Original Research Article

Pension Assets Investments in the Nigerian Economy

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Abstract

This study looked into pension assets investments and its impact in the Nigerian economy. The investments includes quarterly reports of corporate debt securities, government bond securities, mutual funds' investments, money market instruments, private equity funds and real estate securities from 2004 – 2020, and was sourced from the statistics database of the National Pension Commission, the Central Bank of Nigeria and the World data bank. The statistical measures used to analyze the data are the descriptive test, Unit root test, Co-integration test, Vector error correction, Causality and Impulse response function. The outcome of the analysis show that the variables were stationary after first differences were taken; and were also co-integrated at 2 lags indicating that both short and long run equilibrium relationship exist among the variables. From the vector error correction model, previous years' deviations from long run equilibrium had a 0.09% speed of adjustment; leading to a short run equilibrium. The Causality test reveal that changes in government bond securities lead to changes in real estate securities and changes in money market investments leads to changes in government bond securities. In addition, the impulse response demonstrates that a shock to the system produces more negative responses than positive ones. The study thus recommends that the pension industry should vigorously create more awareness on the importance of employee pension plan; develop more e-channels to help rake in investible funds as well as develop more innovative products to support diversification of pension fund in different assets classes among others.
Keywords: Pension Assets, Money and Capital Market Investments, VECM, VEC Causality, GDP Per Capita, Nigerian Economy.

1. INTRODUCTION

Investments are future benefits an individual receives when he or she forgo current enjoyment. Two key gains exist when investments are made, which are growth in capital and safety of income. Though most investments seem less profitable, however, the fact that these assets grow overtime and are also in safe custody gives a sign of relief and an assurance that such investments are reliable. One of such investments is the premiums paid for pensions which are invested in a variety of financial instruments'; thus upholding the principle of diversification and risk reduction.

Pensions are monies set aside on either a monthly or yearly basis as aids after retirement. It is a savings package where employers and employees are mandated by law to contribute a percentage sum on an equal basis, to help support an employee when he or she is no longer in active service. Haruna *et al.,* [1] see it as periodic payments done during an employee' useful years which gives support as well as eases challenges faced following retirement. Onifade [2] opine that pension is confidence boosters as it provides economic security for retirees. Adams [3] also view pension as life- saving channels that keeps one on a timeline of survival.

In both developed and developing nations, pension investments also gives succor by growing the economy to very significant levels [4]. Davis and Hu [5] opine that pension funds are more efficient in fulfilling the intermediation role of financial institutions than banks. In the case of Nigeria, these investments strengthen the capital market, bond market, and money markets as well as enlarge the real sector by way of intensifying business activities when they act as financial intermediaries [6, 7].

Findings from the pension industry statistics show that in 2021, there was a marginal growth of about 0.89% in membership enrollment of Retirement Savings Account (RSA) which is attributed to compliance from both the private and public sectors;

thus, increasing pension contributions to very high levels of N7.10 trillion. Moreover, a critical look at the pension fund portfolio investments reveal that its net asset value stood at N12.7 trillion in the second quarter of 2021. In comparison with previous quarter, the growth in investment of about 2.57% indicates both an increase in contributions and a surge in the market value of some securities. These investments were mostly in domestic and foreign ordinary shares, federal and state securities, corporate debentures, domestic and foreign money market instruments, mutual funds, real estate, private equity funds, infrastructure funds and other assets worth investing. In addition, the GDP grew by 5.01% in real terms and 12.25% in nominal terms, even when faced with the covid-19 disruption; indicating an improvement in economic and or commercial activities.

However, the stock market experienced a downward trend from about 3.28% to 2.91%; while the bond market went up from 9.90% to 11.90%. In the same period, two pension fund administrators' were acquired. Guaranty Trust Holding Company acquired a 100% shareholding of Investment-One Pension Managers Limited; while FCMB Pensions Limited acquired a 60% shareholding of AIICO Pensions. More so, about 10,417 firms' applications were approved and granted clearance certificate which resulted to a remittance of about N38b into the retirement savings account of employees; likewise, N398m of pension liabilities were recovered from defaulting employers [8].

Despite the growth in the pension industry, the Nigerian economy is still faced with frequent challenges especially in the aspect of financing of her basic infrastructures. A clear example is the nation's inability to secure adequate funding for its deficit budget year-in year-out. Badejo [9] hold forth that Nigeria is daily challenged with the dilemma of how to finance known infrastructure gaps. He advised that she can obtain funding either by means of infrastructure bonds or development finance partners such as leveraging on the pension industry to addressing its transport infrastructure disparities.

Quite a number of studies have looked into the pension industry and its impact on economies. Oladeinde [7] evaluated pension reforms in Nigeria's political economy and emphasized key institutional processes and the roles played by international policy advisors. Muema *et al.,* [10] explored on equity and bond investments and its performance on Kenya's investment programs. Shimave [6] studied the effect of the administration of pension funds on stock market growth in Nigeria. In Turkey, Ertugrul and Gebesoglu [11] looked into the effect of pension on savings. Bijlsma *et al.,* [12] also investigated funded pensions and how it impacts on economic growth of 34 OECD countries. Alda [13] examined the influence of pension equity investments on the development of 13 European stock markets. Alda García and Marco Sanjuan [4] addressed the significance of equity pension in the stock market. Impavido *et al.,* [14] examined pension and life insurance investments in both OECD and non-OECD countries', and its effect on the development of securities markets. Davis [15] researched on the interplay between pension funds, financial intermediation and the new financial landscape.

In spite of these researches, there still exists the dilemma on pension investments especially in the Nigerian economic environment. A good number of these studies have generated differing submissions and or inconsistent findings with regards to the determinants employed or methodological evaluations adopted as well as the nature of data or periods of study. Researches from several scholars have submitted a variety of factors ranging from insufficient pension awareness campaign, delay in payment of pensions, weak pension laws enforcement, the size of the fund, few investment vehicles/opportunities, government regulations, financial market performance, the rate of inflation, exchange and interests, individual characteristics'/preferences, inefficient management culture, illiteracy, and growth rate of the economy [16-19]. A good number of studies have adopted investments from retirement savings account only and not including other pension schemes recognized and approved by the regulatory body. Some have employed annual data which may not have captured a detailed study. For the most part, Market capitalization or the All-share index was utilized; while in some, pension equity, savings or bond investments were discussed. Also, a large amount of the literature has been on economic growth while some have only depicted the human development index.

Even though a considerable debate has been ensured in industrialized economies, discussions with regards to the Nigerian environment remains scarce. Hence, this study to critically investigate pension investments in the Nigerian economy by using quarterly data to unearth detailed particular investments schemes adopted by the pension fund administrators and how it has helped to stimulate economic activities and overall economic welfare. This study aims to ascertain how the Approved Existing Schemes (AES), Contributory Pension Scheme (CPS) and Closed Pension Fund Scheme (CPFS) have improved the local cost of living of retired citizens and how well the Nigerian economy has performed overtime. All these constitute the gap that this study intends to fill.

Specifically, this study examines how pension investments in corporate debt securities, government bond securities, mutual funds' investments, money market instruments, private equity funds and real estate securities have impacted on the economy of Nigeria using quarterly series from 2004Q1 – 2020Q4. Past

studies have adopted various least square techniques in evaluating these relationships. This study departs from the current literature by examining robust methods like the Vector Error Correction model to help evaluate both long and short term effects as well as discover the significant link among the variables.

This study is quite significant to institutional, private investors and pension fund administrators on how best to manage and rebalance their portfolios. It serves as a guide to both government agencies and trust fund managers on valuable investment decisions. Also, scholars will better appreciate its input in furthering their research interest.

The paper is structured as: section one to five: - the introduction which highlights an overall view of pension in Nigeria; the theoretical literature; data and econometric methods applied; key findings and discussions; conclusion and recommendations.

2. THEORETICAL AND EMPIRICAL LITERATURE

Basically, there are specific economic and financial theories that explain pension investments and overall economic development. Economic theories include:

a. **The Endogenous Growth Model by Romer [20]**: According to this model, economic development is engineered through internal processes rather than external ones. As such, innovations, productivity and capital investments in infrastructure, health, education and R&D by both government and private institutions, are the principal causes of prosperity.

b. **The Life Cycle Theory of Consumption by Ando and Modigliani [21]**: It argues that younger adults undertake more investments in their period of productive employment than at a later year in life when they become more conservative. Thus, over an individual's life cycle, he or she tend to accumulate more earnings to save and then enjoy their already saved investments when they retire. This further explains that the growth rate of an economy is a function of its aggregate savings by way of pension funds (as in this case).

Other financial theories that support pension investments are:

a. **The Agency theory by Ross [22] and Mitnick [23]**: This theory explains that the owners of a firm are the principals who appoint agents as managers of their business. Thus, pension fund administrators act as agents to their principals' (employees of firms). The agents are to act in the best interest of their principals by investing in assets that generate above average rates of returns thereby bringing wealth to both citizens and the economy in general [24].

b. **The Signaling Theory by Ross [25]**: This theory view corporate financial or investment decisions as signals conveyed by firms' managers to investors due to the fact that the market reacts to either good or bad signals. If bad, it may result to asset rebalancing or portfolio revision. If good, it creates confidence about sufficient cash flows to service pension liabilities. Thus, the growth in assets in pension industry signals efficiency in asset allocation and portfolio construction [26, 27], adherence to corporate governance principle of financial disclosures [28], efficient and professional business management [29], and low credit risk exposures [30]. Overall, this creates wealth for citizens and supports the Shareholders' Wealth Maximization objective.

c. **The Pecking Order Theory by Myers and Majluf [31]:** opine that pension fund managers follows right professional investment principles of a balance of equity and debt both in the short and long term in order to improve the economic life of citizens [32].

d. **The Intermediation theory by Gurley and Shaw [33]:** hold forth that pension funds perform the traditional function of pooling resources from different investors and lending to borrowers as well as giving their investors professional management and the opportunity to diversify into various basket of securities [34]. In addition, they are mostly the largest institutional investor in the capital market; and so provide insured retirement income/benefits to their clients [35].

A wide literature exist on pension investments in both developed and developing economies with differing submissions that has generated more twists to the dilemma on pension investments. Ertugal and Gebesoglu [11] employed quarterly data on an ARDL model to analyze the short and long-term relationship between domestic savings, interest rate and private pension schemes in Turkey. The result indicate that private pension have impacted positively on Turkey's savings. This is equally supported by Shimave [6] that the investments made by pension schemes positively impact on the market liquidity and capitalization; and recommend that more e-channels should be adopted for wider collection and disbursement purposes. In Kenya, Muema *et al.,* [10] employed the panel regression on 17 collective investment schemes from 2010 – 2018; and found that only equity investment have significant impact on the returns of the investment schemes. They suggest that both equity and bond investments should be constantly revised to enable better financial returns. Similarly Kolodiziev *et al.,* [36] utilized a panel approach to investigate the impact of the pay-as-you-go pension investments on economic growth of post-socialist countries and Ukraine. They found that pension assets strongly influence the gross fixed capital formation and the GDP of the selected countries. In particular, public sector securities account for a max

54% and 64% in both Hungary and the Czech Republic. Bijlsma *et al.,* [12] conducted across-country and cross-industry regression on the impact of private pension savings on the growth of 34 OECD countries from 2001-2010. The data covered 69 manufacturing firms who rely mostly on external sources of financing. The analysis show that an increase in pension assets also increases the manufacturing sector growth of those firms who actively employ external financing for their operations. Alda Garcia and Marco Sanjuan [4] adopted both the bivariate causality and panel error correction approach to testing the significance of domestic pension fund on stock market development for 8 European economies. From the evaluation, there exists a reciprocal effect such that advancements in domestic pension fund investments accelerate stock market development, as well as the stock market being supportive in the growth of pension fund investments. However, the growth is mostly predominant in the short term. Zandberg and Spierdijk [37] researched on the funding of pension funds and its impact on economic growth of both OECD countries and emerging economies. Country-level data for 58 countries were gotten from the statistics database of OECD, MSCI return index and the Barclay's capital bond index. The unbiased LSDV technique was employed to evaluate the data and the study shows that a higher rate of return leads to continuous growth in pension assets especially in the OECD sample. Impavido *et al.,* [15] investigated how contractual savings impact on securities market in both OECD and non-OECD countries. According to them, an increase in savings geared towards financial asset investments has helped to boost both the stock and bond markets. More so, this is significant for firms with mandatory pension contributions, low international transactions in securities, and a market-based financial system. In addition, market liquidity and depth is directly proportional to how transparent a firm is, especially those with appropriate accounting standards. They recommend that countries should make pension policies that are geared towards institutionalizing savings. On the contrary, Nyang'oro and Njenga [38] examined pension fund in sub-Saharan Africa and found that the pension system is characterized by low participation, low income levels, low returns due to investments only in government securities, low asset under management and restrictive regulations. They propose that a targeted universal pension system (to be financed using public resources) should be instituted. However, this process should be gradual to avoid fiscal tensions on the economy. Oladeinde [7] found that pension schemes in Nigeria are continuously affected by the lack of capability in the management of pension assets, cost of premium collection and individual capitalization. The study concludes that the operational framework/administration of pension is strongly inefficient as it does not deliver on its core mandate of better-quality infrastructure and overall economic development. Daradkah and Al-Hamdoun [39] examined the dynamic interplay between pension fund, macro-fundamentals and capital market development in Jordan from time 1980 to 2017. Employing an ARDL approach on annual series, they found significant relationship only on the long run. The study thus advocate for an improved and promoted pension fund particularly in terms of regulations and innovative financial instruments to help strengthen the Jordanian capital market. Alda [13] tested the relationship between pension fund and the stock market with specific reference to Europe's aging population of between 16-64 and 65 to the elderly. The study explores if higher positive impacts are on the stock market due to a larger pension from the working and elderly population. Using 13 European countries from period 1999 – 2014, and the Panel regression approach; the findings show that the long term characteristics of pension funds have no significant link with European markets efficiency. In another development, Ashari *et al.,* [40] utilized a panel approach from 2010 – 2019 in OIC member countries and found slower growth due to existing demographic measures. Specifically, working and retired female participation in pension fund present negative effect on pension investments. They advise that both financial literacy and investment culture should be strengthened.

3. METHODOLOGY

Following Daradkah & Al-Hamdoun [39], economic welfare is measured by growth rate of GDP per capita. It is an indicator of the total income generated by economic activity in a country, and measures citizens' material well-being and or living standards. Pension investments include corporate debt securities, government bond securities, mutual funds, money market instruments, private equity funds and real estate securities; which are in logarithmic form for uniformity purposes. All financial variables are measured at the end of each quarter, and were obtained from the World Bank [41], PENCOM [8] and CBN [42] statistics database from 2004-2020. At the 5% level, the study intends to discover the descriptive values, unit root test, Johansen co-integration test, Vector Error Correction model, Causality test and impulse responses. In summary, the study aims to explain the dynamic behaviour of the relationship among the variables and the responses when shock is introduced into the system. To achieve stated objectives, the model becomes:

$$GDP_{pc} = f\,(CDS, GBS, MFI, MMI, PEF, RES) \qquad (1)$$

The mathematical and econometric equations are;
$$GDPpc = \alpha_o + \beta_1 CDS_t + \beta_2 GBS_t + \beta_3 MFI_t + \beta_4 MMI_t + \beta_5 PEF_t + \beta_6 RES_t \qquad (2)$$
$$GDPpc_t = \alpha_o + \beta_1 CDS_t + \beta_2 GBS_t + \beta_3 MFI_t + \beta_4 MMI_t + \beta_5 PEF_t + \beta_6 RES_t + \mu_t \qquad (3)$$
$$\beta_1, \beta_2, \beta_3\ \beta_4,\ \beta_5\ and\ \beta_6 > 0$$

Where, GDP = gross domestic product per capita as a measure of economic welfare, CDS = investments in corporate debt securities, GBS = investments in government bond securities, MFI =

mutual funds' investments, MMI = investments in money market instruments, PEF = investments in private equity funds, and RES = investments in real estate securities; α_o = Intercept; β_1, β_2, β_3, β_4, β_5 and β_6 = Constant parameters, μ_t = Error term. A prior, the study expects a positive and significant relationship between the dependent and independent variables.

It's a known fact the time series auto correlate; thus, the need to test for stationarity of the variables in order to obtain accurate predictions [43-45]. The ADF approach is adopted for this study to address stationarity and autocorrelation exertions. Its test statistic is:

$$ADF_\tau = \frac{\varphi}{S_{e(\varphi)}} \tag{4}$$

Co-integration is a feedback process that forces stationary variables to remain closely [46]. For the test of co- integration, when variables are stationary, the VECM is most appropriate to check the co-integration rank by way of the trace test and maximum Eigen values [47]. The trace and max-eigen values statistics are:

$$Tr(r) = -T \sum_{i=r+1}^{k} I_n(1 - \lambda_i) \tag{5}$$
$$\lambda_{max(r,r+1)} = -T\, I_n(1 - \lambda_i) \tag{6}$$

For the multivariate analysis, the VAR→VECM model is utilized. The VAR model is:

$$Y_t = \sum_{i=1}^{p} \Phi_i\, Y_{t=1} + \epsilon_t \tag{7}$$

Where;
Y_t = n x1 vectors at time t
Φ = n x n matrix of Y_{t-1} periods
P = lag length
ϵ_t = n x 1 vector shocks

The VECM model is the restricted VAR to evaluate both long and short term effects among the variables [44]. The model accommodates the inclusion of exogenous variables as independent variables alongside their lags [48].

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-p} + \sum_{i=0}^{s} \Phi_1 \chi_{1,t-1} + \sum_{i=0}^{s} \Phi_2 \chi_{2,t-1} + \mathcal{E}_t \tag{8}$$

Where;
Δ is the differencing function
$\Delta Y_t = Y_t - Y_{t-1}$, thus, Y_{t-1} is the vector of one endogenous variable at lag one,
$\mathcal{E}_t$ = k × 1 vector disturbance,
Π = co-integration matrix coefficient
Γ_i = matrix coefficient
Φ_i = matrix coefficient for the exogenous variable.

Causality and impulse response function was also carried out to estimate short-run unidirectional or bi-directional relationships [49]. The model for Granger causality is:

$$Y_t = \alpha + \sum_{k=1}^{k} \beta_k Y_{t-1} + \sum_{k=1}^{i} \delta_k X_{t-1} + \epsilon_t \cdots \tag{9}$$
$$X_t = \alpha + \sum_{k=1}^{k} \beta_k X_{t-1} + \sum_{k=1}^{k} \delta_k Y_{t-1} + \epsilon_t \tag{10}$$

A variable χ_t is said to be Granger because of variable Y_t, if the previous and current values of χ_t can predict the current value of Y_t.

Likewise the impulse response functions to determine the response of one variable as a result of a shock in another [50]. The IR model is explained as:

$$\Delta X_{t+s} = \frac{\partial X_{t+s}}{\partial U_{1t}} \delta_1 + \frac{\partial X_{t+s}}{\partial U_{2t}} \delta_2 + \cdots + \frac{\partial X_{t+s}}{\partial U_{nt}} \delta_n$$
$$= \psi_s \delta$$

4. RESULTS AND DISCUSSIONS

Table 4.1: Descriptive Statistics

	GDPpc	CDS	GBS	MFI	MMI	PEF	RES
Mean	431636.6	4.928070	6.464460	2.974690	5.929686	2.529276	5.465458
Median	430545.4	4.360950	5.784393	3.005366	5.885221	2.133815	5.402112
Maximum	846870.9	6.753066	8.674293	4.821984	7.603748	3.572047	7.003379
Minimum	124867.3	4.074578	4.768219	2.140875	4.363540	1.751263	4.155508
Std. Dev.	195676.9	0.900548	1.394356	0.506066	0.782947	0.654121	0.457022
Skewness	0.177730	0.715538	0.460294	1.145074	0.013608	0.592998	1.602787
Kurtosis	1.919723	1.818416	1.493103	6.094714	2.508079	1.612612	8.102230
Jarque-Bera	3.664492	9.758345	8.834959	41.99577	0.687726	9.439055	102.8740
Probability	0.160054	0.007603	0.012065	0.000000	0.709026	0.008919	0.000000
Sum	29351287	335.1088	439.5833	202.2789	403.2187	171.9908	371.6511
Sum Sq. Dev.	2.57E+12	54.33610	130.2633	17.15888	41.07142	28.66756	13.99425
Observations	68	68	68	68	68	68	68

Source: E-views 12 Output

From table 4.1, deviations from mean values are at high levels signifying frequent fluctuations in the pension industry especially when being hit by the covid-19 pandemics and subsequent economic recessions. Further proof is seen from the Jarque-Bera statistics, where the probability values indicate that all the variables except GDP and money market instruments are not normally distributed.

Table 4.2: Stationarity Result

Variables	ADF T-Stat @ Level	T-Critical @ level	P-value @ level	ADF T-Stat @ 1st Diff.	T-Critical @ 1st Diff.	P-value @ 1st Diff.	Order of Integration
GDPpc	0.996976	2.909206	0.9961	4.625329	2.906210	0.0003	I(1)
CDS	0.756297	2.909206	0.9925	6.078909	2.908420	0.0000	I(1)
GBS	0.176682	2.905519	0.9356	6.812931	2.906210	0.0000	I(1)
MFI	0.671593	2.906210	0.9907	4.277536	2.906210	0.0011	I(1)
MMI	0.008490	2.909206	0.9538	3.209576	2.909206	0.0241	I(1)
PEF	0.519590	2.909206	0.8797	4.352958	2.906210	0.0008	I(1)
RES	2.174810	2.912631	0.2175	2.985102	1.946549	0.0035	I(1)

Source: E-views 12 Output

From table 4.2, unit root test at levels depicts non-stationarity of the variables due to fluctuations observed in their descriptive values; and therefore necessitates a differencing of the data. The data were however, stationary after differencing at order 1 which confirms that the variables have long run form.

Table 4.3: Johansen Co-integration Test

Trace test – Series: GDP$_{pc}$, CD, GB, MF, MMI, PEF, RE				
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical value	Probability
None *	0.550458	169.9531	125.6154	0.0000
At most 1 *	0.519370	117.9839	95.75366	0.0006
At most 2 *	0.352595	70.36118	69.81889	0.0452
At most 3	0.276253	42.10026	47.85613	0.1559
At most 4	0.185780	21.08485	29.79707	0.3524
At most 5	0.098824	7.725775	15.49471	0.4952
At most 6	0.014695	0.962238	3.841466	0.3266
Maximum Eigenvalue – Series: GDP$_{pc}$, CD, GB, MF, MMI, PEF, RE				
None *	0.550458	51.96915	46.23142	0.0110
At most 1 *	0.519370	47.62275	40.07757	0.0059
At most 2	0.352595	28.26092	33.87687	0.2017
At most 3	0.276253	21.01540	27.58434	0.2753
At most 4	0.185780	13.35908	21.13162	0.4197
At most 5	0.098824	6.763537	14.26460	0.5175
At most 6	0.014695	0.962238	3.841466	0.3266

*0.05 level rejection of the null hypothesis.
Source: E-views 12 Output

From table 4.3, both Trace and Max Eigen value of 3 and 2 co-integrating relationships portend the existence of co-integrating relationship among the variables, and hence, a rejection of the null hypothesis at the 5% level. The result from the unit root and cointegration test justifies the employment of the Vector Error Correction (VEC) model to ascertain both long and short run nature of the variables. However, a lag length selection is required to estimate the vector error correction model. This is explained in table 4.4.

Table 4.4: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-845.4249	NA	1334.069	27.06111	27.29924	27.15477
1	-303.4227	946.3531	0.000215	11.41025	13.31525	12.15949
2	154.1155	214.7415*	1.58e-07*	3.107444*	11.67998*	6.479065*
3	-188.3821	175.3001	2.79e-05	9.313716	12.88561	10.71856
4	-156.6178	41.34393	5.60e-05	9.860883	15.09966	11.92132
5	-96.41627	64.97944	5.35e-05	9.505278	16.41093	12.22131

Source: E-views 12 Output

* indicates lag order selected by the criterion at the 5% level of significance. **LR** is the Likelihood-Ratio test for goodness of fit; **FPE** is the Final prediction error for model accuracy; **AIC** is Akaike information criterion for model quality and selection; **SC** is the Schwarz information criterion for model selection and **HQ** is also the Hannan-Quinn information criterion for model selection

From the analysis in table 4.4, the least number of lags to be selected at 5% level of significance is between 1-2 lags, to ascertain forecast accuracy. With this, the study proceeds to conducting the VECM technique

Table 4.5: Vector Error Correction Model

Variables	Cointegrating Eqn1	Standard Error	T-statistic
GDPpc (-1)	1.000000		
CDS(-1)	-6.290926	1.29478	-4.85868
GBS(-1)	-1.154917	0.58744	-1.96600
MFI(-1)	3.080678	0.92151	3.34307
MMI(-1)	-0.082270	0.60329	-0.13637
PEF(-1)	9.166924	1.34933	6.79369
RES(-1)	-0.547122	0.37943	-1.44195
c	-3.259917		
ecm(-1)	-0.009223	0.00371	-2.48449
Adjusted R^2	0.605501		
F-statistic	19.71729		

Source: E-views 12 Output

From table 4.5, *the long run equation is:*

GDPpc$_{t-1}$ = 3.259917 + 6.290926CDS$_{t-1}$ + 1.154917GBS$_{t-1}$ – 3.080678MF$_{t-1}$
Se (1.29478) (0.58744) (0.92151)
t-stat [4.85868] [1.96600] [-3.34307]

+ 0.082270MMI$_{t-1}$ – 9.166924PEF$_{t-1}$ + 0.547122RES$_{t-1}$
Se (0.60329) (1.34933) (0.37943)
t-stat [0.13637] [-6.79369] [1.44195]

From the analysis, mutual fund investments and private equity investments are negative but significant; corporate debt securities is positive and significant; while government bond securities, money market instruments and real estate securities are positive but insignificant.

The negative value of the error correction term is an indication of positive speed towards balance; and supports the existence of both short run and long run equilibrium in the system. Thus, previous quarter deviation from long run equilibrium is corrected at a speed of 0.9%.

The Adjusted R-Square of 0.605501 indicates that the independent variables explain about 61% of the GDPpc. Other variables not included in this model account for the remaining 39%. The F-Statistics value of 19.71729 clearly shows that jointly, the model accurately predicts the data and so, has a good fit.

Table 4.6: VEC Causality Test

Dependent variable	Independent Variables							ECT$_{t-1}$ Coefficient (t-ratio)
	χ^2 – statistics of lagged 1st difference term [P-value]							
	ΔGDPpc	ΔCDS	ΔGBS	ΔMFI	ΔMMI	ΔPEF	ΔRES	
ΔGDPpc	…..	0.285 [0.867]	2.119 [0.347]	2.020 [0.364]	0.967 [0.617]	3.391 [0.184]	3.329 [0.189]	-0.009** (-2.484)
ΔCDS	0.155 [0.925]	…..	3.802 [0.149]	2.916 [0.233]	1.456 [0.483]	2.588 [0.274]	2.031 [0.362]	0.045 (4.279)
ΔGBS	0.254 [0.881]	0.808 [0.668]	…..	0.632 [0.729]	0.759 [0.684]	0.291 [0.865]	11.842** [0.003]	0.039 (1.323)
ΔMFI	1.020 [0.6]	1.327 [0.515]	1.197 [0.549]	…..	0.305 [0.859]	0.176 [0.916]	0.663 [0.718]	-0.025 (-1.589)
ΔMMI	0.633 [0.729]	1.751 [0.417]	12.214** [0.002]	5.044 [0.080]	…..	1.978 [0.372]	4.534 [0.104]	-0.052 (-5.859)
ΔPEF	1.717 [0.424]	2.270 [0.321]	1.329 [0.515]	0.165 [0.921]	1.941 [0.379]	…..	1.941 [0.379]	-0.024 (-2.526)
ΔRES	0.249 [0.883]	0.023 [0.988]	0.249 [0.883]	0.072 [0.964]	0.091 [0.956]	0.106 [0.948]	…..	0.017 (0.401)

Note: ** denotes a 5% significance level; Figures in (…) are t-statistics; Figures in […] are p-values
Source: E-views 12 Output

From table 4.6, changes in government bond securities lead to changes in real estate securities and changes in money market investments leads to changes in government bond securities.

Table 4.7: Impulse Response Test

Response of GDPpc						
Period	GDPpc	CDS	GBS	MFI	MMI	PEF	RES
1	0.025597	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.035130	0.003417	0.000668	-7.02E-05	-0.002885	-0.002177	-0.002582
3	0.040714	0.005773	0.000406	0.000901	-0.007472	-0.002374	-0.006073
4	0.042612	0.010091	0.003243	-0.000458	-0.012102	-0.004574	-0.008570
5	0.043741	0.013421	0.005845	-0.002848	-0.015148	-0.005990	-0.009066
6	0.044660	0.015897	0.007688	-0.005788	-0.016827	-0.006794	-0.007616
7	0.045821	0.016753	0.008121	-0.008124	-0.017381	-0.006096	-0.005274
8	0.046957	0.016507	0.007668	-0.009560	-0.017495	-0.004304	-0.003025
9	0.047875	0.015563	0.006777	-0.010078	-0.017535	-0.001778	-0.001584
10	0.048360	0.014597	0.006034	-0.010093	-0.017753	-0.000759	-0.001152

Source: E-views 12 Output

The impulse response test explains the dynamic behaviour of the study's variables. It reports the impact of a shock to a system as a result of a change to an input. From the analysis above, a one standard deviation to GDPpc causes significant decrease in MFI, MMI, PEF and RES from the 1st to 10th period. This effect did not dissipate thereafter. Also, a significant increase was also observed in CDS and GBS which peaked in the 7th period and later decreased from the 8th to 10th period.

Table 4.8: VEC Residual Serial Correlation LM Test

Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	Df	Prob	Rao F-stat	Df	Prob
1	40.35006	49	0.8059	0.806375	(49, 187.2)	0.8110
2	31.63330	49	0.9744	0.618867	(49, 187.2)	0.9753

Source: E-views 12 Output

The probability value of the serial correlation test in table 4.8 is 0.8110. This value is greater than the 5% significance level; hence, we accept the null hypothesis that there is no serial correlation amongst the variables.

Table 4.9: VEC Residual Heteroskedasticity Test

Joint test:		
Chi-sq	Dof	Prob
820.8245	840	0.6755

Source: E-views 12 Output

From table 4.9, the heteroskedasticity test results demonstrate that the p-value of the Chi-Sq joint test of 0.6755 is greater than the 5% level of significance. Consequently, we accept the null hypothesis that the regression contains equal variances and as such constant.

4.2 DISCUSSION OF FINDINGS

Pension investments in the Nigerian economic environment have been quite challenging. This is according to the National Pension Commission annual report of 2021 which reveal that the industry's allocation to various asset classes declined by 66.64%. Looking at the analysis in table 4.5, first, investment in government bonds, money market instruments and real estate securities are positive but insignificant. This is not in line with apriori expectation that these investments ought to lead to growth in the per capita income of citizens. Accordingly, the positive nature of the result supports the life cycle theory of consumption that pension savings in the early years of an individuals' life help to grow the economy especially when these savings are put into different investments. However, its insignificance is a proof of low returns on investment and a negation to the Agency theory. As such, pension fund administrators, in the period under study, have invested in assets that have generated below average rates of return. This may be, however, associated with slow growth especially in the real estate industry, insufficient liquidity due to lack of investible funds, low revenue from shortages in oil supply and its associated subsidies, increase in unemployment rate, GDP contraction, and the volatile nature of the investing environment especially when faced with galloping inflation or a fallout of the covid 19 pandemic. A recent report by NPC [8] show that investments in government

bond stood at 69.71%, real estate has 8.25%, while that of money market instrument is at 19.33%. In addition, these investments experiences higher unrealized losses and lower return [8]. This finding is in line with [39, 40] that pension fund investment may not necessarily increase the standard of living of citizens.

Second, the positive and significant nature of pension investments in corporate debt securities signals professional and efficient business management skills in asset allocation and portfolio construction, as well as low credit risk exposures of the investment. This finding is in line with a priori expectation. Corporate debt securities were mostly in specific industries like telecommunications-16.84%, consumer goods- 16.22%, industrial goods- 15.22%, oil & gas- 4.54%, agriculture- 4.24%, and these investment were dollar denominated [8]. Such investments are stable, diverse, liquid, has low volatility and with a default risk close to zero [51].

Third, mutual funds and private equity investments were significantly negative. This is also not in line with apriori expectation. Pension fund managers allow only 0.27% and 0.14% of their entire investible asset into these investments; resulting to a decline in revenue [8]. The reason for the small investible funds is because the economy is fraught with challenges like weak financial sector and high inflation which are capable of recording below risk-adjusted rates of return; since most of these investments are in the financial sector [52]. This finding however supports Oladeinde [7] that pension administration in Nigeria is strongly inefficient and does not deliver overall economic development.

4.3 LIMITATIONS
The study on pension fund investment covers only Approved Existing Schemes (AES), Contributory Pension Scheme (CPS) and Closed Pension Fund Scheme (CPFS) only. It was conducted in the Nigerian economy and as such its outcome may differ if applied in other climes. The choice of only these three investment schemes does not represent the whole population of the pension fund industry in Nigeria. Finally, historical data was utilized which may be susceptible to alteration by management.

5. CONCLUSION AND RECOMMENDATIONS
5.1 Conclusion
This study employed quarterly data from 2004-2020 to investigates pension investments in corporate debt securities, government bond securities, mutual fund investments, money market instruments, private equity funds and real estate; and its impact on per capita income in the Nigerian economy. Data was sourced from the statistical database of the World Bank, National Pension Commission annual report and the Central Bank of Nigeria. Statistical tools employed to estimate the data were descriptive statistics, unit root test, co-integration test, vector error correction model, causality test and the impulse response function. From the unit root test, the variables were not stationary at levels but were stationary after the first difference was taken. The co-integration test achieved long run equilibrium relationship at 2 lags. the Vector error correction test indicate the presence of both short and long run connection, thus, mutual fund investments and private equity funds were both negative but significant to GDP per capita; government bond securities, money market instruments and real estate investments were positive but insignificant to GDP per capita; while corporate debt securities were positive and significant to GDP per capita. Furthermore, the error correction estimate gave a 0.9% speed of adjustment which reveals that previous quarter errors were subsequently corrected. Also, the VEC causality test signify that changes in government bond securities drive changes in real estate investments; and changes in money market instruments precede changes in government bond securities. Shocks from mutual fund investments, money market instruments, private equity funds and real estate securities cause significant decrease in the GDP per capita from periods 1-10. Overall, this means that investments by pension fund managers are more of corporate debt securities than any other investment avenues.

Relying on these findings, the study made the following recommendations:
a. The pension industry should vigorously create awareness on the importance of employee pension plan; and the development of varieties of e-channels to help rake in more investible funds into the industry. This will help increase participation and curb problems of illiquidity.
b. Develop more innovative products to support diversification of pension fund in different assets classes.
c. Collaborations with the Central Bank on implementation of monetary policies to help stem inflationary pressures, stabilize the economy, stimulate economic activities and create a favourable environment for pension fund investment schemes to thrive.
d. Review of policies with regards to pension payment defaulters to encourage timely payment of pension.

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