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The Correlation of Investment Securities and the Returns of Pension Fund Administrators in an Emerging Economy

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ABSTRACT: The pension fund administrators (PFAs) are saddled with the responsibility to manage and invest pension contributions on behalf of employees through investment in securities and the earnings from the investments. The PFAs are constantly faced with the problem of optimizing financial performance of assets to invest in. The paper aims to access the connection between financial assets that the PFAs in Nigeria invest in and their investment returns. In line with theory, econometrics offers correlation frameworks as a simple and efficient way to resolve and understand the relationship between financial assets and financial returns. We applied a Pairwise correlation approach to published information from the National Pension Commission (PENCOM) from 2007 to 2021 to evaluate the link between four financial assets and investment returns. We find that two of the securities – money market securities and mutual funds – have a positive relationship with the PFAs' returns, and the other two considered – the federal government securities and private equity funds – have a negative relationship with the PFAs' returns. Only the correlation between the growth of investment return and investment in money market securities is moderate and significant. In contrast, others are low and insignificant, thus leading us to refute the first hypothesis, maintaining others. The study offers insights into factors that affect their financial performance and investment strategies to be put in place to optimize return, which in turn will benefit their contributors. The outcome provides policymakers and regulators with a comprehensive overview of all investment securities and administrators' performance.

Keywords: Pension Fund Administrators, Financial Assets, Return On Investment, Pairwise Correlation.

INTRODUCTION

The pension fund administrators (PFAs) are saddled with the responsibility to manage and invest pension contributions on behalf of employees through investment in "securities, and the earnings from investment generate incomes for employees at retirement. They are required by regulations to allocate a fraction of the funds for investment, ranging from government securities, which are low

risk, to periodic coupon payments, which provide a steady stream of income for the PFAs (Madukwe & Okeke, 2022). The pension assets in developing countries are still low, at 20% compared to 92% in the Organization for Economic Co-operation and Development (OECD) countries. In 2020, PENCOM increased the allowable limit for equity investments from 25% to 30% of their total assets under management to encourage more investment in the stock market. This led to an increase in equity investments by some PFAs, although many continue to focus on fixed-income securities (United Nations, 2021).

In Nigeria, the PFAs have for years invested primarily in fixed-income securities, such as government bonds, treasury bills, and corporate bonds, as conditioned by the Pension Reform Act (PRA) of 2004 that pension funds should be invested in low-risk securities. This requirement is intended to protect pension fund members. However, it limits the ability of pension funds to generate high returns because low-risk securities generally have lower yields than higher-risk securities such as private equity, mutual funds, infrastructure, and real estate. In recent years, there has been a shift towards alternative investments as the PFAs seek to diversify their portfolios and generate higher returns. This has increased the proportion of pension funds invested in equities from 7.8% in 2019 to 9.1% in 2020 and their return on investment from 9.33% to 11.27% in the same period. This increase was largely due to the stock market's strong performance in the second half of 2020, which benefited PFAs (PENCOM, 2020).

The PFAs are constantly faced with the problem of decision-making and optimizing the financial performance of assets in which to invest. This is because an investment vehicle that provides income for retirees, if unsecured, may result in retirees not receiving the income they need during retirement. Because invested funds are exposed to risks, some theories suggest investing in various securities to spread risk and reduce exposure to one particular security or asset class (Idowu & Ibrahim, 2021). Diversifying an investment portfolio ensures security, reduces the risk of investment losses, and improves the fund's overall performance (Omiete, 2023).

Several studies, including Benedictus (2020), Ahmed and Opusunju (2022), Ogungbade et al. (2022), Musa et al. (2021), Fisnik and Simon (2022), Wambui (2021) and Mutula and Kagiri (2018) investigated investments and financial performance. Benedictus (2020) examined the factors that hinder pension fund investment in infrastructure in Namibia. In Nigeria, Ahmed and Opusunju (2022) investigated the determinants of the efficiency of PFAs. Musa et al. (2021) investigated the efficiency of pension fund investment in shares, bonds, and treasury bills. Only Ogungbade et al. (2022) examined the assets holding and financial performance of the PFAs. However, they do not provide a framework on the correlation between the assets and financial returns of the firms, which represents an efficient way to understand and resolve the issue of which class of assets the PFAs can invest in since the investment returns are likely affected by the securities which they are invested. Given how vital the pension funds are to stakeholders and the role of investment securities in reducing the risk of losses and ultimately improving the financial performance of the PFAs, it is therefore important to examine how the securities and financial performance of PFAs are related.

The paper seeks four specific aims:

1. Determine the association between the money market security and the financial performance of pension funds.
2. Ascertain the link between the investment in government security and the financial performance of pension funds.
3. To examine the connection between the private equity funds and financial performance of pension funds
4. Determine the relationship between the mutual funds and the financial performance of pension funds. For the aim

We apply a simple correlation framework to assess the direction and extent and test the significance of the relationship between the different investment securities and the financial performance of pension funds. In sum, the findings show that two of the securities – money market securities and mutual funds – have a positive relationship with the PFAs' returns, and the other two considered – the federal government securities and private equity funds – have a negative relationship with the PFAs' returns. Moreover, only the correlation between the growth of investment return and investment in money market securities is moderate and significant. In contrast, others are low and insignificant, thus leading us to refute the first hypothesis, maintaining others. This offers insights into factors that affect their financial performance and investment strategies to be put in place to optimize return, which in turn will benefit their contributors. The outcome provides policymakers and regulators a comprehensive overview of all investment securities and administrators' performance. The findings inform regulators in developing policies and regulations to ensure PFAs comply with best practices in fund management to enhance sustainability, survival of PFAs, and the well-being of the industry in general.

Pension Funds

Pension fund administrators (PFAs) are institutional investors who collect, accumulate, and invest funds from contributors to provide future benefits (Ibish et al., 2020). Pension funds are among the most vital institutions in some domestic financial markets. They represent a form of financial intermediation, carried out by non-financial institutions via collection and investment of funds pooled for payment to members as retirement benefits (Ndum & Okoye, 2022). The purpose of the pension fund is to manage funds contributed by employees during their working years to provide benefits in the form of income during retirement. The age of retirement may vary from country to country. It enables employees to accumulate savings during their active service years to fund their needs in retirement. Pension Funds are categorized as defined benefit (DB) or defined contribution (DC). In DB funds, employers guarantee the benefit the employees will get upon retirement based on the employee's salary before retirement. This system follows the Pay As You Go scheme. In DC funds, the employees' retirement benefits are determined based on employee and employer contributions and any returns earned from the funds' investment during the contribution period (Benedictus, 2020). More recent PFAs are mostly DC funds, while older ones are DB funds.

In Nigeria, the contributory pension scheme (CPS) is the DC pension scheme that was adopted in 2004. Before the Pension Act reform in 2004, amended in 2014, the public sector pension funds followed the DB scheme and were always subject to budgetary allocations, non-contributory and not fully funded constraints resulting in different issues, including deficits, diversion of allocated funds, and presence of ineligible pensioners on the payroll. The reform was patterned to ensure that the employee contributes 8% and the employer contributes 10% that is reviewed thereafter to a PFAs who will, on behalf of the retiree, invest the fund and provide the funds cum returns upon retirement (50 years and above) as a pension. The DC scheme of 2004 amended 2014 replaced the DB scheme with the objectives of ensuring that everyone who has worked in the public and private service of the federation receives their entitlement as at when due, ensuring adherence to a uniform set of rules, regulations, and standards of administration in payment of retirement benefits, among others (Egolum & Ndum, 2021). The PFA works with the pension fund custodian, who keeps the funds in safe custody and then carries out transactions on their behalf. PENCOM regulates the activities of the PFAs, pension fund custodians, and other stakeholders.

One of the requirements of the new pension scheme is that pension funds are to be managed privately by licensed PFAs and activities supervised by PENCOM. The PFAs are duly licensed by PENCOM and are required to open the RSAs for employees, invest and manage the pension funds in line with the Commission's issued guidelines, provide information to the employees or their beneficiaries, and pay retirement benefits to employees in line with the PRA 2014 (Onakeke & Falope, 2020). The roles of PFAs are to open RSA for all employees with a Personal Identification Number (PIN), appoint a PFC for receipt of contributions and safe custody of pension funds and assets, invest and management of the fund and assets, Calculate annuities; Provide customer support services including account statement and payment of Retirement Benefits following the provisions of commission. Other functions include providing customer service to RSA holders, like issuing RSA statements at least once every quarter and appointing a pension fund custodian to provide custody and safety of the pension fund under its management (PRA, 2014).

Investment Securities

Provision of the PENCOM regulation on investment of pension fund assets Act 2019 as amended stipulates that pension funds should be invested in the following allowable securities: Federal government securities, State and Local government securities, corporate debt securities, quoted ordinary shares, money market securities, mutual funds, private equity funds registered with Security and Exchange Commission (SEC) and both Real Estate Investment Trusts (REITs) and the Infrastructure Funds registered with registered by the SEC (PENCOM, 2019).

Federal Government Securities: Federal Government securities are typically regarded as low-risk investments because the taxing power of a government backs them and offers fixed interest rates and periodic coupon payments, which can provide a steady stream of income for pension funds (Madukwe & Okeke, 2022). According to PENCOM Investment Act 2019, they are bonds, Sukuk, treasury bills, global depository notes, and other securities issued by the federal government of Nigeria through the

Central Bank of Nigeria (CBN) or their agencies. In Nigeria, more than 70% of pension fund assets are invested in federal government securities.

Money Market securities: Money market securities are short-term debt instruments that typically have high liquidity and low credit risk. Pension funds invested in money markets are meant to buy and sell short-term securities to achieve a fair return on investment with minimum risk (Horne & Kotaskova, 2019). It provides regular income in the form of interest payments. These payments can serve as a consistent source of revenue for pension funds, supporting their cash flow requirements. In line with the PENCOM Investment Act 2019, PFAs can invest in money market securities such as bank placements and commercial papers.

Mutual Funds: Mutual funds or unit trusts are collective investment schemes that offer a valuable strategy that can be employed by small investors with limited investment knowledge and skills to profit from the financial market amidst uncertainties (Yinusa et al., 2018). Mutual funds take various forms, such as open or closed-ended investments, where public members are invited to invest their money or assets into a shared portfolio (Investment & Securities Act, 2007). In a mutual fund, the portfolio is collectively owned by individuals and firms who have invested in the fund, and no individual investor can claim ownership of specific assets within the portfolio. In line with PENCOM Investment and Securities Act 2019, Mutual funds are Open/Close-ended/Hybrid Investment Funds, including Exchange Traded Funds and Non-Interest Compliant Investment Funds, Real Estate Investment Trusts (REITs) which are registered with the SEC.

Private Equity Funds: Private equity refers to private financing outside of public markets and involves investors directly investing in firms or buying them out (Harvard Business School, 2020). Investors are often high-net-worth individuals, institutional investors, or venture capital firms interested in supporting a company's operations for personal or commercial reasons (Tamunowariye & Otekenari, 2021). The fund companies aim to generate profit for their investors. In return, investors in private equity funds pay management fees to the firms. In line with the PENCOM Investment and Securities Act (2019), a private equity fund is investment capital targeted at all stages of private equity investment, from start-ups to large buyouts, including those held by corporate entities, limited partnerships, and other investment vehicles.

State and local government securities: They are bonds and Sukuk issued by eligible state and local governments or their agencies or wholly owned companies of the state government, provided that such securities are fully guaranteed by irrevocable standing payment orders (ISPOs) or external guarantees by eligible banks or development finance institutions with a minimum credit rating of 'A' (Investment and Securities Act 2019).

Corporate debt securities: They are bonds, debentures, redeemable/convertible preference shares, and other non-interest-compliant debt instruments issued by eligible listed and unlisted corporate entities

and asset-backed securities, including mortgage bonds, mortgage-backed securities, and infrastructure bonds. They include debt securities issued by corporate entities and guaranteed by the governments. Quoted ordinary shares are ordinary shares of public limited companies listed or proposed to be listed through an initial public offer (IPO) on a securities exchange. Majorly, investment in shares is done in existing securities bought and sold in secondary markets, and it is meant for long-term investment (PENCOM, 2019).

Research Framework

The study's empirical method hinges on the agency theory's theoretical construct. The theory from Jensen and Meckling (1976) conjects how the relationship between agents, such as the company executives and managers, and their principals, such as shareholders, can be tapped to govern a corporation to realize its efficiency. The theory is essential because decisions made by the agent regarding contributions, asset allocations, and risk preferences impact its financial performance. Interest in agency relations became more prominent for many large corporations, where many agents seek other goals that conflict with their principals' profit-maximizing aim and lead to agency conflict. This problem is addressed by developing a framework between principals and agents and identifying ways to align their interests through incentive mechanisms, such as performance-based compensation, that motivate agents to act in the best interests of the principal and to align interests through monitoring mechanisms, such as auditing that provide principals with periodic information. In the PFA context, the pensioners and sponsoring firms are the principal, while agents are the PFAs.

Some authors should align the relationship with modern portfolio theory (MPT), especially in PFAs (Wambui, 2021). The MPT, from Markowitz (1952), is an investment-based theory that states that risk and reward are inherent in all investing options. It is based on the premise that investors are rational and risk-averse, and when faced with two investments and securities that offer the same expected return, the investor will go for the less risky one. Conversely, investors who want higher expected returns pursue such at the expense of more risk. The theory proposes the diversification of securities by constructing a diversified portfolio of assets with varying degrees of risk and return. Investors can achieve higher returns for a given level of risk. The MPT advocates for investors to pick stability over high return, showing that the portfolio's performance is more important than individual stock (Jingchen & Juntai, 2022). The investor will have various options for assets that will be included in the portfolio, considering that when assets in a portfolio are joined, they build an efficient frontier portfolio with a set of portfolios that offer the highest expected returns. The risk of an individual asset is not as vital as the overall portfolio's risk if the assets are diversified and uncorrelated. In the PFA context, pension managers can construct a well-diversified portfolio and make informed investment decisions that achieve investment objectives while minimizing risk.

Based on this, the paper construes four hypotheses:

1. There is no significant correlation between investments in money market securities and pension fund financial performance.

2. There is no significant correlation between the investment in the government security investment and pension funds' financial performance.
3. There is no significant correlation between the investment in private equity funds and the financial performance of pension funds.
4. There is no significant correlation between mutual fund investments and pension fund financial performance.

The other sections are presented as follows: Section 2 provides the method, Section 3 presents the outcomes, and Section 4 closes.

METHOD

The data from the annual reports of PENCOM involves information from 2007-2021. The year 2007 was chosen as the baseline since the year already accounts for the lag that ensures the ramifications of the potential impact of the PRA. The periods were limited to 2021 due to the unavailability of complete information on all variables for the periods after. The recapitalization exercise by PENCOM requires the PFA to have operational capital based on N5 billion within a 12-month transition period from April 27, 2021, to April 27, 2022. This led to the reduction of the PFAs from 22 to 20. Table 1 offers a list of the 20 licensed PFAs.

The literature measures financial performance through different approaches, including return on investment (Gbadebo et al., 2023; Igbekoyi et al., 2022), expense ratio (Wambui, 2021), Risk-adjusted returns (Wambui, 2021), liquidity and asset allocation (Ogungbade et al., 2022). We use the growth rate of return on investment (GROI) computed by dividing the net profit by total investment multiplied by 100 as a measure of the financial performance of pension funds.

Although the PENCOM investment guideline offers a broad range of securities in which the PFAs invest the pension funds. The investments are the major ones often undertaken by the PFAs. To ensure a unified scale for estimating the correlation coefficients, we use the growth rate for the security. The growth rate for the money market securities (GRMMS) is computed as the percentage of investment in money market securities to total assets. The growth rate for federal government securities (GRFGS) is the percentage of investment in federal government securities to total assets. The growth rate for private equity funds (GRPE) is measured as the percentage of investment in private equity funds in total assets. The growth rate for the mutual funds (denoted GRMF) is measured as the percentage of investment in mutual funds to total assets (Ogungbade et al., 2022)."

Table 1. Licensed PFAs in Nigeria

S/N	Licensed PFAs	S/N	Licensed PFAs
1	ARM Pension Managers Limited	11	NPF Pension Fund Managers

2	Crusader Sterling Pensions Limited	12	Oak Pensions Limited
3	FCMB Pensions Limited	13	Pensions Alliance Limited
4	Fidelity Pension Managers Limited	14	Premium Pension Limited
5	First Guarantee Pension Limited	15	Radix Pension Managers Limited
6	Guaranty Trust Pensions Managers Limited	16	Sigma Pensions Limited
7	IEI-Anchor Pension Managers Limited	17	Stanbic IBTC Pension Managers Ltd.
8	Leadway Pensure PFA Limited	18	Tangerine Apt Pensions Limited
9	Nigerian University Pension Management	19	Trustfund Pensions Limited
10	NLPC Pension Fund Administrators Limited	20	Veritas Glanvills Pensions Limited

Source: PENCOM quarterly report (2022)

The paper follows the standard procedure for empirical testing required to evaluate the study's hypotheses. First, we employ some summary statistics, including the mean, standard deviation, minimum, and maximum, to describe the variables. We also employ the Jarque-Bera (JB) statistics to demonstrate the normality or otherwise of the variables' distribution. The statistic, computed from equation (1), represents a goodness-of-fit assessment that confirms whether recovered sample skewness and kurtosis match the normal distribution.

$$JB\text{-statistic} = 1/6 * [(\tilde{\mu}_3)^2 + 0.25\ (\tilde{\mu}_4 - 3)^2] \quad (1)$$

Where $\tilde{\mu}_3$ and $\tilde{\mu}_4$ are the skewness and kurtosis coefficients. The variable's series is a non-normal distribution if the JB is far from zero and the test is significant at the chosen level.

Second, the correlation matrix was presented here to describe the relationship among the variables. Correlation provides direction and strength of the link between covariates. To demonstrate this, the standard procedure is to assume two data pairs (x_i, x_j), with n-set $[(x_{1,1}, x_{2,1}), x_{1,2}, x_{2,2}), \ldots, (x_{1,n}, x_{2,n})]$, and use equation (2), which offers the estimates for the (centered) correlation coefficient (denoted $r_{x_1 x_2}$), where:

$$r_{x_1 x_2} = \sum_i^n (x_{1,t} - \bar{x}_1)(x_{2,t} - \bar{x}_2) \left[\sqrt{(x_{1,t} - \bar{x}_1)^2}\sqrt{(x_{2,t} - \bar{x}_2)^2}\right]^{-1} \quad (2)$$

The estimated coefficient would lie between –1 and +1, with a mid-point at 0, showing the non-existence of linear evidence.

RESULT AND DISCUSSION

We present the results and evaluate the working hypotheses. Before presenting correlation and its "significant tests, we report the summary statistics of the variables in Table 2 to show the descriptive information of the considered variables on the investment growth and the returns. Mean values represent the average behavior of each variable over the period. The return on investment has an average of 0.234507 (23.45%), a standard deviation of 0.062058 (6.2%), a minimum of 0.065121 (6.5%), and a maximum of 0.326364 (32.6%). The growth rate of investment in money market securities has an average of 0.142515 (14.25%) with a standard deviation of 0.023023 (2.3%), a minimum of 0.065121 (6.5%), and a maximum of 0.326364 (32.6%).

The growth rate of investment in government securities has an average of 0.669952 (67%), with a standard deviation of about 0.031517 (3.1%), a minimum of 0.644073 (64.4%), and a maximum of 0.764802 (76.48%). The growth rate of investment in private equity funds during the period has an average of 0.001278 (0.13%), with a standard deviation of 0.00058 (0.058%), a minimum of 0.000942 (0.094%), and a maximum of 0.00282 (0.28%). The growth rate of investment in mutual funds has an average of 0.004132 (0.41%), with a standard deviation of 0.001151 (0.12%), a minimum of 0.001128 (0.11%), and a maximum of 0.005269 (0.53%). The Jarque-Bera statistic shows that all the variables are not normally distributed. This is evident from the p-values of their respective Jarque-Bera statistics. The p-values of their Jarque-Bera statistics are less than 0.05, indicating a rejection of the normality null.

Table 3 shows the correlation matrix. The evidence indicates that the growth of return on investment has a positive relationship with the growth of investment in money market securities. The correlation coefficient of 0.4615 is moderate and significant. The p-value of 0.0103 associated with the relationship between return on investment and money market securities is less than 0.05, indicating that the first null is significant at 5%. The correlation has the highest magnitude relative to investment growth in other securities. We find no sufficient evidence to maintain the first null. The findings revealed that investment in money market securities is associated with improved return on investment, supposing the risk-returns relation for the money market securities is consistent with the agency theory (Wambui (2021) Orbunde et al. (2019)). The growth of return on investment has a negative link with growth in government securities. The correlation of -0.150496 is low and insignificant since the associated p-value of 0.4273 is over the acceptable significance of 0.1, indicating that the second null is maintained. The findings revealed that investment in government securities is not associated with the PFAs' returns. Thus, the risk-return relation for government security is inconsistent with the agency theory.

The growth of return on investment has a negative relationship with investment growth in private equity funds. The correlation coefficient of -0.140266 is low and insignificant, as the p-value of 0.4597 associated with the correlation is over the acceptable significance of 0.1, indicating that the third null is maintained. The findings revealed that investment in private equity is not associated with the return on investment of the PFAs. Hence, the risk-returns relations for the private equity funds are inconsistent with the agency theory. The growth of return on investment has a positive relationship with the growth of investment in mutual funds. The correlation coefficient of 0.147274 is low and insignificant, as the p-value of 0.4374 associated with the correlation is over the acceptable significance of 0.1, indicating that the fourth null is maintained. The findings revealed that investment in mutual funds is not associated with the return on investment of the PFAs. Hence, the risk-returns relations for the private equity funds are inconsistent with the agency theory.

Huan et al. (2019) show that a pension fund imbalance would occur in the early 2020s and then expand under existing policies. Fertility adjustment, retirement delay, or combination reforms would not fundamentally solve the financial crisis in the long term. Zwan et al. (2019) identify considerable variation in the joint regulatory incentives that support sustainable investment, with the Netherlands, Denmark, and Germany as active, modest, and with little regulatory support for sustainable

investment. Wambui (2021) discovered a strong link between liquidity and performance, indicating that more liquid pension schemes perform better.

Bakare (2020) revealed that pension fund investments have favorably impacted Nigeria's stock market development. Musa et al. (2021) revealed that investment in shares and bonds has a positive and significant effect on the return on the investment, with treasury bills recording insignificant returns. Sajuyigbe et al. (2021) found that the contributory pension scheme has no essential effect on job satisfaction and organizational commitment among Osun State workers in Nigeria. Umar (2021) explored the Islamic PFA scheme and found that due to religious beliefs, Nigerians had a positive perception of participating in an Islamic pension scheme. Ahmed and Opusunju (2022) found that determinants of the efficiency of PFAs include short-term debt to total and total debt to total assets. Ogungbade et al. (2022) found that the accumulation of assets by PFAs impacts the financial performance of the pension funds. The assets held by PFAs are relevant in terms of their financial performance".

Table 2. Summary Statistics

Variable	Mean	Std. Dev.	Minimum	Maximum	JB	JB p-value
ROI	0.243507	0.062058	0.065121	0.326364	10.07232	0.006
MMS	0.142515	0.023023	0.068235	0.179053	24.44126	0.000
FGNS	0.669952	0.031517	0.644073	0.764802	29.04604	0.000
PEF	0.001278	0.000581	0.000942	0.002827	20.67379	0.000
MF	0.004132	0.001151	0.001128	0.005269	17.99357	0.000

Note: Jarque-Bera (JB)
Source: Authors (2024)

Table 3. Correlation Coefficients

Variable	GRROI	GMMS	GFGS	GPEF	GRMF
GROI	1.0000				
GMMS	0.461518**	1.0000			
	(0.0103)				
GFGS	-0.150496	0.233353	1.0000		
	(0.4273)	(0.2146)			
GPEF	-0.140266	0.342714*	0.640039***	1.0000	
	(0.4597)	(0.0637)	(0.0000)		
GRMF	0.147274	0.527546***	0.387367**	0.349973*	1.0000
	(0.4374)	(0.0027)	(0.0344)	(0.0580)	

Note: p-value in parenthesis; *, **, ***, signify significance at 10%, 5%, and 1% respectively. The correlation coefficients are the pairwise correlation matrix. Table 3 shows the correlation matrix that depicts the direction and extent of the linear relationship between the variables.

Source: Authors (2024)

Furthermore, "other findings are discussed based on the relationship between the different investment components. The growth of investment in money market securities has a significant positive relationship with the growth of investment in private equity funds and the growth of investment in mutual funds. Still, it has an insignificant relationship with the growth of investment in government securities. The relationship between investment growth in money market securities and the growth of investment in private equity funds is significant at a 10% significance level. In comparison, the relationship between investment growth in money market securities and the growth of investment in mutual funds is significant at a 1% significance level. The relationship between investment growth in money market securities and investment growth in government securities is insignificant since its p-value is greater than the 10% significance level. This implies that investment in money market securities is positively related to investment in private equity funds and mutual funds.

The growth of investment in government securities has a significant positive relationship with the growth of investment in private equity funds and the growth of investment in mutual funds. The relationship between investment growth in government securities and investment in private equity funds is significant at a 1% significance level. In comparison, the relationship between investment in government securities and the growth of investment in mutual funds is significant at a 5% significance level. This implies that investment in government securities is positively related to investment in private equity funds and investment in mutual funds, and it moves in the same direction with both variables. The growth of investment in private equity funds has a significant positive relationship with growth in mutual funds. The relationship between investment growth in private equity funds and growth in mutual funds is significant at 10%. This implies that investment in private equity funds is positively related to investment in mutual funds, and both variables move in the same direction.

CONCLUSION

The pension managers in Nigeria manage the pension contributions in a broad range of securities in line with investment guidelines issued by PENCOM. They diversify risk as much as possible to achieve the scheme's objectives of financial sustainability of social security. The investment comprises treasury bonds and treasury bills; money market securities are short-term debt instruments that have high liquidity and low credit risk as well as mutual funds that offer a valuable strategy to profit from the market amidst uncertainties and private equity funds involving investors directly investing in firms or buying them out.

Some studies provide the knowledge frontier about how investment securities affect the performance of the PFAs (Huan et al., 2019; Zwan et al., 2019; Benedictus (2020), Wambui, 2021; Zwan et al., 2019; Kinyua et al., 2022). According to the aim, we consider the assessment of a simple correlation and its significance in showing the relationship between the investment securities and the financial performance of pension funds between 2007 and 2021 for 20 pension funds in Nigeria. This finding is four-fold: First, a significant positive association exists between investment growth in

money market security and the financial performance of pension funds. Second, a significant positive association exists between the growth of government security investment and pension funds' financial performance. Third, a significant positive association exists between the growth of investment in private equity funds and the financial performance of pension funds. Fourth, a significant positive association exists between the growth of investment in mutual funds and the financial performance of pension funds.

The findings, which provide insights into the risk-return trade-offs associated with different investment securities and the financial performance of pension funds in Nigeria, offer information for policy, regulations, and future research on the subject. Despite this, the paper has some limitations, which we suppose that future studies can supplement. It focused only on four financial market assets: money market securities, federal government securities, mutual funds, and private equity funds. As PENCOM investment guideline recommends, pension administrators invest in other investment securities. Therefore, we suggest that future studies may consider establishing the relation to involve a broad range of permissible" investments.

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