ASSETS/ LIABILITIES MANAGEMENT AND PERFORMANCE OF PENSION FUNDS ADMINISTRATION IN NIGERIA: SHAREHOLDERS' FUNDS PERSPECTIVE

Dr.F. F. Olowokudejo[1] M.T. Oyerinde[2] Prof. M. A. Obalola[3]
08062704956 08033632311 08023352698

Email: (*folowokudejo@unilag.edu.ng*), (mosesoyerinde818@gmail.com), (mobalola@unilag.edu.ng)
[123]Department of Actuarial Science & Insurance, Faculty of Management Sciences
University of Lagos

Abstract

The research posed a significant relationship between Shareholder's funds and the Performance of Pension Funds Administration companies in Nigeria. An expost facto research design was adopted and cross-sectional data were sourced from 12 PFA companies covering years 2010-2021 using a purposive sampling. Data were analysed using fixed effect and random effect regressions. Hausman zest was also carried out and the null hypothesis of a random effect model is rejected. The results revealed that the variables fairly explain the relationship between asset liability management and pension fund companies' performance. The correlation between ROA and shareholders' funds is not only positive but has proven to be very significant. Hence, PFAs must ensure strategic asset liability management to return good value to shareholders to justify confidence reposed in the pension fund managers.

Keywords: *Administration, Fund, Pension, Performance, Shareholder, Nigeria*

1.0 Introduction/Background of the Study

The efficient management of liabilities is crucial for the financial performance of PFAs. They must effectively manage administrative expenses, pension payments, and other liabilities to optimize costs. By implementing streamlined processes, leverage on technology solutions, and adopting efficient operational practices, PFAs can minimize costs, improve profitability, and enhance their overall financial performance. Effective cost management also allows PFAs to offer competitive fees to contributors while ensuring sustainable growth and profitability.

Furthermore, effective communication and transparency regarding assets and liabilities management are vital for PFAs in Nigeria. They must provide clear and timely information to pension contributors, regulatory authorities, and other stakeholders regarding their investment strategies, risk management practices, and financial performance. Transparent reporting fosters trust, enhances credibility, and confidence in the pension system, positively impacting the financial performance of firms (Fadun, & Oye, 2020).

The lack of robust and efficient asset allocation strategies is one of the issues affecting PFAs in Nigeria. The absence of well-defined investment policies, risk assessment frameworks, and portfolio diversification strategies can hinder the ability of PFAs to generate optimal investment returns. Insufficient asset allocation practices may lead to underperformance or excessive exposure to certain asset classes, potentially affecting the financial performance of PFAs. Hence, in line with this problem, study coined to know whether there is or no significant effect of Macro-economic factors on profitability of pension funds administration.

Obasa, (2022), provide the goal of asset liability management (ALM) as that of assuring the applicable coordination between assets and liabilities to achieve the organization's goal for a particular stage of dangers underneath predefined constraints. Thus, the asset liability management (ALM) branch is accountable for producing research and imparting suggestions on management approaches and asset allocation

2.0 Literature Review

Overview of Assets and Liabilities Management (ALM)

The analysis of asset liability management (ALM) heavily relies on the fluctuations in interest rates in developed countries, which have had both positive and negative impacts on pension fund services (Di Francesco, & Simonella, 2023). Before 1970, there were minimal variations in interest rates in developed nations, resulting in limited losses or mismatches between assets and liabilities. Liabilities arising from deposits, existing pension fund management, pension fund policies, or annuities were invested in assets such as loans, bonds, or real estate (Sangeeta, & Singh, 2023). All assets and liabilities were recorded at book value, effectively concealing the risks associated with pension funds due to divergences between assets and liabilities.

During the 1970s and early 1980s, a period of volatile interest rates emerged, posing significant challenges for pension fund institutions. In an attempt to control the interest rates that pension fund administrations could offer depositors, regulations were implemented in developed countries. However, this resulted in the migration of market opportunities for US deposits to overseas markets (Di Francesco, & Simonella, 2023). The associated risks were not immediately apparent due to the use of accrual accounting by most companies.

These companies gradually accumulated pension fund losses over the following five or ten years. One notable example is the equitable life pension fund industry. The lessons learned during this period led to the development of more robust asset liability management (ALM) practices. Managers of pension fund administration companies sought ways to manage their balance sheets through various strategies, aiming to maintain a balanced mix of credit through contributions, liabilities, and investments. This approach aligned with the primary function of pension fund management, ensuring long-term growth and risk management.

The result was the enhancement of novel pension fund strategies, including gap analysis, duration assessment, and scenario evaluation within every pension fund management and pension fund administration organization.

Conceptual Framework

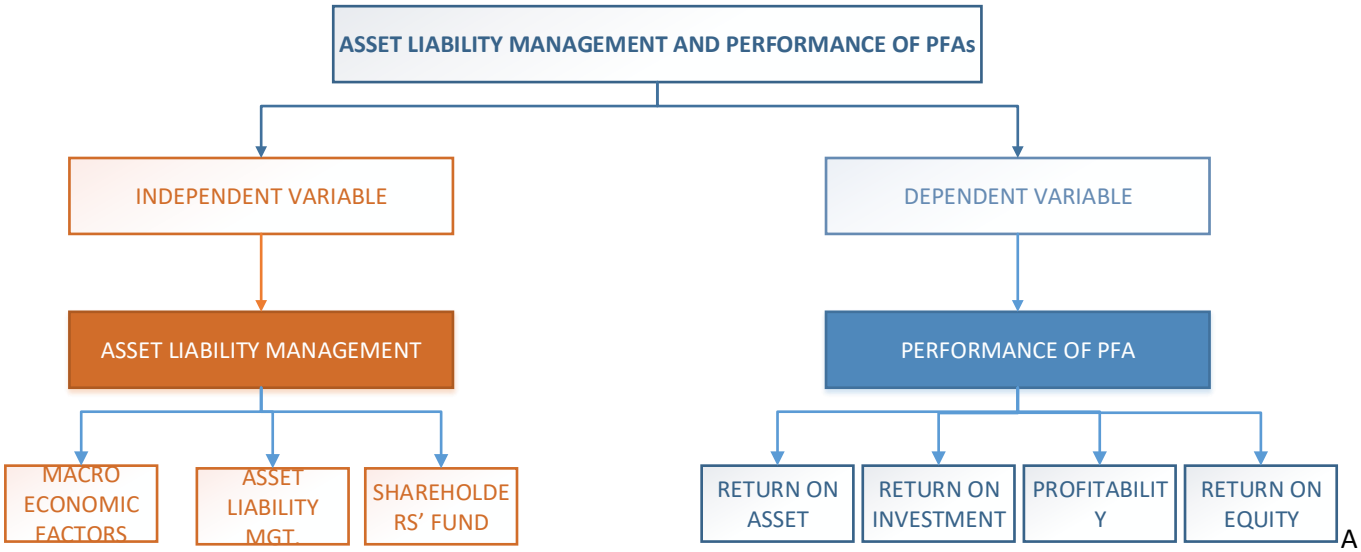
The Concept of Assets and Liabilities Management (ALM)

Ukpong, & Olowokudejo (2021) and Baum (2016) at reference provide a definition of assets as resources that are expected to provide future benefits, indicating the potential to generate revenue. Conversely, liabilities are obligations or debts that arise from business activities and represent a responsibility to settle. Asset liability management (ALM) encompasses various models used to predict the development of a company over time by analysing their assets and liabilities portfolios, as well as calculating expected cash inflows and outflows (Baum, 2016).

ALM can be applied in the administration of pension funds, within the pension fund industry, and in other pension fund organizations such as national pension funds or companies with extensive and diverse assets and liabilities. Orreborn (2017) defines ALM as the management of asset allocation in relation to the cash flows of a firm's liabilities, involving the mitigation of risks arising from mismatches between assets and liabilities. He further characterizes ALM as an ongoing process of devising, implementing, monitoring, and adjusting strategies related to assets and liabilities to achieve the pension fund's objectives, considering the organization's risk tolerance and other constraints.

Conceptual Framework

THE RESEARCHER'S CONCEPTUAL MODEL



Author concept: 2023

Theoretical Framework

Modern Portfolio Theory (MPT)

Modern Portfolio Theory (MPT)- Orreborn (2017) introduced by Markowitz is a seminal concept in financial economics. Markowitz, an American economist, was awarded the Nobel Prize in Economic Sciences in 1990 for his pioneering work in this area (Atari, 2021). MPT revolutionized investment strategies by introducing the concept of diversification. The theory contends that a portfolio's risk should not be assessed by the individual risks of its components but rather by how those components interact with one another. Markowitz's work laid the foundation for understanding the relationship between risk and return in a portfolio, emphasizing the importance of not only seeking higher returns but also managing risk through diversification.

The Relevance of Modern Portfolio Theory (MPT) to the Study

In the study of the impacts of assets and liabilities management on the financial performance of Pension Fund Administration (PFA) in Nigeria, Modern Portfolio Theory (MPT) holds profound relevance. MPT provides a systematic framework for constructing and managing portfolios, which is particularly crucial

for PFAs entrusted with safeguarding the financial interests of pension contributors. The application of MPT principles allows PFAs to optimize their investment portfolios by diversifying across various asset classes, thereby achieving a balance between risk and return. In the context of PFAs managing pension funds, MPT offers a strategic approach to aligning investment decisions with the long-term obligations of the fund, ensuring that assets are managed prudently to meet future liabilities. By embracing MPT, PFAs can enhance the resilience of their portfolios, potentially improving overall financial performance and, ultimately, fulfilling their fiduciary responsibilities to pension contributors in Nigeria.

The Relevance of Statistical Cost Accounting Theory (MPT) To the Study

The statistical cost accounting principle of regular least rectangular regression is normally used to estimate the parameters of the mannequin on a cross-sectional pattern of data. The parameters of the asset are anticipated to have fine signs, whilst that of liabilities is anticipated to show up with terrible signs. The intended profits realized via the pension funds administration will be linear characteristics of the factors of its portfolio. To this end, a pension fund administration's earnings (net income) can be expressed as the weighted sum of its number of assets and liabilities (Michael, Nwabuisi, & Trimisiu, 2022).

Empirical review

Several empirical studies focusing on Asset Liability Management (ALM) and profitability have been conducted within the banking sector, primarily concentrating on strategic measures of bank profitability. Notable works in this area include those by Mweu, (2022), Juliana, (2024), TANWAR, (2022) and Amira (2024).

Furthermore, a considerable amount of research has been carried out on ALM and pension fund companies recently, with a focus on solvency, stochastic analysis, and profitability. Noteworthy studies in this domain include those by Metselaar, Zwaneveld, & van Ewijk, (2022) and Teixeira Damasceno, & de França Carvalho, (2021).

The relationship between ALM and the profitability of Pension Fund Administrators (PFAs) has received limited attention, as evidenced by the scarcity of literature on the subject. Additionally, while the Stochastic Control Approach (SCA) model has been applied in the banking industry, its full application in the pension sector, particularly in PFAs, remains unexplored. Given that banks, pension funds, and pension companies operate within the same financial sector, there is a rationale for applying the same model to PFAs to assess its effectiveness and bridge this research gap.

This study aims to address this gap and provide valuable insights for insurers, offering a comprehensive database and resource material on ALM and profitability in PFAs. Moreover, the study contributes to the existing literature by presenting findings on ALM and profitability specific to PFAs in a developing country like Nigeria.

3.0 Methodology

The data was collected using descriptive survey research design. This involves the collection of data for the purpose of describing and interpreting the existing situation. The data reflects the assets and liabilities management and pension funds administration. The instrument employed was secondary data (e-view).

The justification for using secondary data (e-view) is because it is the best method for collecting highly confidential information. It does not expose the investigator to danger as in the case of observation method. The study covers the twelve years (2010 to 2021) pension funds analysis of the selected pension funds administration in Nigeria.

The population of the study is made up of 12 licensed PFAs by PENCOM to operate in pension market as at the time of the study. Sample size is selected based on 2 criteria: the existence of the company through the study period (2010- 2021) and the availability of the financial statements. Ten (12) PFAs met these criteria and were duly selected as the sample size for this study. These companies are: FCMB Pension, ARM Pension, FUG PFA, Radix PFA OAK PFA, Fidelity PFA, IEI ANCHOR PFA, Leadway PFA; Crusader Sterling PFA, Trust Fund PFA, IBTC PFA and PAL PFA

The Sampling method adopted was purposive and convenience sampling method using secondary data (e-view) to collect data; Purposive and convenience sampling is used to draw a portion of the population that are in existence within the study period and whose complete audited financial statements are accessible. Purposive and convenience sampling was considered appropriate as the existence and availability of the audited financial statements of the PFA companies for the period of study are very essential.

The secondary data was used for the study. The secondary data (e-view) was used to gather the relevant information that was analyzed through the use of the e-view method.

The secondary data required for the study is sourced from the National Pension Commission Database and from the websites of the selected pension funds administration. The PENCOM and PFAs websites database pension funds statements of the randomly selected (12) pension funds administration for 12-year period covering from 2010-2021. These companies are: FCMB Pension, ARM Pension, FUG PFA, Radix PFA OAK PFA, Fidelity PFA, IEI ANCHOR PFA, Leadway PFA; Crusader Sterling PFA and; Trust Fund PFA, STANBIC IBTC PFA and PAL PFA.

The data analytical procedure was used to find out how all the secondary data (e-view) that was been used are to be analyzed. The secondary data of panel data (time series: e-view formula) was used as the database financial statements of the selected pension funds administration of Nigeria for 12-year period covering from 2010-2022 time series

To analyze the implication of assets and liability management on the performance of Pension Funds Administration in Nigeria, the secondary data of (e-view formula) were adopted. The conceptualization was done based on the research objective

For the research objective, Assets and liability management was conceptualized based on the Nigeria Pension funds Administration which is return on Assets (ROA),

The data was analyzed using the Pearson's product moment correlation and logistic regression instrument. To recognize the relationship existing between the independent and dependent variables, the regression model was adopted and equations formed through the influence of the independent variables and dependent variables the general form of models adopted were:

Financial Performance (Y) = $\alpha_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + e\ it$
Were

β_1, β_2, β_3, β_4, β_5 = represents the coefficients for the independent variables (Return on assets, Profit after tax/total assets, Cash and cash equivalents, Financial assets, Debtors and prepayments).

α_0 = represents the intercept for X variable of performance of PFA.

In examining the effect of ALM on the profitability PFA companies, the statistical cost accounting (SCA) model is adopted. This model was first postulated by Owusu, & Alhassan (2021) and had subsequently been adopted. The SCA model is based on the assumption that the rate of return of earning assets is positive and varies across assets whereas the rate of cost on liabilities is negative and varies across liabilities, Its basic theoretical framework is based on the fact that ALM has potentially positive or negative energy on the profitability of financial firms in the presence of other factors such as the market structure and macroeconomic conditions. These macroeconomic factors have been incorporated by Issah, & Antwi, (2017), Liu, et, al (2021) and Ceylan, (2021) in a bid to present the traditional model in a modified way. Tamiru (2013) posits that if these factors are not included in the model, the regression results may be unreliable and the coefficients biased. Thus, the SCA model is basically:

$$Y_{it} = \alpha_1 + \sum \alpha_{2i} A_{ilt} + \sum \alpha_{3j} L_{jkt} + e_{lt} \quad \ldots\ldots(1)$$

Where Y represents the profit of the firm

A_t, is the *i*th asset, i = 1,2…..*m*

L*j* is the *j*th liability, j = 1,2,….*n*

l-represents the number of firms, *l* = 1,2.,..k,

t is the time period, t = 1,2,…..*T*

$\alpha_{2i}$is the rates of return and shows the variations in profit by replacing one unit of cash with one unit of the *i*th asset and is expected to be positive or non-negative.

α_{2i} represents the rate of cost of liabilities and indicates the changes in profit by adding one unit of cash and one unit of *j*th liability and is expected to be negative or non-positive.

α_{3j} is a constant term, and

elt, is the stochastics error term accounting for stochastic differences among the firms (Owusu and Alhassan, 2020)

Kramaric.Miletic and Pavic (2017) in adopting this model for the Pension industry stated it thus:

$$Yit = c + \sum_{k=1}^{k} \beta_k X^k_{it} + \varepsilon_{it} \quad \ldots\ldots(2)$$

$\varepsilon_{it} = Z_i + U_{it}$

whereY_{it} is the profitability of the PFA company *i* at time *t*, with *i* = 1…,N; t = 1…, T.

X_{it} are k independent variables;

ε_{it} is the disturbance term with Z_i being the unobserved Pension-specific effect and u_{it} being the idiosyncratic error as a one-way error component regression model.

Table 1: A description of both the explained and explanatory variables and their apiori expectations

Variable Profitability	**Description**	**Expected sign**
ROA Assets	Return on assets Profit after tax/total assets Cash and cash equivalents Financial assets Debtors and prepayments	 Positive (+) Positive (+) Positive (+)

Assumption:

This analysis assumes that companies with a negative return of assets are assigned a probability ratio (Y) of zero.

Secondary data collected is prepared in Microsoft excel and imported to E-views 9 for analysis. Panel data analysis is carried out in line with the objectives of the study. Mohajan, (2020) opines that the advantage of using panel data is that it controls for individual heterogeneity and less collinearity among variables. Moreover, trends in the cross sectional data can easily be tracked which would have been difficult to achieve with either the trend series or the cross sectional data (Liu, Wang, & Xu, 2024). The time series data also allows for dynamic adjustment. Data is subjected to descriptive statistics, correlations, and panel data regressions. The Hausman test is used to determine the preferred model out of fixed effect and random effect models.

Variables used in the analysis are chosen based on relevant theory and literature in line with similar studies on the subject and based on the availability of data (secondary source). The data collected are presented in a tabulated and are interpreted in relation to the research objectives.

Then, in the study, nominal variables are used to measure the variables. Basically, nominal variables can be placed into categories like male/female, young, adult, senior or freshman junior/ senior etc. The study has two measurement variables (assets and liabilities management and pension funds administration), to analyzing the data (hypothesis test).

4.0 Data Analysis

Data Presentation

Table 2 below displays the statistical summaries of both the explanatory and explained variables, derived from a dataset amalgamated from 12 PFA firms, totaling 144 observations.

Table 2: Descriptive statistics

Date: 01/10/24 Time: 16:43
Sample: 1 144

	LOG(ROA)	LOG(TA)	LOG(TL)	LOG(TAL)	LOG(SF)	GDP	INF
Mean	4.885397	6.128833	5.314074	6.296071	4.017417	0.031967	0.123542
Median	5.592256	6.459876	5.715045	6.577915	6.046051	0.031500	0.121600
Maximum	8.103478	9.235765	8.971746	9.342364	9.103950	0.080100	0.169500
Minimum	0.000000	0.000000	0.000000	0.000000	0.000000	-0.017900	0.080500
Std. Dev.	2.278837	1.906392	1.943704	1.881561	3.283541	0.030011	0.028984
Skewness	-1.384977	-2.361453	-1.578092	-2.401245	-0.312024	-0.181686	0.104959
Kurtosis	3.635541	8.556420	5.665103	9.139082	1.342280	2.073107	1.875615
Jarque-Bera	48.45932	319.0779	102.3856	364.5134	18.82482	5.947018	7.849842
Probability	0.000000	0.000000	0.000000	0.000000	0.000082	0.051124	0.019744
Sum	703.4972	882.5520	765.2266	906.6343	578.5081	4.603200	17.79000
Sum Sq. Dev.	742.6131	519.7091	540.2518	506.2590	1541.775	0.128796	0.120129
Observations	144	144	144	144	144	144	144

Source: researcher's computation from E views 12 (2023)

Analysis of data

A unit root test was conducted on the dataset to examine its stationarity. Given the substantial magnitude of assets and liabilities values, a logarithmic transformation to the base 10 was applied to the data for this and subsequent analyses. This transformation aimed to reduce data variability, ensure uniformity, and produce more reliable outcomes. Both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests using Fisher's chi-square were utilized to assess stationarity. These tests evaluate the null hypothesis of a unit root against the alternative that the time series data for the variables are stationary. Rejecting the null hypothesis indicates that the series is stationary, implying it is integrated at order zero. Conversely, if the series is non-stationary, it is integrated at a higher order and must be differenced until it achieves stationarity or reaches the second order differencing, whichever occurs first.

Table 3: Unit root test

Variable	ADF		PP-Fisher chi square		Order of Integration
	Statistics	Probability	Statistics	Probability	
LOG(ROA)	-6.586044	0.0000	-6.447905	0.0000	I (0)
LOG(TA)	-9.224178	0.0000	-8.995008	0.0000	I (0)
LOG(TL)	-8.298251	0.0000	-7.925701	0.0000	I (0)
LOG(TAL)	-8.857591	0.0000	-8.637182	0.0000	I (0)
LOG(SF)	-4.202187	0.0009	-4.201433	0.0009	I (0)
GDP	-12.25448	0.0000	-6.322316	0.0000	I (0)
INF	-7.919895	0.0000	-8.895453	0.0000	I (0)

Source: researcher's computation from Eviews 12 (2023)

The table reveals that all the variables exhibited stationarity at level I (0). This suggests the absence of a unit root in all studied variables, indicating no shocks in the model and a likelihood that future statistical patterns will replicate past behavior.

Correlation analysis

To determine the degree of relationship between the variables, a correlation analysis was performed. This is due to the propensity of multiple independent variables in a research investigation to provide an inflated and deceptive contribution valuation while elucidating the dependent variable. When two or more independent variables have substantial collinearity (0.7 and above), this is typical. Regression coefficients with very large standard error estimates might result from multicollinearity. As a result, incorrect inferences regarding the importance of the independent variables in the model under study may be drawn. The idea that independent variables in a research analysis are interdependent would be violated by this.

Correlation coefficient values fall within the range of +1 to -1. A perfect positive link between the two variables is shown by a correlation value of +1, whilst a perfect negative association is indicated by a correlation coefficient of -1. There is no linear relationship between the variables when the correlation coefficient is zero. This study employed the most popular bi-variant correlation statistic, the Pearson product correlation, and the results are shown in the table below.

Table 4 Pearson correlation matrix

Covariance Analysis: Ordinary
Date: 01/10/24 Time: 11:35
Sample: 1 144
Included observations: 144

Correlation Probability	LOG(ROA)	LOG(TA)	LOG(TL)	LOG(TAL)	LOG(SF)	GDP	INF
LOG(ROA)	1.000000						
LOG(TA)	0.512135 0.0000	1.000000					
LOG(TL)	0.509048 0.0000	0.758970 0.0000	1.000000				
LOG(TAL)	0.569563 0.0000	0.950296 0.0000	0.836679 0.0000	1.000000			
LOG(SF)	0.415785 0.0000	0.278937 0.0007	0.206741 0.0129	0.284846 0.0005	1.000000		
GDP	-0.252543 0.0023	-0.263663 0.0014	-0.177930 0.0329	-0.288019 0.0005	-0.107113 0.2013	1.000000	
INF	-0.012415 0.8826	-0.026332 0.7541	-0.106194 0.2052	-0.030288 0.7186	-0.054985 0.5128	-0.470563 0.0000	1.000000

Source (2023): Authors computation from Eviews 12 * probability values significant at 5% level. Identify the significant values * from the correlation matrix (Table 4)

The correlation matrix of the variables, as determined using the Eviews 12 statistical software, is displayed in the table along with the coefficients and probability at the 0.05 level of significance. The correlation coefficient, which reflects the degree of correlation between the variables, is represented by the upper value, and its significance is shown by the probability values displayed in the lower value. It is evident that the majority of the variables' correlation coefficients are less than 0.5. No relationship is perfect; none is positive (+1) or negative (-1). This lends support to the collected data and its appropriateness for the study by demonstrating the lack of multicollinearity among the variables.

Table 5 Regression Analysis

Dependent Variable: LOG(ROA)
Method: Least Squares
Date: 01/10/24 Time: 12:38
Sample: 1 144
Included observations: 144

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(TA)	-0.319331	0.257003	-1.242518	0.2162
LOG(TL)	0.142715	0.145194	0.982929	0.3274
LOG(TAL)	0.739991	0.314914	2.349816	0.0202
LOG(SF)	0.193268	0.047517	4.067348	0.0001
GDP	-8.062815	6.008707	-1.341855	0.1819
INF	-1.782541	5.982406	-0.297964	0.7662
C	1.126613	1.120484	1.005470	0.3164

R-squared	0.416031	Mean dependent var	4.885397
Adjusted R-squared	0.390456	S.D. dependent var	2.278837
S.E. of regression	1.779163	Akaike info criterion	4.037553
Sum squared resid	433.6627	Schwarz criterion	4.181919
Log likelihood	-283.7038	Hannan-Quinn criter.	4.096215
F-statistic	16.26694	Durbin-Watson stat	0.956740
Prob(F-statistic)	0.000000		

Interpretation

The Eviews 12 programme adds an intercept to the model, as shown in the table below, so that the estimations are relative to the constant term and add up to zero. The intercept does not reduce the degree of freedom because it is not a new variable to estimate. Instead, it is the mean of certain cross-sectional intercepts, which are already variables. Table above shows while other variable in the test research are either negative or positive but with very weak significant to ROA, shareholders' funds revealed both positive and strong significance to ROA. Strong correlations to ROA as a measure of financial performance of PFAs underlines

The study's factors can predict 41.6% of the profitability of insurance firms, according to the coefficient of determination (R^2) stat of 0.416031. How well the regression model describes the fluctuations in the dependent variable is indicated by the modified R2R^2. With an adjusted R^2 of 39%, it can be concluded that while changes in the independent variables account for 39% of the variation in ROA, additional factors not included in the model account for 61% of the change. This indicates that the variables fairly explain the relationship between shareholders' funds and profitability of PFAs.

The p-value corresponding to the observed F-statistic is displayed by the F-statistic, which calculates the standard F-test of the joint hypothesis. An F-Stat Probability of 0.0000 in the regression strengthens the model's validity and indicates that it fits the data well. This is because most of the models are significant.

5.0 Conclusion & Recommendations

The study used the SCA model and panel data from 12 companies from 2010 to 2021 to analyze the impact of shareholders' funds on pension fund administration in Nigeria. The SCA model's premise was tested by examining estimated rates to evaluate the link between variables, followed by a correlation analysis to solve the issue of several independent variables. Tests were performed to assess whether the

variables' time series data were stationary or required differentiating for stationarity. The findings revealed that shareholders' funds had a favorable and significant impact on the performance of pension fund management in Nigeria, demonstrating financial health, stability, and the paper recommendations that pension fund administrators should present clients with clear and unambiguous information regarding investment plans, costs, and results. Also, administrators should develop effective risk management rules and procedures. Furthermore, solid governance systems and compliance with legislation are critical. Administrators should also use shareholder cash to grow and consider taking sensible investment risks. Overall, the study emphasizes the need for additional research in this area.

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