in Nigeria. *International Journal of Economics and Business Management*, *2*(9), 1-20.