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PENSION INVESTMENT AND FINANCIAL EFFICIENCY IN NIGERIA

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Abstract: The purpose of this study is to evaluate the effect of pension investment on financial efficiency in Nigeria. The study adopted an *ex-post facto* research design. The population of the study is 14 years of Nigeria's economy from the year 2007-2020. Time-series data were sourced for this study which are entirely secondary data from the Pension Commission and the Central Bank of Nigeria (CBN) statistical bulletin, and the World development indicator (WDI) of the World Bank Database. Autoregressive Distributed Delay Limitation (ARDL) bounds testing approach was adopted to examine the long- and short-term relationships between the series, using Eviews version 12. The long-run results show that there is evidence that pension investment in equities and mutual funds have a positive relationship with financial efficiency. This implies that increases in pension investment in equities and mutual funds will lead to an increase in financial efficiency in Nigeria. Conversely, there is evidence that pension investments in FGN securities and local money market securities have a negative relation with financial efficiency, thus increases in pension investments in FGN securities and local money market securities will lead to a fall in financial efficiency. However, the result of the short-run model shows that pension investments in equities and local money market securities have a positive relationship with financial efficiency, while pension investment in FGN securities and mutual funds have a negative relationship with financial efficiency. The study suggested that financial sector efficiency can only be achieved through pension investment if the investments enable economic resources to be allocated to their best use across time and space

without imposing unnecessary cost or rents on households and businesses.

Keywords: Financial development, Financial efficiency, Pension fund, Pension investment, Nigeria

JEL Classification: C23, F10, F21, G100; G240; G32

INTRODUCTION

Financial development is the policies, regulations, factors, and institutions that lead to efficient intermediation and operative financial markets. A solid financial system provides risk diversification as well as efficient capital allocation. The larger the financial development, the greater the mobilisation of funds and the allocation of savings to high-return enterprises.

Financial development is a component of the private sector's development strategy to stimulate economic growth, alleviate poverty, and overcome adversity "costs" which are incurred in the financial system (Estrada, Park, & Ramayandi, 2010). Financial development is an improvement of five basic functions provided by the financial system which include information production; corporate governance; risk diversification; savings mobilization; and transaction facilitating (Levine, 2005).

A veritable perspective to measuring financial development is that of Èihák, Demirgüç-Kunt, Feyen and Levine (2013), and Levine's study for the World Bank (2005). They are the most cited indicators, although they recognize that the recommended variables may not completely capture all the features of the financial system. The measurement is performed at the level of financial institutions and the financial market. For each of these two, there are four dimensions: depth, access, efficacy, and financial stability. These characteristics of the financial system are representations of the services provided by the financial system.

Regarding financial efficiency, it is defined as the ratio of traded values and overheads, which is equal to the overhead costs of the banking system concerning the assets of the banking system. Therefore, it measures the effectiveness of financial intermediaries and markets (Demirgüç-Kunt & Levine, 2004). Financial stability is an important feature of the financial sector, enabling financial markets and the financial institutional system to withstand economic shocks (Nastu, Stancu, & Dumitrache, 2020).

Pension reform in Nigeria has been required by massive pension deficits of $2 trillion, which the Federal Government cannot meet through budgetary allocations, resulting in social and economic hardships for pensioners. Furthermore, there are many problems associated with the defined benefits (DB) pension scheme in Nigeria, which are identified by Odia and Okoye (2012) as the inefficiencies of the institutions charged with handling pension funds, retirees

not receiving the monthly pension as at when due and having to do it through rigorous verifications before receiving their gratuities, pensions, and other pension benefits, and corruption of pension institutions.

Furthermore, Nigeria's recent shift to Contributory Pension Schemes means that the post-employment benefits of all Nigerian workforce in both the private and public sectors will now be determined by the contributions made by these employees during their active service years and the investment income earned on the contributions by the pension managers. The efficiency of these pension managers in managing pension fund assets and creating good investment income is relevant to the value of monthly pension receivable and the length of time to receive monthly pensions at retirement, as a pension manager with higher investment income will provide a higher value of monthly pension over a longer period than one with lower investment income (Ololade, Adegboye & Salawu, 2019).

While the Pension Reform Act of 2014 required contributors to choose their pension managers without any financial guidance, the analysis of the technical efficiency of the pension fund administrators tasked with managing pension fund contributions in Nigeria, which should be a financial guide, has not been extensively researched in the literature. As a result, this study makes a unique addition by assessing the impact of pension investment on financial efficiency in Nigeria.

LITERATURE REVIEW

Financial Development and Efficiency

Fnancial development could be referred to as the improvements of five basic functions provided by the financial system such as Information Production; Corporate Governance; Risk Diversification; Savings Mobilization; Transaction Facilitating. Each of the financial system's functions is capable of exerting impacts on the investment decisions and the efficiency of financial resources allocation, thus promoting long-term output (Levine, 2005). As a result, if it exists, the causal relationship should be running from financial development to economic performance. Such a view is also referred to as the "supply-leading" hypothesis. However, some argued that the financial sector passively responds to the new demand for financial service in the economy. In short, as stated by Robinson (1952), "where enterprise leads finance follows". According to this "demand-following view, the causality is from economic performance to financial development.

Roubini and Bilodeau (2008) on the other hand opined that financial development provides enabling infrastructure (factors, policies, and institutions) that lead to effective financial intermediation and markets, and deep and broad access to capital and financial services. An assessment of economic development

is crucial in measuring the improvement of the economic sector and understanding the corresponding impact on financial growth and poverty reduction. The universal function of a financial system is to lessen information and transactions charges impeding financial activity, and it is five (5) core capabilities are to reveal investments and offer corporate governance after offering finance; produce information about possible investments and allocate capital; facilitate the trading, risk control, and diversification; mobilize and huge financial savings; and simplify the exchange of products and offerings (Demirgüç-Kunt & Levine, 2008).

Demirgüç-Kunt and Levine (2008) further revealed that the efficiency of a financial system refers to how well a financial system performs the five core functions and financial development as an improvement in the efficiency of a financial system. They elaborated each of the five core functions to gain a clearer understanding of the nexus between financial development and economic growth viz: Financial systems produce information and allocate capital; monitor firm behaviour and exert corporate governance, create; financial instruments as intermediaries, thus facilitating the trading, hedging, and pooling of risk. It pools or mobilizes savings from different savers for investment, at a more fundamental level.

Pension Investment in Nigeria

Pension funds are assets created from contributions and the return on investment from those contributions minus benefits from the fund (Bodie *et al,* 2009). There are two types of pension plans. Defined benefits (DC) and defined benefits (DB) (McGill, 1984). In a defined contribution plan, a formula specifies contributions but not benefit payment. Contribution rules are usually specified as a given percentage of salary (for example, an employer contributes 15% of an employee's annual salary to the plan (Bodie et al, 2009). The pension fund is made up of several separate investment accounts, one for each worker. Pension benefits are not defined, but that when the employee retires, he or she may use the whole cumulative value of contributions and profits on those contributions to purchase an annuity (Klumpes & Whittington, 2003).

In Nigeria, pension plans have manifested themselves in two ways: old and new pension schemes. The Pension Law No. 102 of 1979 is known as the "Old Pension Plan", while the Pension Reform Act of 2004 (including the Restructured/ Amended Pension Act of 2014) is the "New Pension Plan". The old pension plan was a non-contributory defined benefit plan, which implied that employees only paid into the fund and the benefits to be paid to any retired employee who was entitled to a pension/bonus was predetermined in percentages of the final salary on the date of retirement. and the number of years of service with the employer. On the contrary, the new pension plan is a defined contributory plan in which the

amount of the benefit accrued for the employee upon retirement or upon the termination of employment depends only on the total amount of contributions in his retirement savings account. as at the date of cessation of employment and interest accumulated thereon.

Odia and Okoye (2012) described the pension system as pay-as-you-go (PAYG). To further strengthen Nigeria's pensions, the Nigerian Stock Exchange (NSE) launched the NSE Pension Index on January 2, 2013, and was open to investors on Thursday, July 2, 2015. Nigeria in the development of other products considered PENCOM guidelines, such as Pension Fund Managers (PFA), Exchange Traded Financial Instruments (ETPs), Index Futures Contracts, Pension Fund Managers (CPFA). Separately, the NSE Pension Index was an indicator for measuring performance and reporting it to holders of national Retirement Savings Accounts (RSA) (Proshare Ecosystem, 2016). As of December 31, 2016, the NSE Pension Index has 40 companies with market capitalization and liquidity. In their article, the study adopted a variance-comparison test to analyze pension investment funds in Nigeria's non-contribution (pre) and contribution (post) schemes. The rest of this document covers existing literature on pension schemes, rationale, results, and discussions, conclusions, and recommendations.

Pension Fund Managers (PFAs) invest money in stocks and other securities and investment assets on behalf of RSA holders to ensure value gains. They also save for retirees, protect assets, fund pension schemes, and cover retirees' costs (Wallick, Julieann, Christos & Joanne, 2012). To meet the different needs of retirees or to ensure fund performance that is within the existing regulatory provisions, PFAs take investment decisions considering the internal and external environment, objective setting, risk assessment, risk response, control activities, risk appetite, information and communication, and regulatory review.

Allowable Instruments for Investment of Pension Fund Assets

A pension plan is a type of retirement plan in which an employer contributes to a pool of assets set aside for a worker's future benefit. The pool of assets is invested on behalf of the employee, and the proceeds from the investments provide income to the employee at retirement. PenCom from time-to-time issue, regulation on investment of pension fund asset, the latest of which was issued in February 2019. This Regulation's requirements are compatible with the terms of the Pension Reform Act of 2014. The Regulation's goal is to provide universal regulations and criteria for the investment of pension fund assets.

Section 4.0 of the regulation specifically provides for Allowable Instruments Pension fund assets shall be invested as follows:

4.1 Bonds, Sukuk, Treasury Bills, Global Depository Notes and other securities issued by the Federal Government of Nigeria and CBN or their agencies as well as Special Purpose Vehicles

and Companies created/owned by the Federal Government of Nigeria, provided that the securities are guaranteed by the CBN or Federal Government of Nigeria.

4.2 Bonds and Sukuk issued by eligible State and Local Governments or State Government Agencies or wholly-owned companies of the State Government, provided that such securities are fully guaranteed by Irrevocable Standing Payment Orders (ISPOs) or external guarantees by MDFOs with a minimum credit rating of 'A', and subject to the fulfilment of the conditions set out in the Commission's Circular on Minimum Requirements for the inclusion of State Bonds as Investible Instruments in the Pension Industry''

4.3 Bonds, Sukuk, debentures, redeemable/ convertible preference shares, and other non-interest compliant debt instruments issued by eligible listed and unlisted corporate entities; and Asset-Backed Securities, including Mortgage Bonds, Mortgage-Backed Securities and Infrastructure Bonds / Sukuk. This includes debt securities issued by corporate entities and guaranteed by the Federal/State Governments.

4.4 Ordinary Shares of Public Limited Liability Companies listed or proposed to be listed through an Initial Public Offer (IPO), on a Securities Exchange registered by SEC.

4.5 Money Market Instruments of Banks and Commercial Papers issued by eligible corporate entities.

4.6 Open/ Close-ended/ Hybrid Investment Funds, including Exchange Traded Funds and Non-Interest Compliant Investment Funds, which are registered with SEC.

4.7 Specialist Investment Funds whose underlying assets are tangible physical assets These include: i. Real Estate Investment Trusts (REITs) registered by SEC.

ii. Private Equity Funds registered with SEC.

iii. Infrastructure Funds registered with SEC.

4.8 Supranational Bonds and Supranational Sukuk issued by eligible MDFOs approved by the Federal Ministry of Finance.

4.9 Global Depositary Receipts/Notes (GDRs/Ns) and Eurobonds issued by eligible Nigerian corporate entities as well as Naira-denominated Depository Receipts/Notes issued by Foreign companies and listed on a securities exchange that is a member of the World Federation of Exchanges (WFE).

Review of Previous Empirical Studies

Uwakwe and Louis (2020) studied the Post 2014 Pension Reform Act and Nigeria's Economic Growth. The study determines the effects of after 2014: performance of the pension account (RSA) portfolio; Closed-End Pension Fund Managers (CPFA) portfolio performance; and the performance of the defined contribution pension plan (CPS) portfolio concerning Nigerian economic growth. The study followed an expository research design. The study shows that the performance of the retirement account portfolio; the Performance of the portfolio of closed pension fund managers; and the performance of the contributory pension plan portfolio

has a huge impact on Nigeria's economic growth. The study recommended that Government should further enact policies that are aimed at sustaining and strengthening this very vital part of the financial sector, which has a direct effect on the standard of living of the citizens and further ameliorate the plight of the masses.

Musa (2020) examined the determinant of the 2014 Pension Reform Act in Nigeria: A Study of Abuja Workers and adopted a survey research design. 246 questionnaires were processed. The study's objective is to determine the impact of taxpayers' actions on the 2014 Abuja Pension Reform Act, as well as to investigate the impact of pensioners' living conditions on the 2014 Abuja Pension Reform Act. According to a Nigeria study, taxpayer decision-making has a good and significant impact on the 2014 Pension Reform Act in Abuja FCT, whereas retirees' level of living has a negative and large impact on the 2014 Pension Fund Reform Act in Abuja FCT. It was suggested that the new 2014 Pension Reform Act continue to apply to workers and workers if workers make the wise decision to use the plan to avoid future financial issues after retirement. The new Pension Reform Act of 2014 should be implemented with a greater emphasis on seniors' quality of living, even if there have not been many plans for pensioners' level of living.

Ololade, Adegboye and Salawu (2019) assessed the technical efficiency of pension fund administrators in Nigeria using Stochastic Cost Frontier Model to generate efficiency scores for each of the eleven (11) selected pension fund administrators from a population of twenty-one (21). The maximum likelihood technique was used to analyse panel data gathered from the annual reports of the selected pension fund administrators and the National Pension Commission. The results revealed that inefficiency existed to varying degrees in the selected fund administrators due to input costs on labour, equipment, and premises, with the mean and median efficiency scores being approximately 75% and 72%, respectively. The most efficient pension fund administrator had an inefficiency score of 0.077, while the least efficient had an inefficiency score of 0.388. According to the study, increasing profitability, the number of contributors, participating in open fund investment activities, and merger and acquisition reduce operating costs. As a result, it was recommended that the industry undergo a regulator-initiated merger and acquisition to eliminate waste, which would have a positive impact on investment income. Furthermore, the regulatory agency should make it easier and more convenient for existing contributors to transfer their pension contributions from an inefficient pension manager to an efficient one in order to increase competition in the pension industry.

Okoro and Okoye (2019) conducted a study on pension investment funds analysis: A Variance-Comparison Tests of Non-Contributory (Pre) and Contributory (Post) Schemes in Nigeria. The research compared both non-contributory (pre) and contributory (post) pension schemes in Nigeria. Secondary sources of data

were utilized. The findings revealed the contributory (post) system is healthy, reliable, and ready to help retirees survive once they leave the service. Therefore, the reform in Nigeria has significantly improved the defined contribution system (post), particularly in the area of pension funds. The study, therefore, recommended that there should be an unlimited retirement savings plan and that employers should not make any pension contributions to PENCOM; In addition, the return on investment and service delivery by pension fund managers should be improved to increase pension investment and voluntary contributions.

THEORETICAL FRAMEWORK

Pension Fund Hypothesis

La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998, 1999, 2002) suggested the legal origin theory in addition to the positive association between financial development and economic development. stating that diverse legal roots result in varied financial development That is, investors and creditors are more protected in common law nations than in civil law ones. As a result, their financial development has improved. In particular, as compared to civil law nations, particularly French civil law countries, English common law countries give superior legal protection to shareholders and creditors.

The common law has a capacity and flexibility that is oriented towards financial development. Britain's former colonies (Nigeria is not left out) inherited the common law system; thus, their financial development began with an advantageous starting position. However, a country will have a civil law heritage if it was colonised by France, Spain, Portugal, or another civil law country. As a result, its average degree of financial market development is poor.

According to law and finance theory, legal traditions differ in terms of the importance they place on preserving the rights of private investors vs the rights of the state, and this has substantial consequences for financial development.

The endowment theory, on the other hand, contends that disease and geography influence the formation of long-lasting institutions that influence financial development. Using a sample of former colonies, Acemoglu, Johnson, and Robinson, (2001) explored whether the legal system brought by colonizers and/or the initial disease/geographical endowments encountered by colonizers explain financial development. Their empirical findings show that both the legal systems brought by colonists and the initial endowments in the colonies are major factors of stock market growth and the safeguarding of private property rights. Initial endowments, on the other hand, are more substantially related to financial intermediary development than legal origin, and initial endowments explain more of the cross-country variance in financial intermediary and stock market development than legal origin.

Politics and finance theory, on the other hand, dismisses the significance of legal tradition. According to Rajan and Zingales (2001), financial development has evolved significantly over the previous century, but each country's legal tradition has stayed constant. As a result, they stressed the relevance of political elements that fluctuate over time rather than fixed factors such as legal tradition. More broadly, the politics and finance perspective stressed how individuals in power shape policies and institutions to their advantage (Marx 1972; North 1990; Olson 1993).

If the ruling group sees free financial markets as supporting their interests, then they will create laws and institutions that support financial development. If, on the other hand, the governing class wants to utilise its influence over government to channel society's savings toward its goals, this will stymie financial development. Furthermore, a centralized/powerful government, according to the politics and finance viewpoint, will more successfully implement the wishes of the elite than a decentralised, open, and competitive political system (Acemoglu, Johnson, & Robinson, 2001).

Many examples of nations that support the legal origin theory and resource endowment hypothesis may be discovered from the preceding discussion. These explanations, however, cannot explain the disparities across countries, and certain countries, such as Switzerland, can only be considered exceptions. Religious, cultural, political, and war-related criticisms of the legal genesis and endowment theories are acceptable. The legal origin concept, for example, cannot be applied to the Netherlands, Denmark, or Switzerland, where financial markets are highly developed (Sun & Hu, 2014).

The endowment theory does not apply to Chile, which has a similar topography and mortality rate to its neighbours but a strong stock market. Neither of the two ideas can explain why Chile's stock market outperforms that of New Zealand, even though the former is a French civil law nation with a high mortality rate (Sun & Hu, 2014).

The foundation for Pension Fund Hypothesis was laid by Davis and Hu (2008) while comparing 18 OECD countries and 19 transforming countries, indicating that the size of pension funds could be an explanatory variable for the differences in economic growth between countries, particularly for the transforming countries. If an accumulated scheme could be integrated into the system as part of a pension system reform, it will bring significant returns in the stock market and also to the national economy of a country (Sun & Hu, 2014).

The pension fund hypothesis by Sun and Hu, (2014) is apt for this present study. Therefore, based on the contribution of pension funds, the legal origin hypothesis as introduced by La Porta, Lopez-de-Silanes, Shleifer, and Vishny, (1998, 1999, 2002) is apt, been adapted to reflect that pension funds can provide financial

support to financial development among others. In addition to the religious and cultural view and the political and militaristic view on the differences in financial development. The pension fund view can provide additional explanations for financial development.

Methods

The study adopted an *ex-post facto* research design. The population of the study is 14 years of Nigeria economy from the year 2007-2020. Time-series data were sourced for this study which are entirely secondary data from the Pension Commission and the Central Bank of Nigeria (CBN) statistical bulletin, and the World development indicator (WDI) of the World Bank Database. Autoregressive Distributed Delay Limitation (ARDL) bounds testing approach was adopted to examine the long- and short-term relationships between the series, using Eview version 12.

The Long-run model is given as:

$$LFDIEF_t = \gamma + \propto_1 LPENINVEQ_t + \propto_2 LPENINVFS_t + \propto_3 LPENINVLMMS_t + \propto_4 LPENINVMF_t + u_t \tag{3.16}$$

To distinguish the short-run impact from long-run impact the error correction model framework is written as:

$$\begin{aligned}\Delta LFDIEF_t = \gamma + \sum_{i=1}^{N1} \delta_i \Delta LFDIEF_{t-k} + \sum_{j=0}^{N2} \eta_j \Delta LPENINVEQ_{t-k} \\ + + \sum_{j=0}^{N3} \beta_j \Delta LPENINVFS_{t-k} + \sum_{j=0}^{N4} \theta_j \Delta LPENINVLMMS_{t-k} \\ + \sum_{j=0}^{N5} \gamma_j \Delta LPENINVFS_{t-k} + \propto_1 LPENINVEQ_t + \propto_2 LPENINVFS_t \\ + \propto_3 LPENINVLMMS_t + \propto_4 LPENINVMF_t + u_t\end{aligned} \tag{3.17}$$

To determine the speed of adjustment in a co-integrating ARDL model, equation (3.17) can be re-specified to include an error correction term as follows:

$$\Delta LFDIEF_t = \rho\varrho_{t-1} + \sum_{i=1}^{N1} \delta_i \Delta LFDIEF_{t-k} + \sum_{j=0}^{N2} \eta_j \Delta LPENINVEQ_{t-k} + + \sum_{j=0}^{N3} \beta_j \Delta LPENINVFS_{t-k} + \sum_{j=0}^{N4} \theta_j \Delta LPENINVLMMS_{t-k} + \sum_{j=0}^{N5} \gamma_j \Delta LPENINVFS_{t-k} + U_t \quad (3.18)$$

Where:

LFDIEF = Financial development index to efficiency, LPENINVEQ = Pension Investment in Equities, LPENINVFS = Pension Investment in FGN Securities, LPENINVLMMS = Pension Investment in Local Money Market Securities, and LPENINVMF = Pension Investment in Mutual Funds. γ is the intercepts from equations 3.16-3.17, $\delta, \eta, \beta, \theta$, and γ are the short-run coefficients and $\propto_1 - \propto_4$ are the long-run parameter for the explanatory variables, ρ is the coefficient of the error correction term which must be negative, *t* represents the periods under study, U_t are the error term.

DATA AND RESULTS

To conduct the bounds test for co-integration approach within the ARDL framework, the optimal lag order must be determined. According to Enders (2003) too many lags incorporated into the testing equation may reduce the degree of freedom and the power of the test statistics, while too few lags may cause a misspecification problem. Table 1 revealed that the maximum lag for the model is two (2), however, before the maximum lag of two can be used there must be absence of autocorrelation and the is reported in Panel B of Table 1. The result did not reject the null hypothesis of no autocorrelation, thus for the ARDL model estimation of pension investment and financial depth the maximum lag used is two.

Table 1: Diagnostic Tests for Pension Investment and Financial Efficiency in Nigeria
Panel A: Lag Order Selection

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	5.652206	NA	6.71e-07	-0.02509	0.162535	0.046844
1	269.4327	466.6885	6.93e-11	-9.20895	-8.083232*	-8.777376*
2	302.3981	51.98395*	5.24e-11*	-9.515312*	-7.4515	-8.72409
3	319.7345	24.00426	7.55e-11	-9.22056	-6.21865	-8.0697
4	332.3291	15.01657	1.40e-10	-8.74343	-4.80342	-7.23292

Panel B: Serial Correlation LM Test

Lag	*LRE* stat*	*Df*	*Prob.*	*Rao F-stat*	*df*	*Prob.*
1	20.43543	25	0.7236	0.807735	(25, 127.8)	0.7262
2	20.62352	25	0.7134	0.815734	(25, 127.8)	0.7161
3	8.848236	25	0.9988	0.335246	(25, 127.8)	0.9988
4	79.20040	25	0.0000	3.914334	(25, 127.8)	0.0000
5	21.97674	25	0.6371	0.873598	(25, 127.8)	0.6402
6	17.13910	25	0.8767	0.669298	(25, 127.8)	0.8781
7	18.85829	25	0.8039	0.741091	(25, 127.8)	0.8059
8	73.56565	25	0.0000	3.556506	(25, 127.8)	0.0000
9	23.23715	25	0.5637	0.928003	(25, 127.8)	0.5671
10	15.29333	25	0.9343	0.593199	(25, 127.8)	0.9351

Source: Authors, 2022

* indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: Hannan-Quinn information criterion

Table 2: Pension Investment and Financial Efficiency in Nigeria

Dependent Variable: LFDIEF
Panel A: Long -Run Estimates

Variable	*Coefficient*	*S.E*	*t-stat*	*Prob*
C	2.227	0.312	7.140	0.000
LPENINVEQ	0.234	0.210	1.112	0.273
LPENINVFS	-0.082	0.067	-1.229	0.226
LPENINVLMMS	-0.451	0.121	-3.721	0.001
LPENINVMF	0.094	0.085	1.101	0.278

Panel B: Short -Run Estimates

Variable	*Coefficient*	*S.E*	*t-stat*	*Prob*
D(LPENINVEQ)	0.423	0.344	1.230	0.226
D(LPENINVEQ(-1))	-0.369	0.347	-1.063	0.294
D(LPENINVFS)	-0.032	0.061	-0.516	0.609
D(LPENINVFS(-1))	-0.082	0.061	-1.345	0.186
D(LPENINVLMMS)	0.462	0.216	2.138	0.039
D(LPENINVLMMS(-1))	0.091	0.214	0.427	0.672
D(LPENINVMF)	-0.070	0.034	-2.051	0.047
D(LPENINVMF(-1))	0.014	0.035	0.404	0.688
ECM(-1)	-0.632	0.064	-9.927	0.000

Panel C: Diagnostic Tests	*Statistic*	*Prob.*
Bound Test	14.598	0.000
Serial Correlation	1.670	0.202
Heteroscedasticity	1.604	0.197
Linearity Test	2.080	0.186
Adjusted R-square	0.621	
	CUSUM	
Stability Test	Stable	

Source: Authors, 2022

Notes: Table 2 examine the effect of pension investment on financial efficiency in Nigeria. The dependent variable is financial development index to efficiency (LFDIEF), while the explanatory variables are pension investment in equities (PENINVEQ), pension investment in FGN securities (PENINVFS), pension investment in local money market securities (LPENINSLMMS) and pension investment in mutual funds (LPENINVMF). The sample period is from 2007Q1-2020Q4. The estimation process was facilitated using Eviews 12.

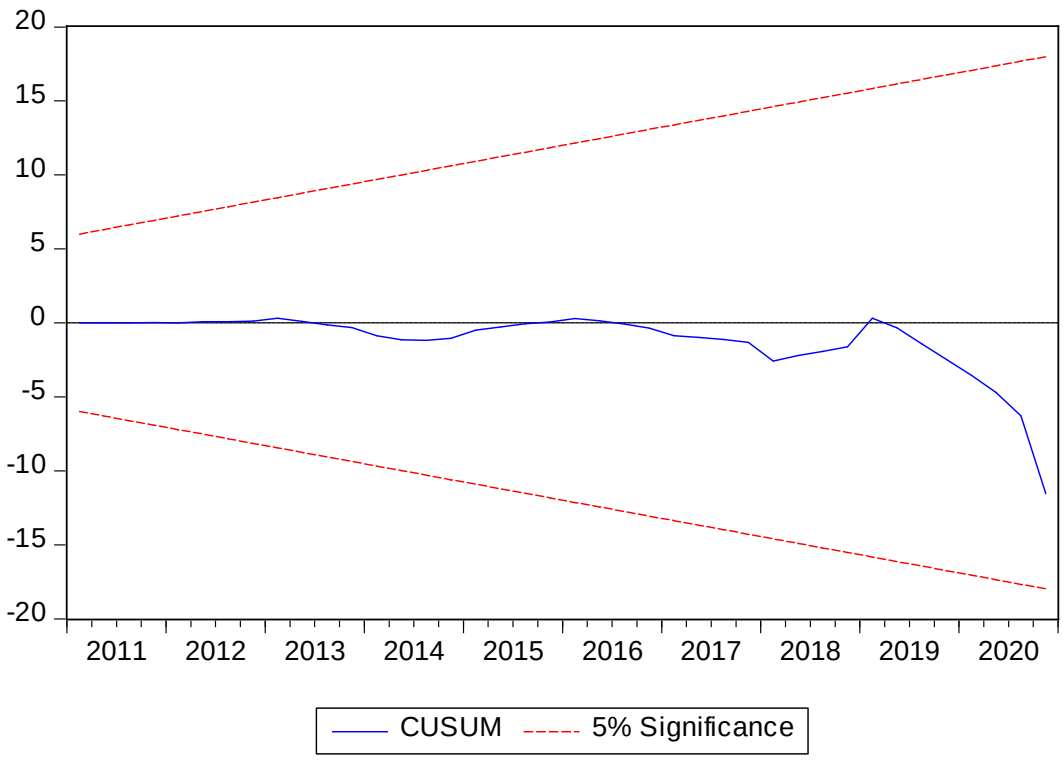

Figure 1: Stability Test - Plots of Cumulative Sum of Residual

INTERPRETATION

Bound Test

The first condition to ascertain the possibility of long-run relationship for pension investment and financial efficiency is the bound test, the results shows that the bound test statistics of 14.598 is statistically significant at 1 per cent level. This is because the statistics of 14.598 is greater that the critical values of 4.26, 3.5 and 3.13 at 1 percent. This implies that there is possibility of a long run cointegrating relationship for pension investment and financial efficiency in Nigeria. Based on the possibility of a long-run relationship for pension investment and financial efficiency in Nigeria, the study then estimates the long-run and the short-run elasticity. The empirical results for the model for the effects of for pension investment and financial efficiency in Nigeria, in the short and long run are reported in Table 2.

The Long-Run Dynamics

The estimated long-run coefficients (elasticities) for the UECM model are given in Panel A of Tables 2. In the long run, there is evidence that pension investment in equities and mutual funds have positive relationship with financial efficiency. This implies that increases in pension investment in equities and mutual funds will lead to increase in financial efficiency in Nigeria. Conversely, there evidence that pension investments in FGN securities and local money market securities has negative relation with financial efficiency, thus increases in pension investments in FGN securities and local money market securities will lead to fall in financial efficiency in the long run.

Furthermore, there is evidence of a long-run significant relationship that pension investment in local money market securities with financial efficiency in Nigeria (LPENINSLMMS = -0.451, t-test = -3.721, $\rho = 0.001$). This implies that pension investment in local money market securities is a significant factor influencing changes in financial efficiency in Nigeria. Conversely, there is no evidence of a long-run significant relationship that pension investments in equities, FGN securities and mutual funds with financial efficiency in Nigeria (LPENINVEQ = 0.234, t-test= 1.112, $\rho = 0.273$, LPENINVFS = -0.082, t-test= -1.229, $\rho = 0.226$; and LPENINVMF = 0.094, t-test= 1.101, $\rho = 0.278$). This implies that pension investments in equities, FGN securities and mutual funds are not significant factors influencing changes in financial efficiency in Nigeria.

Concerning the magnitude of the estimated parameters, a 1 per cent increase in pension investment in equities and mutual funds will lead to 0.234 and 0.094 per cent increases in financial efficiency respectively, while a 1 per cent increase in pension investments in FGN securities and local money market securities will

lead to 0.082 and 0.451 per cent decreases in financial efficiency respectively in Nigeria in the long run.

To test the hypothesis for objective one, the bound test of 14.598 was used and it is statistically significant at 1 per cent level, thus on the overall, the null hypotheses that there is no significant effect of pension investment on financial efficiency in Nigeria was rejected and accept the alternative hypothesis that there is significant effect of pension investment on financial efficiency in Nigeria.

Short-Run Dynamics

The purpose of this section is for two reasons. First, is to examine if changes and the statistical significance experienced in the long run also exist in the short run model. Second, is to examine the degree of adjustment back to equilibrium using the error correction term. The short-run adjustment process is measured by the error correction term ECM_{t-1} and it shows how quickly variables adjust to a shock and return to equilibrium. For stability, the coefficient of ECM_{t-1} should carry the negative sign and be statistically significant.

The result shows that in the short run that pension investments in equities and local money market securities have positive relationship with financial efficiency, while pension investment in FGN securities and mutual funds have negative relationship with financial efficiency. In addition, the estimated coefficient for the ECM_{t-1} reported in Panel B of 4.7 is negative and statistically significant (ECM= -0.632, t-test = -9.927, p = 0.000). This implies that deviations from pension investments in equities, FGN securities, local money market securities and mutual funds equilibrium path are corrected by nearly 63 per cent over the following quarter. In other words, the adjustment process is relatively high in Nigeria. The statistical significance of the ECM_{t-1} confirms the presence of long-run equilibrium relationship between pension investment and financial efficiency in Nigeria.

The Adjusted R-square is 0.62; this implies that pension investments in equities, FGN securities, local money market securities and mutual funds explains about 62 per cent changes in financial efficiency, while the remaining 38 per cent were other factors affecting changes in financial efficiency but were not captured in the model.

Post-Estimation Test

For the validity and reliability of the parameter estimates and to be able to draw valid conclusions based on the results, four types of residual test were conducted. First, is the serial correlation test which is used to test for the possibility of the error term being uncorrelated. Second, is to check if the finite variances of the error terms are equal. This assumption is referred to as the homoscedasticity. A violation of this assumption is referred to as heteroscedasticity. Third, is the linearity

test, which is used to test if the model is linearly specified, the non-significance of the Ramsey RESET test implies the model is linear specified. Fourth, is the stability test, where the cumulative sum of residuals (CUSUM) is used. For the stability of the estimated model, the plot of CUSUM statistic must stay within a 5% significance level portrayed by two straight lines.

The results revealed that the successive error terms are not serially correlated because the probability value of *F*-statistic of 1.670 with a probability of 0.202 is not significant. Thus, the null hypothesis that there is no serial correlation in the residuals up to the specified lag orders at 1, 5 or 10 percent significant level is not rejected. The study concluded that the successive error terms were not correlated in the estimated model for pension investment and financial efficiency in Nigeria. Also, the heteroscedasticity results show that the *F*-statistic of 1.604 with a probability value of 0.197 is not statistically significant at either 1, 5 or 10 per cent levels of significance this implies that the null hypothesis of homoscedasticity could not be rejected; thus, there is evidence that the covariance of the error terms have a constant finite variance.

In addition, the Ramsey Reset Test, *F*-statistics of 2.080 with a probability value of 0.186 is not significant, thus, the model is correctly specified and that there is a linear relationship between pension investment and financial efficiency in Nigeria. Also, the CUSUM reported in Panel C and Figure 4.4 shows that that the estimated model is stable; because the plot of CUSUM statistic stays within a 5% significance level portrayed by two straight lines.

DISCUSSION OF FINDINGS

The purpose of this study is to evaluate the effect of pension investment on financial efficiency in Nigeria. The long run results show that there is evidence that pension investment in equities and mutual funds have positive relationship with financial efficiency. This implies that increases in pension investment in equities and mutual funds will lead to increase in financial efficiency in Nigeria. Conversely, there evidence that pension investments in FGN securities and local money market securities has negative relation with financial efficiency, thus increases in pension investments in FGN securities and local money market securities will lead to fall in financial efficiency. However, the result of the short run model shows that that pension investments in equities and local money market securities have positive relationship with financial efficiency, while pension investment in FGN securities and mutual funds have negative relationship with financial efficiency.

To corroborate this evidence, the study of Meng and Pfau (2010) which examined the effects of pension funds on capital market developments for both the equity and bond markets study found that the financial assets of pension funds have a positive impact on the depth and liquidity of the stock market as well as on

the depth of the private bond market. However, if we divide countries into two groups according to their level of financial development, the effects are only significant for countries with "high" financial development. Pension funds do not influence capital market developments in countries with "low" financial development. Also, Iheonu, Asongu, Odo, and Ojiem (2020) examined the development of the financial sector and on investments in selected countries of the Economic Community of West African States. The study examined the effects of financial sector development on national investments in ECOWAS between 1985 and 2017 and reveal that the financial sector development index influences the development of the financial sector in domestic investment. Therefore, the study concluded that policymakers should be cautious about financial sector development measures used as policy tools to encourage domestic investment in ECOWAS. Policymakers should also aim to improve economic growth in ECOWAS.

CONCLUSION AND IMPLICATIONS

In recent time, the development of the financial sector has received great attention all over the world. At the same time, pension funds increase the capita supply to financial markets such that larger financial markets domicile in countries with large pension funds to GDP ratios. Thus, it is on this premise that this study examined the effects of pension investment on financial sector development in Nigeria.

From the findings of the study, the study concludes that pension investment in equity, pension investment in FGN securities, pension investment in local money market securities and investment in mutual funds are significant determinants of financial efficiency in Nigeria which is a component of financial sector development. In particularly, pension investment in Nigeria significant reinforce financial sector development in the aspect of financial development efficiency.

The study suggested that financial sector efficiency can only be achieved through pension investment if the investments enable economic resources to be allocated to their best use across time and space without imposing unnecessary cost or rents on households and businesses.

Future Research

Empirical studies should develop comparative analysis of pension investment and financial sector development of different developed and developing countries of the world.

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