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The Impact of Contribution Density, Size, Idle Contributions, and Pension Funds' Performance

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ABSTRACT: Management of pension funds is crucial to ensure that the funds yield better returns. This study offers answers to three issues based on evidence from Nigeria: (a) to what extent has the density of pension contribution influenced the investment performance of PFAs? (b) to what extent has idle contribution affected the investment performance of PFAs? (c) to what extent does the pension contribution size induce the investment performance of PFAs? Pension fund administrators (PFAs) are reliable catalysts for steady economic growth. Effective We applied the generalized least square (GLS) regression based on PFAs performance between 2014 and 2023 to evaluate the connection between four financial assets that the PFAs invest in and the investment returns. Contribution density, idle contribution, contribution size, total pension fund assets, and leverage are critical factors in determining investment performance. A positive coefficient for contribution density was reported for the adopted regressors. This implied that the PFAs could improve their performance if credence is given to their contribution density because of contribution density. We recommend measures that would boost the sustainability of pension funds, securing better retirement outcomes for contributors and strengthening the financial ecosystem.

Keywords: Pension Fund Administrators, Generalized Least Square, Economic Growth and Development

INTRODUCTION

The need to ensure the management of pension funds in the best possible ways or most "effective manner was borne out of the need to ensure that they yield better returns on investment, a move capable of improving the fortunes of the pensioners who seem to be the beneficiaries because of interest generated by these funds. Pension funds and assets are a reliable catalyst for steady economic growth and development and development. This is because the relevance of pension administration goes far beyond old-age support mechanisms. At the same time, targeted macroeconomic benefits include but are not limited to aiding labor, development of money markets, and capital markets, among

others (Zubair, 2016). Before the 2004 Pension reforms, The Federal and State government's failure to pay pensions and gratuities on time or at all was one of the many problems that plagued Nigeria's pension fund administration. As of December 2005, for example, the backlog of pensions was estimated to be at N2.56 trillion.

Millions of former Nigerian workers live in extreme poverty and are frequently neglected and underprovided after retirement, making pension fund management a difficult problem. (Iwegbu, 2020). It is no gainsaying that before the enactment of the Pension Reform Act 2004, the country had operated a defined benefit scheme that was largely unfunded and non-contributory, and at the same time, led to massive accumulation of pension debt over time. The scheme to this end became unsustainable essentially because of the inability of the government to provide timely and adequate budgetary provisions and increases in salaries and pensions (Ajibola, 2021). Pension funds must be prudently administered firstly because of the need to ameliorate the conditions of the would-be beneficiaries, who, after serving their fatherland in various possible ways or after rigorous and active services for decades, deserve to get something reasonable to fall back to and sustain their economic or financial needs for the rest of their lives, secondly, because of the tendencies of these funds to be invested in strategic sectors of the country's economy, to ensure steady development in critical sectors of the economy.

Several studies have examined how pension funds affect economic growth and development and impact investment performance. Most of the previous studies, such as Adesodun and Rapheal (2020), Iwegbu (2020), Apriyanto and Firdiansjah (2021), Fapohunda (2021), Eme and Uche (2021), Zubair (2023), Abubkar (2023), Ibrahim et al. (2024) and others that examined the subject matter in Nigeria did not specifically study the impacts of contribution density, idle contribution and contribution size about pension administrators performance. This leaves the subject matter in Nigeria unresearched. Ezugwu and Itodo (2020) investigated equity, which accounted for the largest percentage of the portfolio and yielded the highest return of N2.8528 billion. They note that the steady rise in return over time as the weight of the portfolio's asset classes increases points to a strong correlation between the magnitude of an asset and its return. Past studies on the subject matter did not specifically study the implications of pension contribution density, pension idle contribution, and pension contribution size on the investment performance of pension fund administrators (PFAs) in Nigeria.

This study attempts to answer three issues based on evidence from Nigeria.

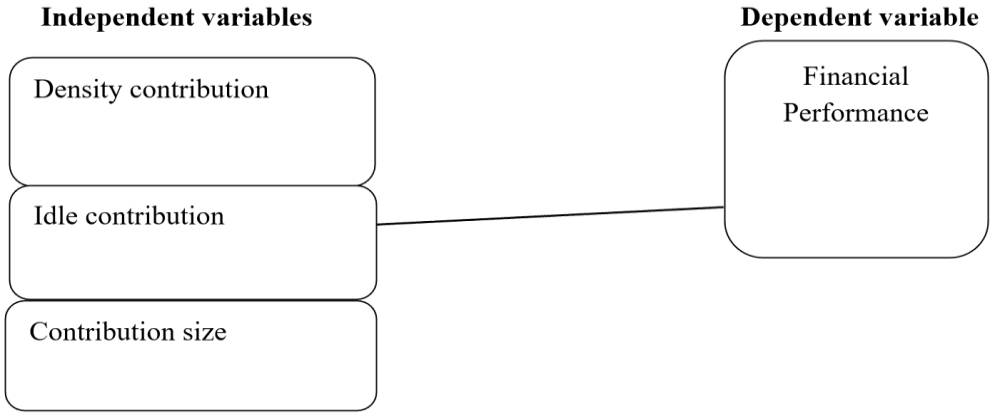
1. To what extent does the pension contribution density affect PFAs's performance in Nigeria?
2. To what extent has idle contribution affected the performance of PFAs in Nigeria?
3. To what extent does the pension contribution size induce the performance of PFAs in Nigeria?

The research has objectives as follows:

1. Show how the density of pension contributions affects the PFAs' performance in Nigeria.
2. Analyse how idle contribution affected the performance of the PFAs in Nigeria.

3. Demonstrate how the pension contribution size induces the performance of PFAs in Nigeria.

This study examines how pension contribution density, idle contribution, and contribution size have induced the investment performance of PFAs in Nigeria. We depict the conceptual framework that shows how the investment in securities" (independent variable) connects with the PFAs' financial performance (dependent variable).



Source: Researchers (2024)

Theory of Capital Accumulation

Capital is defined essentially as economic or commercial asset value that is derived, "in this case, from infrastructural development. Capital incorporates both power and productivity (Nitzan & Bichler, 2000). Marx (1867) defines capital as the means of production and does not undergo any quantitative alteration of value in the production process. Oluitan and Falode (2020) adopted Karl Marx's capital accumulation as the operation whereby profits are reinvested into the economy, increasing the total quantity of capital. Marx stressed capital as the expanding of value, which means a sum of capital, usually expressed in money, that is transformed through human labor into a larger value and extracted as profits.

Marx defined capital accumulation as employing surplus value and reconverting it to capital; Marx further explained that the accumulation of surplus value indicates the appropriation of unpaid labor to extend the appropriation of unpaid labor. Marxian theories of accumulation and crisis cannot be based on real forces alone but need to consider the interaction of monetary and real forces in a concrete historical analysis, Eckhard (2002). The real analysis is based on the development of the technical conditions of production, and the development of distribution determines the accumulation path. It is assumed that capitalist profits limit accumulation, and the rate of capitalist savings determines the accumulation rate. Marx (1894) Marx's theory of capital accumulation and growth should be based on the principle of effective demand.

Nitzan and Bichler (2000) termed capital a function of factor inputs, which is the number of different factors of production labor, raw materials, and capital goods used to produce that output. Capital accumulation is an income-generating fund or financial wealth; these have the stock of physical

instruments or capital goods. Capital goods are funds or advances whose principal role is to 'assist' with the original factors of production - labor and land. The neoclassicist or Marxist could not clearly define what is being accumulated, which is a problem, but it is assumed that accumulation could be measured in material terms.

The development of the profit share positively influences capital accumulation and capacity utilization and negatively influences the development of the capital potential output-ratio Eckhard (2002). The profit share will, therefore determine the rate of capital accumulation, the rate of capacity utilization, and the interest rate. The long-run accumulation rate is measured as the rate of growth of the capital stock (K), g= ΔK/K determined by the development of the rate of profit defined as the ratio of annual profits (Π) to the capital stock r=Π/K, and capitalist's propensity to accumulate out of profits a= ΔK/ Π. Marx's theory accumulates capital through a circulation scheme, (M-G-P-P'-C'-M'), where financial capital (money M), turns into commercial capital (commodities C), to be made into industrial capital (work in progress, or productive capital P), producing more industrial capital (P'), converted again into commercial capital (more commodities C') and finally into financial capital (more money M') (Nitzan & Bichler, 2000). The circulation scheme describes accumulation in backward working terms because profit is earned because of production, making accumulation the end of the process, to be measured in units of 'dead labor.' Absentee ownership reversed this order, turning accumulation into a forward-looking process. The value of a corporation, measured by its capitalization on the bond and stock markets, reflects not its past profit and interest, but what it is expected to earn in the future (Nitzan & Bichler, 2000).

To demonstrate this, we adopt the capital accumulation theory, according to past studies, including Venkatesh and Vanishree (2021) and Hassanudin et al (2023). We find that the contribution density, idle contribution, contribution size, total pension fund assets, and leverage are critical in determining investment performance. A positive coefficient for contribution density was reported for the adopted regressors. This implies that the selected PFAs could considerably improve their performance if credence is given to their contribution density because contribution density is a key driver of a PFA's performance. The growth opportunities of PFAs depend to some extent on contribution density. We recommend measures that would boost the growth and sustainability of pension funds, securing better retirement outcomes for contributors and strengthening Nigeria's financial ecosystem. The following is how the other sections are presented: Section 2 is the method, Section 3 presents the result, and Section 4 presents the conclusions.

Hypothesis Development

Ibish et al. (2020) examine the evaluation of the financial performance of pension funds in Kosovo, Albania, and North Macedonia. The paper revealed that increases in gross domestic product (GDP) and return on investment have positively influenced the performance of pension funds for the countries. Krishna (2020) examined the performance of the listed PFAs in India using Sharpe, Treynor, and Jensen's alpha as risk-adjusted measures. They found that the pension funds ltd has

dominated and performed better than other PFAs under Sharpe ratio & Jensen's performance measures. Bojana et al. (2019) examined the performance of pension funds in Croatia and discovered that the efficiency of the pension system has a significant impact on economic growth and social cohesion. The paper only focused on the technical efficiency of mandatory pension funds and failed to consider other factors that may influence the performance of pension funds.

Benedictus (2020) examined the factors that hinder pension fund investment in infrastructure in Namibia. He discovered that the lack of expertise, regulation, financial instruments, and assets that march pension funds are the barriers to pension fund investment in infrastructure. Kennedy (2021) examined the effect of real estate investments on the financial performance of pension funds in Kenya and found that assets such as real estate fixed income and equity had a positive and significant effect on the performance of pension funds.

H1: The density of pension contributions dos does not influence the performance of PFAs in Nigeria.

Olweny (2021) examined the impact of capital structure theories on the management of pension funds in Kenya, concentrating on Stanbic Bank Group Securities Company Limited. The study's conclusions indicate that desirable ratios and propositions are not directly correlated with the firm's size or value. Additionally, the report suggests that the tax impact be considered and that the pension plan is not doing anything that the shareholder could do directly and more tax-efficiently by investing in stocks. Nwanna and Ogbonna (2022) also investigated the development of pension management in Nigeria and its economic significance. The study found that pension management, as measured by the number of retirement savings accounts, total pension assets, and pension contributions, significantly enhanced Nigeria's economic growth. The report also suggests that pension management be effectively addressed to address the comparatively small number of retirement savings accounts in Nigeria.

Adesodun and Raphael (2022) report pointed out that the reform mandates that all employers with five or more workers sign up for the program, that the number of formal and informal sector members should not fall below 25 million, that PenCom as it currently stands is unable to collect and handle the necessary data, and that an independent central data management authority must be established. Additionally, it was recommended that PenCom focus solely on its regulatory role and guarantee the compliance of all parties involved, establish a basic registration system, revisit service records in the federal and state civil services, military, and paramilitary, verify membership records for other formal sectors, conduct a census of all informal employers and contributors, and verify retiree records.

H2: The idle contribution does not affect the performance of PFAs in Nigeria.

Ndum and Okoye (2022) revealed a significant positive relationship between pension fund assets, contribution, investment, and gross domestic product at a 5% significance level. Ogungbade et al. (2022) assessed significant differences between the asset classes and investment income components. They found that the accumulation of assets by the PFAs impacts the financial performance of the pension funds. Handoko (2023) shows that the size of the asset and the kind of pension fund has a major impact on the investment portfolio in Indonesia, and all the independent factors have a large impact on the pension fund at the same time. Additionally, the kind of pension fund positively and

substantially impacts the investment portfolio. In contrast, the asset size of the pension fund has a positive and large impact on" the investment portfolio.

H3: The pension contribution size does not affect the performance of the (PFAs) in Nigeria.

METHODS

The paper follows a normal procedure to evaluate hypotheses. To describe the variables, we show basic statistics, including mean, standard deviation, minimum, and maximum. We present correlations to define the direction and strength of the relationship among the variables. The estimated coefficient would lie between –1 and +1, with a mid-point at 0, showing the non-existence of linear evidence. The correlation coefficient (denoted $r_{x_1x_2}$) between a data pairs (x_i, x_j), with n-set $[(x_{1,1}, x_{2,1}), x_{1,2}, x_{2,2}), \ldots, (x_{1,n}, x_{2,n})]$, is computed from equation (1).

$$r_{x_1x_2} = \sum_i^n (x_{1,t} - \bar{x}_1)(x_{2,t} - \bar{x}_2) \left[\sqrt{(x_{1,t} - \bar{x}_1)^2}\sqrt{(x_{2,t} - \bar{x}_2)^2}\right]^{-1} \quad (1)$$

The paper follows modeled according to the work of Eme et al. (2014), Venkatesh and Vanishree (2021), and Hassanudin et al. (2023). This study adapted the model of Abubakar (2023) which examined pension fund investment in Nigeria from an Islamic Perspective. The study adopts the theory of capital accumulation theory as a theoretical framework. The performance of the selected PFAs was proxy by Return on Assets (ROA), while the contributory pension scheme was depicted with the Density of the Contribution ($CONT_{i,t}$), Idle Contribution ($IDLEC_{i,t}$), Contribution Size ($SIZ_{i,t}$), Total Pension Fund Assets ($TPFA_{i,t}$) and Leverage ($LEV_{i,t}$). Therefore, equation 2 (functional form) and equation 3 (linear form) provide the model showing how the contributory pension scheme impacts the investment performance of the selected PFAs.

$$\text{ROA}_{i,t} = f(CONT_{i,t}, IDLE_{i,t}, SIZ_{i,t}, TPFA_{i,t}, LEV_{i,t}) \quad (2)$$

$$\text{ROA}_{i,t} = \beta_0 + \beta_1 CONT_{i,t} + \beta_2 IDLEC_{i,t} + \beta_3 SIZ_{i,t} + \beta_4 TPFA_{i,t} + \beta_5 LEV_{i,t} + \mu_{i,t} \quad (3)$$

β_i $(for\ i = 0\ to\ 5)$ are parameters of estimation, $\mu_{i,t}$ is the error term, i = cross-sectional variable, and t = time series variable.

We estimated the model using the panel data regression, based on the Random effects generalized least square (GLS) regression based on PFAs performance between 2014 and 2023. It was accepted because the panel data estimate technique addresses the heterogeneity related to individual variables. The outcome is more variability due to less collinearity among variables, more degrees of freedom, greater efficiency, and more relevant information by combining time series of cross-sectional observations. Panel data reduces the potential bias from aggregating individual pension administrators (Gujarati, 2015). It also enriches empirical analysis in a way that may not be possible if only time series or cross-sectional data were used.

RESULT AND DISCUSSION

Table 1 presents the descriptive statistics for selected pension administrators' dependent and explanatory variables. The table presents information on the character that each collected data exhibits concerning the average value of the series, the rate of dispersion, and minimum and maximum values for individual series. Table 2 presents the correlation analyses among the adopted variables specifically to establish whether the level correlations between each pair of the dependent and independent variables do not pose the threat of multicollinearity to avoid the problem of wrong model specification. The logic behind the assumption of no multicollinearity is that if the correlation coefficient between two variables is greater than 0.70, it could be interpreted and concluded that the variables have a multicollinearity problem. The solution to the multi-collinearity problem is to drop one of the collinear variables. This is supported by (Gujarati, 2015). It is worthy of note by implication that all adopted variables were not significantly correlated with each other from the pairwise correlation results in the table above, evidenced by the range value of variables correlation, which lies between -0.206 and 0.6838, suggesting the absence of multi-collinearity among the adopted variables for the model.

Table 3 provides statistical information on the estimated panel's random and fixed effects. Critical observation of the estimated panel's random and fixed effect shows that the random effect estimated panel is more robust than the fixed effect. Based on the result of the Hausman test that was conducted to decide on the best estimates from both the random and fixed effect model results. The result reveals a chi2 value of 6.71 with 0.0818 probability, which is above the 0.0500 significant margin, which suggests that the random effect is the best model to be estimated for objective three. Therefore, the random effect was selected and interpreted as the appropriate model.

Table 1. Descriptive Statistics

Variables	μ	σ	minimum	maximum
ROA	0.005	0.003	0.060	0.704
CONT	0.016	0.002	0.025	0.062
IDLEC	0.030	0.010	0.038	0.081
SIZ	0.003	0.001	0.061	0.090
TPFA	0.017	0.040	0.046	0.045
LEV	0.036	0.015	0.015	0.041

Source: Authors (2024)

Note: Table 1 shows the sample statistics (μ, σ, max, min), where $\mu \equiv$ Mean, $\sigma \equiv$ Standard deviation

Table 2. Pairwise Correlation Analysis

Variables	ROA	CONT	IDLEC	TPFA	SIZ	LEV
ROA	1.0000					
CONT	0.102	1.0000				
IDLEC	0.304	0.038	1.0000			

SIZ	0.410	0.159	0.294	1.0000		
TPFA	0.602	0.041	0.402	0.063	1.000	
LEV	0.052	0.061	0.518	0.662	0.402	1.000

Source: Authors (2024)

Note: Table 2 shows the Pearson correlation coefficients, $r_{x_1x_2}$, defined for linear correlation between a pair, x_i and x_j, having n-set $[(x_{1,1}, x_{2,1}), (x_{1,2}, x_{2,2}), \ldots, (x_{1,n}, x_{2,n})]$ with $r_{x_1x_2} = \sum_i^n (x_{1,t} - \bar{x}_1)(x_{2,t} - \bar{x}_2) \left[\sqrt{(x_{1,t} - \bar{x}_1)^2}\sqrt{(x_{2,t} - \bar{x}_2)^2}\right]^{-1}$, and the value lies between –1 and +1.

Table 3. Hausman Specification Result

Variables	Fixed	Random	Difference	S.E.
CONT	0.004	0.012	-0.008	0.005
IDLEC	0.298	0.320	0.023	0.011
SIZ	-0.039	-0.101	0.063	0.022
TPFA	0.297	0.299	-0.002	0.021
LEV	0.025	0.032	-0.007	0.011

Source: Authors (2024)

Table 4 presents the result of the panel data regression (Random-effects), which reveals that the coefficient of R^2 has a value of 0.48. This suggests that the adopted explanatory variables were able to explain 48% of the total variation in the performance of the sampled pension administrators depicted by Return on Assets (ROA), implying that the remaining 52%, which was not accounted for were the stochastic element of the model which represent the error terms. The F-statistics is significant at 1% considering its probability value of 0.0000, which posits that all the adopted independent variables were jointly substantial in explaining Return on Assets (ROA). Because of this, the model could exhibit a reasonable level of goodness of fit.

The coefficients of the constant (C) have a value of 0.0518. This suggests that if all the explanatory variables are held constant, the explained variable, depicted by Return on Assets (ROA), will surge by 0.0518 units. This shows that regardless of the change in the explanatory variables of the sampled pension administrators, Return on Assets (ROA) will respond accordingly. The density of the Contribution as part of the adopted regressors shows a positive coefficient of 0.0681, and it was statistically significant at a 10% level, as contained in the table above. This posits that in a situation where other predictor variables are held constant, by implication, a unit change in the Density of the Contribution will account for a 0.0681 unit increase in the Return on Assets. This agreed with the a-priori expectation that was early made for this study. Idle contribution as part of the adopted regressors reveals a positive coefficient of 0.2992 with Return on Assets but is not statistically significant, as contained in the table above. This suggests that where other regressors are held constant, a unit increase in the idle contribution will account for an increment of 0.2992 units in the Return on Assets of the population under study. The contribution size had a positive coefficient of 0.0320 with ROA, which was statistically significant at 5%, as in the table above. This suggests that where other regressors

are held constant, a unit change in the Contribution Size will account for an increase of 0.0320 units in ROA.

Total Pension Fund Assets have a control variable showing a positive coefficient of 0.502, and it was statistically significant at a 1% level, as contained in the table above. This posits that in a situation where other predictor variables are held constant, by implication, a unit change in Total Pension Fund Assets will account for a 0.502 unit decline in the ROA. This is in line with the adopted theory. Leverage as a control variable also shows a positive coefficient of 0413 but is not statistically significant. This posits that in a situation where other predictor variables are held constant, by implication, a unit change in leverage will account for a 0.0413 unit increase in the ROA of the selected pension Administrators. The outcome provides policymakers and regulators with a comprehensive overview of the entire performance of administrators.

Table 4. Random-effects GLS regression

Variable	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
CONT	0.068	0.035	1.980	0.008	0.001	0.136
IDLEC	0.299	0.048	6.250	0.103	0.205	0.393
SIZ	0.032	0.029	1.100	0.004	0.025	0.089
TPFA	0.502	0.038	4.20	0.000	-0.173	0.411
LEV	0.041	0.022	0.317	0.430	0.248	0.003
CONS	0.052	0.005	11.560	0.000	0.043	0.061
R-square	0.480					
F-statistics	0.000					

Source: Authors (2024)

CONCLUSIONS

The study revealed that contribution density, idle contribution, contribution size, total pension fund assets, and leverage are critical in determining the investment performance of the population under study. This offers insights into how contribution density, idle contribution, contribution size, total pension fund assets, and leverage impact the optimized return. We recommend measures that would boost the growth and sustainability of pension funds, securing better retirement outcomes for contributors and strengthening Nigeria's financial ecosystem.

We suggest that the PFA strengthen policies that encourage employers and employees to contribute regularly, enhancing fund inflows' stability and positively impacting PFA performance. Since idle contributions detract from the potential growth of pension assets, the PFAs should implement agile investment strategies to minimize idle time by swiftly allocating incoming contributions to high-performing assets, such as government securities, corporate bonds, or diversified equity portfolios. PFAs should implement policies that encourage higher contributions through incentives that could increase the fund size, thus enabling PFAs to pursue broader investment avenues and potentially higher returns.

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