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DETERMINANTS OF PENSION FUND PERFORMANCE IN NIGERIA

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Abstract

This study empirically investigated the determinants of pension fund performance in Nigeria, a critical inquiry given the pension system's role in national savings and retirement security amidst economic volatility. The research problem centered on identifying the key drivers of performance beyond mere asset growth. The objective was to evaluate the effect of fund value, age, size, returns, contribution density, stock investments, and expenditure on performance. Utilizing an ex-post facto research design, the study analyzed secondary data collected from the annual reports of 20 Pension Fund Administrators (PFAs), purposively sampled from the population of all licensed PFAs, covering the period 2010-2022. Data were analyzed using descriptive statistics, correlation analysis, and multiple regression. The findings revealed that fund returns and stock allocations had a significant positive effect on performance, while operational expenditure had a significant negative impact; however, fund size, value, age, and contribution density were statistically insignificant. The major recommendation is for PFAs to prioritize strategic asset allocation to enhance returns and for regulators to enforce stringent cost-efficiency benchmarks to curb the performance-eroding effect of high expenditures.

Keywords: pension fund performance, asset allocation, operational expenditure, pension fund administrators, contributory pension scheme

1. Introduction

Pension Fund Performance, typically measured through metrics like the real rate of return on assets and growth in net asset value, represents the fundamental gauge of a pension system's health and efficacy. Strong performance ensures that the long-term savings of contributors are not only preserved but also appreciable, thereby providing adequate income replacement in retirement and fostering public confidence in the system.

Conversely, poor performance, characterized by returns that lag behind inflation or are eroded by high costs, jeopardizes retirement security, undermines the social contract between generations, and can trigger systemic risks by destabilizing a key component of the financial sector. The calibration of this performance is therefore not merely a technical financial exercise but a socio-economic imperative.

Globally, pension funds have evolved into dominant institutional investors, with their performance being a function of a complex interplay between macroeconomic conditions and specific fund-level characteristics. In advanced economies, mature governance structures, deep financial markets, and sophisticated investment strategies have

enabled funds to navigate market volatility and generate robust long-term returns (OECD, 2021).

The performance drivers in these contexts—such as significant exposure to alternative assets and international diversification—are often not directly transferable to developing economies. In emerging markets like those in Africa, pension funds operate within a distinctly different ecosystem, often marked by shallower capital markets, higher macroeconomic volatility, and evolving regulatory frameworks, which necessitates a focused examination of the unique determinants of their performance (Mwenda & Mwaba, 2019).

In Nigeria, the landmark Pension Reform Act of 2004, which established the Contributory Pension Scheme (CPS), catalyzed a monumental shift in the retirement landscape. This reform successfully mobilized domestic capital, with pension assets under management growing exponentially from a negligible base to over N17.06 trillion as of 2023 (PenCom, 2024). Despite this impressive quantitative growth, the qualitative aspect the performance and sustainability of these funds—faces persistent headwinds.

The Nigerian economic environment, characterized by fluctuating inflation, currency depreciation, and limited high-yielding investment instruments, poses a significant challenge to achieving consistent real returns (Adegboye, Nwanji, & Olarewaju, 2020). Consequently, the performance of Nigerian pension funds is critically dependent on how well internal fund-specific variables are managed to counteract these external pressures.

The determinants under investigation are pivotal to this management. The Fund Size and Fund Value are theorized to confer economies of scale and enhanced investment capacity, yet their impact in a constrained market like Nigeria's remains ambiguous (Olayinka & Akinbola, 2021).

The Age of the Fund may imply experience and stability, but its direct correlation with performance is not well-established in nascent systems. The allocation to Stocks and Equities offers the potential for higher yields, yet Nigerian PFAs have historically maintained a cautious approach due to market volatility and regulatory limits, warranting a fresh analysis of its actual impact on returns (Udo, 2022).

Furthermore, the consistency of member contributions, or Contribution Density, ensures a steady inflow of capital for investment, while the Expenditure of the Fund on administration and management directly erodes net returns, making operational efficiency a non-negotiable factor (Babalola, 2021). This study posits that the interplay of these specific internal factors fund size, value, age, equity allocation, contribution density, and expenditure collectively provides a more nuanced and contextual explanation of Pension Fund Performance in Nigeria than has been previously offered.

The performance of pension funds in Nigeria, as the dependent variable, is caught in a critical dilemma. On one hand, the system has witnessed phenomenal growth in total asset value, reflecting successful mobilization. On the other hand, there is a growing practical concern regarding the adequacy of the real returns delivered to contributors, as high inflation rates consistently threaten to diminish the purchasing power of accumulated savings (CBN, 2023).

Technically, the problem is the identified gap in empirical understanding of the precise fund-level drivers of this performance within the unique Nigerian context. While

global studies have explored determinants like asset allocation, their findings are not directly applicable due to Nigeria's distinct macroeconomic and regulatory landscape.

Previous research has been fragmented. For instance, studies such as Chovancova et al. (2019) focused narrowly on the impact of bonds and stocks in developed European markets, while Kimeli and Wepukhulu (2018) examined similar variables in Kenya. Although Kibona (2020) provided a broader analysis in Tanzania, these studies collectively suffer from a lack of contextual fit for Nigeria's larger, yet more volatile, economy.

Furthermore, earlier Nigerian studies like Adeoti, Gunu, and Tsado (2012) were conducted when the CPS was in its infancy, and their findings may not reflect the current maturity and complexity of the industry. This creates a clear empirical gap. Theoretically, frameworks like Modern Portfolio Theory and Agency Theory suggest that diversification and cost control are universal performance drivers. However, their manifestation in Nigeria is nuanced.

The theoretical gap lies in the lack of a consolidated model that tests these theories simultaneously against a comprehensive set of internal variables within the Nigerian pension industry. Recent works by Babalola (2021) on cost efficiency and Udo (2022) on equity investments have touched on individual variables, but an integrated analysis is missing.

This study is designed to fill these gaps by providing a contemporary, holistic, and empirical investigation into the effect of fund value, age, size, returns, contribution density, equity investment, and operational expenditure on the performance of pension funds in Nigeria. By doing so, it will offer evidence-based insights crucial for policymakers, regulators, and fund administrators to enhance strategies that safeguard and optimize the retirement wealth of millions of Nigerians.

The main objective is to evaluate the determinants of pension fund performance in Nigeria. The specific objectives are to:

i. Evaluate the effect of fund value on pension fund performance in Nigeria.
ii. Assess the effect of age of the fund on pension fund performance in Nigeria.
iii. Determine the effect of fund size on pension fund performance in Nigeria.
iv. Analyze the effect of fund returns on pension fund performance in Nigeria.
v. Investigate the effect of density of contributions on pension fund performance in Nigeria.
vi. Examine the effect of stocks on pension fund performance in Nigeria.
vii. Evaluate the effect of expenditure of the fund on pension fund performance in Nigeria.

The following hypotheses were formulated in null form:

H_{01}: Fund value has no significant effect on pension fund performance in Nigeria.
H_{02}: Age of the fund does not significantly influence pension fund performance.
H_{03}: Fund size has no significant effect on pension fund performance in Nigeria.
H_{04}: Fund returns do not significantly affect pension fund performance.
H_{05}: Density of contributions has no significant effect on pension fund performance.
H_{06}: Stocks do not significantly affect pension fund performance.
H_{07}: Fund expenditure has no significant effect on pension fund performance.

2. Literature Review

Conceptual Review

Pension Fund Performance

Pension Fund Performance is a multidimensional concept globally recognized as the measure of a fund's efficiency in achieving its primary objective of generating risk-adjusted returns to meet future liabilities while ensuring security and liquidity. According to the Organisation for Economic Co-operation and Development (OECD, 2021), performance is not solely about absolute returns but encompasses the ability to deliver sustainable retirement income, often evaluated through metrics like the real rate of return, Sharpe ratio (risk-adjusted return), and funding ratio (the proportion of assets to liabilities).

This view is reinforced by Amenc, et al. (2021), who posit that robust pension fund performance is intrinsically linked to effective asset-liability management (ALM), where strategic asset allocation is optimized to match long-term payout obligations without compromising capital preservation. Therefore, for this study, Pension Fund Performance is operationally defined as the risk-adjusted financial efficacy of a pension fund, quantitatively measured by its annualized Real Return on Assets (ROA), which reflects the net growth in fund value after accounting for administrative costs and inflation, thereby indicating its true capacity to enhance the retirement wealth of contributors (Iqbal & Stoykova, 2022).

Fund Value, Age of the Fund, Fund Size, Fund Returns, Contribution Density, Stocks, and Fund Expenditure (Pension Fund Determinants)

The conceptualization of pension fund determinants is anchored in financial and institutional theory, with each variable representing a critical dimension of a fund's operational and strategic profile. Fund Value, synonymous with Assets Under Management (AUM), is globally recognized as a key indicator of scale, where larger values are theorized to enable access to premium investment opportunities and economies of scale, thereby potentially enhancing returns (Amenc, et al., 2021).

The Age of the Fund is conceptualized as a proxy for institutional maturity and experience, with older funds presumed to have developed more robust investment processes and risk management frameworks, though they may also exhibit inertia (OECD, 2021).

While often correlated with Fund Value, Fund Size distinctly captures the scope of the contributor base, influencing the stability and predictability of contribution inflows essential for long-term investment planning.

Fund Returns represent the gross financial gains from investment activities, forming the primary engine for asset growth before costs are considered. Contribution Density, a critical metric for system sustainability, measures the active participation rate and directly impacts a fund's liquidity and capacity for long-term capital commitment (World Bank, 2020).

The allocation to Stocks (equities) is a strategic variable that embodies the risk-return trade-off central to Modern Portfolio Theory, where higher allocations are pursued for growth but introduce greater volatility (Bikker, 2017). Conversely, Fund Expenditure, encompassing administrative and management fees, acts as a drag on net performance, with its efficiency being a direct concern of Agency Theory, as high costs can significantly erode member returns (Andonov & Rauh, 2022).

Pension Fund Performance is the dependent outcome, holistically measured not just by nominal returns but by the fund's ability to generate real, risk-adjusted returns that ensure the long-term fulfillment of its pension liabilities.

For the purpose of this study, the variables are operationally defined as follows: Pension Fund Performance is the risk-adjusted financial efficacy measured by the annualized Real Return on Assets (ROA). Fund Value is the logarithm of the total net asset value (NAV) of a pension fund. Age of the Fund is the number of years since the commencement of its operations.

Fund Size is the logarithm of the total number of registered contributors. Fund Returns are the annual gross investment income generated as a percentage of total assets. Contribution Density is the ratio of active contributors (making regular payments) to total registered contributors. Stocks is the percentage of total pension fund assets allocated to domestic and foreign equities. Fund Expenditure is the logarithm of total operational and administrative costs incurred by the fund. These definitions provide a quantifiable framework for analyzing the determinants of performance, aligning with contemporary pension fund research (Iqbal & Stoykova, 2022; Andonov & Rauh, 2022).

Empirical Review

Fund Value and Pension Fund Performance

Based on the empirical investigations of Inderst (2021) and Ayodele and Olayiwola (2022), the relationship between fund value and pension fund performance has been rigorously examined. These studies, employing quantitative panel data designs, utilized secondary data from annual reports and regulatory databases of pension funds with Inderst (2021) analyzing a global panel of OECD funds and Ayodele and Olayiwola (2022) focusing on a purposive sample from Nigeria, Ghana, and Kenya.

Their objective was to assess the impact of fund value, proxied by the logarithm of total net assets, on performance metrics like the Sharpe and funding ratios. Utilizing dynamic panel regression with fixed effects and OLS/quantile regressions respectively, both studies converged on a significant positive relationship, attributing superior net returns and better diversification in larger funds to economies of scale and enhanced bargaining power. However, a key critique is their limited contextual applicability, as their focus on mature markets or regional aggregates may not fully capture the dynamics of Nigeria's unique and evolving pension landscape, characterized by differing market depth and regulatory maturity. Consequently, to test this relationship specifically within the Nigerian context, the null hypothesis is formulated as:

Age of the Fund and Pension Fund Performance

Based on the empirical work of Bikker and Broeders (2020) and Ajibade et al. (2018), the influence of a fund's operational age on its performance has been examined through quantitative, longitudinal panel studies. These investigations utilized secondary data from pension fund financial statements, with Bikker and Broeders (2020) analyzing European occupational schemes and Ajibade et al. (2018) focusing on a sample of 11 Nigerian Pension Fund Administrators (PFAs). Their central objective was to assess how the age of a fund, measured simply as years since inception, affects performance proxies like Return on Assets (ROA) and unit price.

Employing multi-level and panel multiple regression analyses, both studies found a consensus that older funds tend to exhibit superior performance, a phenomenon attributed to accumulated institutional experience and refined investment processes, a finding

specifically confirmed in the Nigerian context by Ajibade et al. (2018). However, a significant critique of this body of evidence is its potential oversight of the downsides of maturity, such as the risk that older funds may become overly conservative or burdened by legacy liabilities, nuances that aggregate models often fail to capture. To empirically test whether this generally positive relationship holds without such detrimental effects in Nigeria.

Fund Size and Pension Fund Performance

The relationship between fund size and performance has been investigated in contrasting contexts by Adekoya et al. (2022) and Fischer & Rauh (2023) using quantitative, ex-post facto and panel data designs. These studies relied on secondary data from annual reports, with Adekoya et al. analyzing a purposive sample of 15 Nigerian PFAs and Fischer & Rauh studying a cross-section of OECD funds. Their objective was to evaluate the effect of fund size proxied by the number of contributors or log of total assets—on performance outcomes like Net Asset Value (NAV) per unit and funding adequacy. However, their findings are divergent; while Fischer & Rauh's hierarchical linear modeling confirmed a positive effect attributed to scale economies, Adekoya et al.'s multiple regression on Nigerian data revealed an insignificant negative effect.

This inconsistency forms the core critique, highlighting that the benefits of scale are not universal but are likely contingent on mediating factors like governance quality and regulatory effectiveness specific to the operating environment. Therefore, to empirically test this ambiguous relationship within Nigeria's unique pension sector.

Fund Returns and Pension Fund Performance

Based on the dynamic panel data studies of Hassan & Idris (2023) on Nigerian PFAs and Peterson & Davis (2023) on U.S. occupational funds, which utilized secondary data from regulatory bodies and employed System GMM estimation and fixed-effects models respectively, a strong positive causal link was established where higher fund returns (proxied by annual gross investment income) directly enhance performance metrics like solvency ratios and replacement rates; however, the critique highlights that this singular focus may obscure underlying portfolio risks, such as over-concentration in volatile assets a particular concern in Nigeria's developing market.

Contribution Density and Pension Fund Performance

Empirical investigations by Rodriguez & Suarez (2023) on Latin American AFPs and Ajibade et al. (2018) on 11 Nigerian PFAs, utilizing quantitative panel designs and secondary administrative data, yielded contradictory findings on the role of contribution density (measured as the ratio of active to registered contributors) on performance metrics like liquidity ratios; while Rodriguez & Suarez's dynamic system GMM analysis confirmed a positive solvency relationship, Ajibade et al.'s multiple regression revealed a significant negative effect in Nigeria, critiqued as highlighting a complex cost-performance interplay that demands further investigation.

Stocks and Pension Fund Performance

Empirical studies by Hassan & Bello (2023) on Nigerian PFAs and Chovancova et al. (2019) on OECD pension data, using quantitative panel designs and secondary regulatory data, employed System GMM estimation and regression analysis respectively to investigate how equity allocation (measured by percentage in stocks) affects solvency and risk-adjusted returns; while Hassan & Bello found balanced exposure (35-45%) enhanced performance in Nigeria, Chovancova et al. observed bonds had stronger impact

elsewhere, with the critique noting Nigeria's shallow equity market introduces volatility risks that may temper returns.

Expenditure of the Fund and Pension Fund Performance

Based on empirical evidence from Mensah & Owusu (2024) and Ajibade et al. (2018) focusing on Nigerian PFAs, alongside complementary studies by Jansen & de Vries (2023) on Dutch funds and Carvalho & Lima (2022) on Brazilian entities, all employing quantitative panel designs with secondary financial data analyzed through System GMM and multiple regression techniques, the consensus indicates that operational expenditure (log of total costs) generally erodes performance metrics like funding adequacy; however, Ajibade et al.'s finding of an insignificant effect in Nigeria critiques the simplistic view by suggesting some costs represent essential investments in capacity rather than pure inefficiency.

Theoretical Framework

Modern Portfolio Theory (MPT), propounded by Harry Markowitz in 1952, posits that investors can construct an "efficient frontier" of optimal portfolios offering the maximum expected return for a given level of risk, achieved through strategic diversification across asset classes that are not perfectly correlated. The core thrust of MPT is the rational management of risk-return trade-offs, moving the focus from individual asset selection to the overall portfolio's characteristics.

Contemporary research continues to validate its principles; for instance, Yao et al. (2023) demonstrated that Nigerian Pension Fund Administrators (PFAs) employing diversified strategies achieved higher risk-adjusted returns, while Chen & Wu (2021) and Hassan & Bello (2023) found that strategic allocations, particularly to equities, were central to enhancing pension fund performance in China and Nigeria, respectively. The theory provides the foundational linkage for this study's variables, directly justifying the investigation into how the allocation to Stocks and the generation of Fund Returns collectively influence overall Pension Fund Performance through the mechanism of diversification.

Agency Theory, formally developed by Jensen and Meckling in 1976, highlights the inherent conflicts of interest (agency problems) that arise when principals (e.g., pension contributors) delegate decision-making authority to agents (e.g., fund managers) who may prioritize their own interests, such as maximizing fees or pursuing personal glory, over the beneficiaries' goal of wealth maximization. The thrust of the theory is the need for monitoring and incentive alignment to mitigate these costs.

Recent studies, including Babalola (2021) on Nigerian PFAs and Andonov & Rauh (2022) in a broader institutional context, have empirically linked weak governance to higher costs and lower net returns, underscoring the theory's relevance. For this research, Agency Theory creates a critical linkage by framing Fund Expenditure as a potential agency cost that can erode net returns and by suggesting that variables like Contribution Density could be influenced by the contributors' trust in the fund's management, thereby affecting the fund's sustainability and performance.

Efficiency Wage Theory, propounded by economists like George Akerlof and Janet Yellen in the 1980s, posits that paying employees’ wages above the market equilibrium can enhance productivity and organizational performance by attracting higher-quality talent, reducing turnover, and motivating greater effort.

In the context of this study, its thrust is that higher compensation for fund managers and analysts is not merely an operational cost but a strategic investment in human capital that can generate superior returns through more sophisticated decision-making. This perspective is supported by contemporary research, including Okafor & Okonkwo (2023), who found that Nigerian PFAs with competitive remuneration retained more skilled professionals; Fischer & Rauh (2023), who observed that top-performing global funds invested significantly in human resources; Babalola (2021), who linked strategic expenditure on talent to improved cost efficiency in Nigeria; and Andonov & Rauh (2022), who demonstrated that spending on expert staff was correlated with higher net returns in pension funds.

The theory provides a crucial linkage for this study by reframing a portion of Fund Expenditure as a potential driver, rather than a mere detriment, to Pension Fund Performance, creating a nuanced relationship that contrasts with the purely negative view of costs often presented by Agency Theory.

3. Methodology

This study on the determinants of pension fund performance in Nigeria employs an ex-post facto research design to analyze historical data. The population comprises all 24 licensed Pension Fund Administrators (PFAs) in Nigeria, with a sample of 20 PFAs selected using a purposive sampling technique based on their operational longevity and the consistent availability of financial data for the 10-year period from 2014 to 2023.

Secondary data was systematically collected from the annual reports of the selected PFAs and the National Pension Commission (PenCom). For data analysis, the study utilizes descriptive statistics to summarize the data, Pearson correlation to examine variable relationships, and multiple regression analysis to determine the precise effect of the independent variables on pension fund performance.

Model Specification

The model for this study is specified as follows:

PFP = f(FVAL, FAGE, FSIZ, FRET, DCON, STOK, FEXP). The econometric form of the model is: $PFPt = \beta_0 + \beta_1 FVAL_t + \beta_2 FAGE_t + \beta_3 FSIZ_t + \beta_4 FRET_t + \beta_5 DCON_t + \beta_6 STOK_t + \beta_7 FEXP_t + \varepsilon_t$

Where: **PFP** = Pension Fund Performance (measured by Return on Assets, ROA); $\boldsymbol{\beta_0}$ = Intercept (Constant term); $\boldsymbol{\beta_1 - \beta_7}$ = Coefficients of the independent variables; **FVAL** = Fund Value (Log of Net Asset Value); **FAGE** = Age of the Fund (Years since inception); **FSIZ** = Fund Size (Log of Total Assets); **FRET** = Fund Returns (Annual return from investments); **DCON** = Density of Contributions (Ratio of active to total contributors); **STOK** = Stocks (Percentage of assets invested in equities); **FEXP** = Expenditure of the Fund (Log of total operational cost); $\boldsymbol{\varepsilon}$ = Error term; **t** = Time period.

4. Results and Discussion

Table 1

Descriptive Statistics

Variable	Mean	Median	Std. Dev.	Minimum	Maximum
PFP (ROA)	6.45%	6.20%	2.10%	2.50%	10.80%
FVAL (Log)	12.34	12.41	0.89	10.50	13.98
FAGE (Yrs)	15.2	16	4.5	8	25
FSIZ (Log)	12.50	12.55	0.95	10.60	14.10
FRET (%)	8.90%	9.10%	3.05%	3.20%	14.50%
DCON (Ratio)	0.65	0.67	0.12	0.40	0.85
STOK (%)	12.30%	11.50%	5.80%	5.00%	25.00%
FEXP (Log)	9.80	9.75	0.75	8.40	11.20

Source: EViews 12.0

Based on the descriptive statistics presented in Table 1, the performance and characteristics of the sampled Nigerian Pension Fund Administrators (PFAs) can be interpreted as follows. The average Pension Fund Performance (PFP) of 6.45%, with a relatively low standard deviation of 2.10%, indicates a trend of modest but stable real returns across the industry, though the minimum value of 2.50% highlights that some funds struggle to generate adequate yields.

The conservative investment posture of the sector is confirmed by the mean allocation to Stocks (STOK) of 12.30%, which is substantially below the regulatory ceiling, suggesting a risk-averse strategy that may prioritize capital preservation over aggressive growth.

Furthermore, the mature profile of the industry is evidenced by the average Fund Age (FAGE) of over 15 years, while the high mean for Contribution Density (DCON) of 0.65 reflects a reasonably consistent inflow of contributions. The close alignment of the mean and median values for most variables, alongside moderate standard deviations, suggests that the data is generally well-distributed without extreme skewness, providing a reliable foundation for further inferential analysis.

Table 2
Correlation Matrix

Variable	PFP	FVAL	FAGE	FSIZ	FRET	DCON	STOK	FEXP
PFP	1.000							
FVAL	0.452*	1.000						
FAGE	0.198	0.310	1.000					
FSIZ	0.489*	0.950*	0.350	1.000				
FRET	0.810*	0.401	0.155	0.420	1.000			
DCON	0.225	0.110	0.288	0.095	0.180	1.000		
STOK	0.601*	0.255	-0.110	0.280	0.655*	0.145	1.000	
FEXP	-0.550*	0.405	0.245	0.520*	-0.480*	-0.098	-0.320	1.000

Source: EViews 12.0

The correlation matrix reveals several critical preliminary insights into the determinants of pension fund performance in Nigeria. A very strong positive correlation (0.810) exists between Fund Returns (FRET) and Performance (PFP), suggesting that investment income is a primary driver of fund success.

Similarly, a moderately strong positive correlation with Stocks (STOK) (0.601) indicates that equity investments, though conservative on average, are beneficial. Conversely, the significant negative correlation with Fund Expenditure (FEXP) (-0.550) confirms that higher operational costs directly erode net returns.

A critical diagnostic finding is the exceptionally high correlation between Fund Value (FVAL) and Fund Size (FSIZ) (0.950), signaling severe multicollinearity that necessitates remedial measures, such as dropping one variable or using a composite index, in the regression analysis to ensure reliable coefficient estimates.

Post-Estimation Diagnostic Tests

The post-estimation diagnostic tests conducted for the panel regression model revealed that although severe multicollinearity exists between Fund Value (FVAL) and Fund Size (FSIZ), it does not invalidate the overall model but only affects the precision of their coefficients. Both the Hausman test and the Lagrange Multiplier (LM) test confirmed that the Random Effects Model (REM) is the most appropriate specification for the data, as the Hausman test showed a p-value greater than 0.05.

This result indicates that the REM estimator is consistent and the LM test showed a p-value less than 0.05, confirming that Random Effects outperforms Pooled OLS. These findings collectively demonstrate that the cross-sectional differences among PFAs are significant and should be accounted for through the REM framework.

Furthermore, the heteroskedasticity test indicated the presence of non-constant variance in the residuals, while the Wooldridge test showed no evidence of serial correlation. As a corrective measure, the Random Effects Model was estimated using robust standard errors, ensuring unbiased and efficient coefficient estimates despite heteroskedasticity. Altogether, the battery of diagnostic tests validates the robustness and reliability of the chosen Random Effects Model for analyzing the determinants of pension fund performance in Nigeria. Ameen.

Table 3

Regression Result (Random Effects Model with Robust Standard Errors)
Dependent Variable: PFP

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	0.015	0.024	0.625	0.535
FVAL	0.002	0.004	0.500	0.619
FAGE	0.000	0.001	0.000	0.999
FSIZ	0.005	0.005	1.000	0.322
FRET	0.455	0.085	5.353	0.000
DCON	0.018	0.022	0.818	0.417
STOK	0.125	0.045	2.778	0.008
FEXP	-0.021	0.008	-2.625	0.011
R-squared	0.781			
Adjusted R-squared	0.752			
F-statistic	26.45 (0.000)			
p<0.01, ** p<0.05				

Source: EViews 12.0

Based on the regression results, the model is statistically significant and robust, as indicated by the F-statistic of 26.45 (p-value = 0.000) and an Adjusted R-squared of 0.752. This means that the collective influence of the independent variables explains 75.2% of the variations in Pension Fund Performance (PFP) in Nigeria, confirming the model's strong explanatory power.

The analysis reveals three key determinants with statistically significant effects. Fund Returns (FRET) has the most potent impact, with a coefficient of 0.455 ($p<0.01$), indicating that a 1% increase in gross returns leads to a 0.455% improvement in PFP, underscoring its role as the primary performance driver.

Conversely, Fund Expenditure (FEXP) shows a significant negative relationship (coefficient = -0.021, $p<0.05$), confirming that higher operational costs directly erode net returns. Furthermore, investment in Stocks (STOK) has a positive and significant effect (coefficient = 0.125, $p<0.05$), validating that strategic equity allocation enhances performance.

Notably, Fund Value (FVAL), Fund Size (FSIZ), Fund Age (FAGE), and Contribution Density (DCON) were found to be statistically insignificant, suggesting that in the Nigerian context, scale, maturity, and contribution consistency are less critical than investment returns, cost efficiency, and strategic asset allocation in determining fund performance.

Discussion of Findings

The significance of the regression model confirms that the selected determinants collectively provide a powerful explanation for performance variations in Nigeria's pension industry. The findings, however, reveal a critical nuance: in the current Nigerian economic

landscape, performance is driven less by fundamental scale or demographic factors and more by strategic financial management and operational efficiency.

The high inflationary environment (with inflation often surpassing 20%) and persistent currency volatility mean that achieving real positive returns is the paramount challenge for Pension Fund Administrators (PFAs). This context makes the significant variables fund returns, stock investments, and expenditure the primary levers for ensuring contributor savings are not eroded over time.

The most potent determinant of pension fund performance is Fund Returns (FRET), a finding that resonates strongly with global and local empirical evidence. Studies by Hassan & Idris (2023) in Nigeria and Peterson & Davis (2023) in the U.S. consistently identify gross investment income as the cornerstone of solvency and sustainability.

In Nigeria's current economy, characterized by fluctuating interest rates and limited high-yielding fixed-income instruments, the ability to generate robust returns is a key differentiator among PFAs. This finding operationally validates the core objective of any investment vehicle: to grow its asset base. The rejection of $\mathbf{H_{04}}$ underscores that, despite all other factors, the primary engine of pension fund growth remains the gross returns generated from its investment portfolio.

Furthermore, the positive and significant effect of investment in Stocks (STOK) offers a crucial insight for the Nigerian pension industry. This result aligns with the principles of Modern Portfolio Theory (MPT), which advocates for diversification into growth-oriented assets like equities to optimize the risk-return profile.

While the descriptive statistics revealed a conservative average allocation of 12.3%, the regression confirms that those PFAs who strategically approached this ceiling were rewarded with enhanced performance. This finding challenges an overly cautious investment stance and is supported by Hassan & Bello (2023), who argued that a balanced equity exposure is essential for long-term real growth in Nigeria. In an economy where government securities often offer negative real returns due to inflation, a strategic foray into equities, despite their volatility, is not just an option but a necessity for preserving the value of pension assets.

Conversely, the significant negative relationship between Fund Expenditure (FEXP) and performance provides a clear cautionary note. This finding is a direct empirical validation of Agency Theory, which warns that the interests of agents (PFAs) may not always align with those of principals (contributors), potentially leading to high operational costs that diminish net returns.

In a competitive and cost-sensitive environment, inefficiencies and excessive administrative overheads directly reduce the savings accumulated for retirees. Previous studies by Babalola (2021) in Nigeria and Andonov & Rauh (2022) internationally have similarly highlighted how cost control is a critical component of fiduciary duty. The rejection of H_07 implies that for Nigerian PFAs, operational prudence is as important as investment acumen, and unchecked expenditure can systematically undermine the benefits of strong gross returns.

The statistical insignificance of Fund Value (FVAL), Size (FSIZ), Age (FAGE), and Contribution Density (DCON) is a particularly insightful finding for the Nigerian context. It suggests that the presumed advantages of scale and maturity have not yet materialized effectively within the industry. This contrasts with studies from more developed markets like Fischer & Rauh (2023), who found clear economies of scale.

In Nigeria, this may indicate that larger or older funds are plagued by bureaucratic inertia or that their growth has not been matched by proportional gains in investment sophistication. The insignificance of Contribution Density, which contradicts findings by Rodriguez & Suarez (2023) in Latin America, may reflect structural issues within the Nigerian labor market, such as a large informal sector and inconsistent remittances from the formal sector, which dilute the potential performance benefits of a dense contributor base.

The failure to reject $\mathbf{H_{01}}$, $\mathbf{H_{02}}$, $\mathbf{H_{03}}$, and $\mathbf{H_{05}}$ directs policy attention away from sheer size and towards the quality of fund management, governance, and strategic asset allocation as the true pathways to superior pension fund performance in Nigeria.

5. Conclusion and Recommendations

In conclusion, this study establishes that the performance of pension funds in Nigeria is not a function of scale or age, but is predominantly determined by strategic financial management and operational efficiency. The empirical evidence confirms that Fund Returns and strategic allocation to Stocks are the primary drivers of positive performance, directly translating into higher returns for contributors.

Conversely, Fund Expenditure acts as a significant drag on performance, underscoring the critical impact of cost efficiency. The insignificance of variables like fund size, value, age, and contribution density reveals that the theoretical economies of scale and benefits of maturity have not materialized in the Nigerian context, likely offset by structural inefficiencies and market limitations. Therefore, the pathway to enhancing pension fund performance in Nigeria lies not in pursuing mere asset growth, but in optimizing investment strategy and enforcing rigorous cost control.

Based on the findings, the following prioritized recommendations are proffered: Prioritize Strategic, High-Yield Asset Allocation: Pension Fund Administrators (PFAs) should move beyond conservative investment postures and dynamically optimize their portfolios within regulatory limits. This includes strategically increasing exposure to equities and other high-yield asset classes to enhance Fund Returns, which is the most critical performance driver. Investment committees should be mandated to pursue superior real returns to combat inflation.

Implement Strict Cost Efficiency Benchmarks: The National Pension Commission (PenCom) should enforce stricter efficiency ratios and transparent reporting of operational expenditures. PFAs must adopt lean administrative models, leverage technology to automate processes, and undergo regular cost-benefit audits to ensure that Fund Expenditure does not erode the value generated for contributors, in direct alignment with the principles of Agency Theory.

Enhance Governance and Managerial Expertise: To leverage the benefits of scale that current larger funds have failed to realize, PFAs should invest in superior governance frameworks and talent. This involves recruiting and retaining skilled investment professionals justified by Efficiency Wage Theory and empowering boards to focus on strategic oversight and innovation rather than bureaucratic management, thereby transforming fund size and age into a competitive advantage.

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