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PENSION FUND INVESTMENTS AND MARKET LIQUIDITY IN THE NIGERIAN CAPITAL MARKET

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Abstract

Despite the growing importance of the relationship between pension fund investment and market liquidity in the Nigerian capital market, it still remains under-researched in the academic literature. As a result, this study examines the impact of pension funds (PFIs) on market liquidity in the Nigerian capital market from 2004 to 2023, using an ex-post facto research design. The analysis uses an autoregressive distributed lag (ARDL) model and multiple regression with an error correction mechanism (ECM) to examine the effects of different PFIs, including pension fund assets (PFAs), pension fund investments in shares (PFIEs) and pension fund investments. in government securities (PFIGS), on key liquidity indicators such as turnover indicators and gross domestic product growth rate (GDPGR). The findings reveal that both PFA and PFIE significantly increase market liquidity, supporting liquidity preference and portfolio theory. Conversely, PFIGS shows no significant impact on market liquidity, suggesting that government securities may not be as effective in stimulating market activity. Based on these results, the study

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recommends that policymakers encourage pension fund managers to diversify their portfolios by including a wider range of asset classes, especially equities, while reconsidering the heavy reliance on government securities. The aim of these recommendations is to optimize the role of pension funds in managing economic development and market stability. The study contributes valuable insights to the theoretical discourse on liquidity and portfolio management and provides practical guidance for enhancing the efficiency and resilience of the Nigerian capital market.

Introduction

The Nigerian capital market plays a vital role in the country's economic development, providing a platform for raising capital, facilitating investment and increasing market liquidity. One of the key factors affecting market liquidity is the flow of investment, particularly from institutional investors such as pension funds. Pension funds, which are designed to provide retirement benefits to workers, are increasingly becoming major players in the Nigerian capital market. With the growing importance of the Contributory Pension Scheme (CPS), pension funds have accumulated significant assets that can be invested in various financial instruments, thereby affecting market liquidity (Olowe, 2013).

Pension funds are typically invested in a mix of asset classes, including pension fund assets (PFAs), which may include equity securities, government bonds and other financial instruments (Adeoye & Atanda, 2019). Pension Fund Investment in Equities (PFIE) and Pension Fund Investment in Government Securities (PFIGS) are the two main areas where pension funds have a direct stake in increasing market liquidity. In particular, PFIE can increase trading volume in the stock market, thereby improving market depth and liquidity (Jiang *et al*., 2012). Similarly, investments in government securities, a safe and stable investment option, provide pension funds with safe returns while injecting capital into the financial system, affecting market turnover and liquidity (Olowe, 2013).

Market liquidity, which refers to the ease with which assets can be bought and sold without significant price changes, is a crucial aspect of a well-functioning capital market. In the Nigerian context, the turnover ratio (TOR) serves as a key indicator of market liquidity, reflecting the volume of shares traded relative to total market capitalization (Adeoye & Atanda, 2019). The relationship between pension fund investment and market liquidity is widely discussed in the global

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literature, with studies suggesting that the larger the pool of institutional investments such as pension funds, the higher the market liquidity, as these funds provide stable and long-term capital. (Jiang *et al.*, 2012). Nevertheless, the impact of pension fund investments on market liquidity in emerging markets such as Nigeria remains understudied. In addition to pension fund investments, other macroeconomic factors such as gross domestic product growth rate (GDPGR) can affect market liquidity. A growing economy usually leads to higher corporate profits, attracts more investment and boosts market activity (Onyenweaku & Agu, 2018). Therefore, GDP growth is considered as an essential control variable in this study because it can confound the relationship between pension fund investment and market liquidity.

The motivation for this study stems from the growing importance of pension funds in the Nigerian capital market as they represent a significant source of institutional investment. With the introduction of the Contributory Pension Scheme (CPS), pension funds in Nigeria have accumulated significant assets, making them key players in the financial markets. However, despite their growing influence, the relationship between pension fund investments and market liquidity in the Nigerian capital market has received limited academic attention. This gap in the literature presents an opportunity to examine how pension fund investments—specifically in stocks and government securities—affect market liquidity, which is essential for the proper functioning of the capital market. Market liquidity, often expressed as a turnover ratio (TOR), is a fundamental factor that determines how easily assets can be traded without significantly affecting their prices. It plays a key role in attracting domestic and international investors to the market. As pension funds have long investment horizons and substantial capital, their market behaviour could significantly affect trading volumes and overall market liquidity. Understanding the impact of pension fund investments on market liquidity could provide valuable insights into the mechanisms through which institutional investors can increase market efficiency, reduce volatility and enhance investor confidence in the Nigerian capital market.

In addition, this study is motivated by the need to assess the broader implications of pension fund investments for economic development in Nigeria. As a critical component of the financial system, the capital market directly affects economic growth by enabling the efficient allocation of capital. By examining how pension fund investments contribute to market liquidity, the study could offer policy recommendations aimed at optimizing the role of pension funds in driving

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economic development. Additionally, understanding the impact of macroeconomic factors such as gross domestic product growth (GDPGR) on market liquidity will provide a comprehensive view of current dynamics. This study aims to fill a critical gap in the existing literature and provide policy makers, pension fund managers and investors with useful insights on how to leverage pension fund investments to promote a more liquid and efficient capital market in Nigeria.

Statement of the Problem

Market liquidity is an essential feature of a well-functioning capital market because it determines how easily assets can be bought and sold without significantly affecting their price. In the Nigerian capital market, liquidity remains a significant challenge, with trading volumes often fluctuating and investor confidence varying with economic conditions and market dynamics (Okeahialam & Awa, 2024). A highly liquid market enables efficient price discovery, reduces transaction costs and encourages domestic and foreign investment. However, despite the importance of market liquidity, the Nigerian capital market has faced persistent problems of low liquidity, characterized by a limited number of active trades and high volatility, especially during periods of economic uncertainty.

One of the key factors that can affect market liquidity is the level of institutional investment, especially from pension funds that have accumulated substantial capital following the introduction of the Contributory Pension Scheme (CPS) in Nigeria. Pension funds, which are intended for the long-term financial security of employees, have become significant players on the financial markets (Bakare, 2022). However, the impact of pension fund investments, particularly in stocks and government securities, on market liquidity in Nigeria remains understudied. Pension funds typically hold large volumes of assets, which can have a significant impact on trading volume and market activity. The impact of such investments on turnover, a key indicator of market liquidity, has not been sufficiently explored in the Nigerian context.

Despite substantial growth in pension fund assets in Nigeria, the capital market has not seen a commensurate increase in liquidity. This raises important questions about the effectiveness of pension funds in increasing market liquidity and whether their investment strategies are consistent with the objective of improving overall market efficiency. One needs to understand how the various components of pension fund investments such as Pension Fund Investments in

Equity (PFIE) and Pension Fund Investment in Government Securities (PFIGS) affect the turnover ratio and consequently the liquidity of the Nigerian capital market. In addition, external factors such as gross domestic product growth rate (GDPGR) may affect liquidity, requiring a comprehensive analysis of these variables. However, this study aims to address these gaps by examining the relationship between pension fund investment and market liquidity in the Nigerian capital market. By examining how pension funds contribute to turnover, this research seeks to provide a clearer understanding of the role of these institutional investors in enhancing market liquidity and efficiency in Nigeria.

Hypotheses

H_{01}: Pension Fund Asset (PFA) has no significant impact on the Turnover Ratio (TOR) in the Nigerian capital market.

H_{02}: Pension Fund Investment in Equities (PFIE) does not have a significant impact on the Turnover Ratio (TOR) in the Nigerian capital market.

H_{03}: Pension Fund Investment in Government Securities (PFIGS) does not have a significant impact on the Turnover Ratio (TOR) in the Nigerian capital market.

LITERATURE

Conceptual Framework

Pension Fund Investments

Investments in pension funds involve the strategic allocation of pooled funds by pension managers across different asset classes to generate income and meet future pension obligations. As institutional investors, these funds channel significant financial resources into financial markets and real assets, thereby contributing to economic stability and development (Davis & Yu-Wei, 2017)). Investments include stocks, government securities, corporate bonds, real estate and alternative investments, each selected to balance risk and return in the portfolio. Stocks offer high returns but carry higher risks, while government securities provide stable returns with low risk that ensure capital protection (Brown *et al.*, 2022). In Nigeria, the Contributory Pension Scheme (CPS) has expanded the assets of pension funds, enabling large-scale investment in the capital market. Pension funds, governed by regulations to ensure safety and optimize returns, diversify their portfolios across asset classes (PENCOM, 2023). These investments secure the financial future of contributors and act as critical

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capital resources for the economy, enhancing liquidity, resource allocation and economic development.

Pension Fund Assets (PFA)

Pension fund assets represent accumulated funds within pension plans, strategically invested across various asset classes to generate retirement benefits and provide long-term capital for economic growth. These investments managed by pension fund managers (PFAs) include equities, government securities, fixed income securities, money market instruments and real estate, each of which contributes to portfolio stability and growth. Stocks offer high returns, government securities provide stability with low risk, short-term instruments provide liquidity, and real estate acts as a hedge against inflation.

In the Nigerian context, PFAs have contributed significantly to the development and liquidity of the capital market under the Contributory Pension Scheme (CPS). They play a key role in stabilizing financial markets, ensuring a steady flow of capital for investment and promoting market depth. As PFAs grow, they increase market participation, reduce volatility and promote price stability. According to PenCom (2024), the net asset value (NAV) of Nigerian pension funds reached ₦18.36 trillion at the end of 2023, reflecting strong growth and diversification. This performance underlines the effectiveness of fund managers in taking advantage of market opportunities and indicates growing confidence among contributors. PFAs are central to the dynamics of market liquidity in Nigeria, with their growth linked to increased participation in financial markets. Their investments in stocks, bonds and other instruments facilitate the efficient allocation of resources, increase investor confidence and contribute to the sustainability of the pension system. As a continuous and stable source of capital, PFAs support economic development and capital market vitality, making them critical to both individual financial security and broader economic stability.

Pension Fund Investment in Equities (PFIE)

Pension Fund Investment in Equities (PFIE) involves allocating pension funds to the shares of publicly listed companies, allowing pension schemes to benefit from capital appreciation and dividends while supporting market liquidity and economic growth. PFIE is critical to promoting business expansion, innovation and market efficiency in emerging economies such as Nigeria as it increases liquidity, price discovery and market stability while reducing volatility (Adedeji *et al*., 2019;

Babalos & Stavroyiannis, 2020). Within the Nigerian Contributory Pension Scheme (CPS), PFIE enhances market liquidity and stability by injecting significant capital into businesses, increasing trading volumes and reducing transaction costs. This is consistent with the hypothesis that higher PFIE allocations improve market stability and liquidity, which is particularly important given Nigeria's economic volatility (Adebayo *et al*., 2020).

Recent figures indicate a robust PFIE performance with domestic listed equities worth ₦1.57 trillion by December 2023, up 7.99% from Q3 2023, driven by rising share prices and positive investor sentiment. Similarly, investments in Federal Government of Nigeria (FGN) securities rose to ₦11.92 trillion, reflecting a 5.41% increase due to additional investments, coupon payments and unrealized gains (PenCom, 2024). These trends highlight the balanced strategies of pension fund managers to optimize returns and protect contributors' funds. The growth of PFIE and FGN securities underscores the strategic role of the Nigerian pension fund system in developing the capital market, enhancing liquidity and ensuring sustainable financial growth for contributors. This dual focus reflects the importance of the PFIE in supporting the economy and maintaining the stability of the pension system.

Pension Fund Investment in Government Securities (PFIGS)

Pension fund investment in government securities (PFIGS) involves the allocation of pension assets to low-risk, government-backed instruments such as Treasury bills and bonds, providing stable returns and capital protection. These investments provide a secure basis for managing long-term liabilities, minimize exposure to market volatility, and maintain consistent income streams, making them critical to financial sustainability (Adebayo *et al*., 2020; Bayar *et al*., 2022). In addition to financial stability, PFIGS contributes to national development by financing government projects, infrastructure and economic stabilization programs. This mutually beneficial relationship enables pension funds to achieve reliable returns while supporting fiscal policy and economic growth. In Nigeria, these investments are regulated by the National Pension Commission (PenCom) to ensure that the principles of safety, liquidity and prudent asset allocation are adhered to, thus promoting confidence among contributors and increasing the sustainability of the pension system (Adekoya & Nwaobia, 2021).

PFIGS plays a key role in balancing risk, liquidity and return management within pension fund portfolios. Its predictable returns and low-risk nature help maintain

financial stability, provide liquidity for withdrawals and protect capital. By funding government initiatives, PFIGS also aligns with Nigeria's economic development goals, benefiting both pension funds and the wider economy (Bakare, 2022). PFIGS improves the financial health and performance of Nigeria's pension funds by ensuring consistent growth and supporting the future liabilities of pensioners. Its dual role in economic growth and the stability of the pension system underlines its strategic importance. Adherence to PenCom's guidelines enables pension funds to optimize portfolios, achieve stable returns and contribute to economic resilience, making PFIGS the cornerstone of Nigeria's pension system.

Gross Domestic Product Growth Rate (GDPGR)

The gross domestic product growth rate (GDPGR) measures the annual percentage change in the total value of goods and services produced in a country and serves as a key indicator of economic health. A positive GDPGR means economic expansion, while a negative growth means contraction. It reflects productivity and competitiveness influenced by factors such as investment, government spending, consumer behaviour and trade. A high GDPGR signals favourable conditions for business activity, job creation, and investment, making it a critical metric for policymakers and investors (World Bank, 2020; Togan & Kayhan, 2022). GDPGR provides a framework for analysing economic growth across sectors, including consumption, investment, government spending and net exports. It highlights the role of financial instruments such as pension fund investments in capital formation, job creation and market participation. The relationship between GDPGR and pension fund performance is bidirectional: higher GDP growth increases fund returns, while pension fund investment supports economic growth through capital market development and infrastructure financing (Nanshuwan & Moses, 2021).

In this study, GDPGR is used as a control variable to account for macroeconomic fluctuations and isolate the effects of pension fund investments on economic growth and capital market performance. This ensures that the analysis focuses on the specific contributions of pension fund strategies, such as allocations to government securities or real estate, rather than general economic trends. The inclusion of GDPGR as a control variable strengthens the validity of the study by clarifying how pension fund investments independently affect Nigeria's economic development and capital market performance.

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Market Liquidity in the Capital Market (MLCM)

Market liquidity in the capital market (MLCM) refers to the ease of trading financial securities without significant price fluctuations. High liquidity increases market efficiency, lowers transaction costs and increases investor confidence, facilitates the flow of capital and enables efficient fundraising by companies and governments. Conversely, low liquidity leads to price volatility, wider bid-ask spreads, and higher trading costs, making markets less attractive to investors (Sanusi & Kapingura, 2021). In Nigeria, MLCM is a key indicator of financial stability that reflects the ease of transactions in the capital market. High liquidity supports capital formation and economic growth, influenced by factors such as market depth, financial intermediaries and technology. Innovations such as automated trading platforms and real-time settlement systems by the Nigerian Exchange Limited (NGX) have improved efficiency, while regulatory oversight by the Securities and Exchange Commission (SEC) and stable macroeconomic indicators are increasing market confidence (Ahmed & Opusunji, 2022).

Despite these advances, issues such as limited market depth, political instability and low inflows of foreign investment occasionally limit liquidity. Addressing these issues is essential for efficient resource allocation and enabling pension funds to diversify portfolios and optimize returns. Pension funds depend on liquid markets to invest in high-yielding, inflation-resistant assets that provide stable returns and support capital market stability and economic growth. Recent metrics underscore the importance of liquidity in the Nigerian capital market. In Q4 2023, the All-Shares Index (NSE-ASI) rose by 12.64% to 74,773.74 points and market capitalization increased by 23.25% to ₦40.918 trillion, driven by improved investor confidence, favorable macroeconomic conditions, political reforms and strong corporate earnings (Pencom, 2024). This study highlights the key role of MLCM in influencing pension fund investments. The study examines its relationship with pension fund inflows and shows how liquidity supports capital market efficiency and economic growth, making it a crucial control variable for analysing investment performance and broader economic impacts.

Turnover Ratio (TOR)

The turnover ratio (TOR) measures trading activity in relation to market size, calculated as the total value of securities traded divided by the average market capitalization, multiplied by 100. A high TOR reflects active trading, efficient price discovery, reduced transaction costs and market liquidity, signalling a strong

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investor participation, efficient resource allocation and a robust market environment. Conversely, a low TOR indicates limited activity, inefficiency and reduced investor confidence, which can potentially hinder market growth (Ogonda & Okiakpe, 2022). TOR is essential for assessing market conditions and liquidity, correlating with investor confidence and efficient capital allocation. High TOR values indicate better market depth, making the markets attractive to institutional investors, such as pension fund managers, who rely on liquidity to optimize returns and manage risk. In Nigeria, TOR is a critical indicator of capital market efficiency and liquidity, supporting the active trading environment needed for pension funds to effectively reallocate assets and achieve stable returns.

This study integrates TOR as a control variable to examine the impact of pension fund investments on the Nigerian capital market. By linking pension fund activities to market performance, TOR highlights how increased trading increases liquidity, lowers transaction costs and strengthens market confidence. Its inclusion underscores its role in assessing the contributions of institutional investment to market stability, efficiency and economic development. TOR serves as both a diagnostic tool and a performance metric that reflects the relationship between pension fund investments and overall market performance. However, Ogonda and Okiakpe (2022) provided the following formula for calculating turnover.

$$\text{Turnover ratio} = \frac{\text{total value of shares traded}}{\text{Market capitalization}} \times 100$$

Relationship between Pension Fund Asset and Market Liquidity in the Nigerian Capital Market

The relationship between pension fund assets and market liquidity in the Nigerian capital market is critical to capital flow, market stability and economic growth. As key institutional investors, pension funds increase liquidity by increasing the volume of securities traded, narrowing the bid-ask spread and reducing transaction costs. This activity promotes market depth, promotes investor confidence and attracts local and foreign investment. Pension funds contribute to market stability by creating a consistent flow of capital, reducing price volatility and increasing efficiency. Their diversified portfolios increase demand for various financial instruments and address liquidity constraints and inefficiencies common in emerging markets such as Nigeria. This increased market activity improves the

efficiency of capital allocation and supports broader economic development. However, pension fund assets directly affect market liquidity by driving trading volumes and improving market functionality. This interplay ensures stable market conditions and allows pension funds to redistribute investments with minimal price distortions while creating a favourable environment for national economic progress.

Theoretical Framework

Modern Portfolio Theory (MPT)

Developed by Harry Markowitz in 1952, this theory provides a quantitative framework for constructing investment portfolios that optimize returns for a given level of risk. Emphasizing the principle of diversification, MPT tries to minimize unsystematic risks by investing in various assets. It assumes that investors are rational and risk averse and prefer lower risk portfolios for equivalent returns. The theory emphasizes the importance of asset correlation, particularly the benefits of negatively correlated assets, and introduces an "efficient frontier" that represents optimal portfolios that balance risk and return.

MPT is highly relevant to the study of the Contributory Pension Scheme (CPS) and its impact on market liquidity in the Nigerian capital market. Pension Fund Managers (PFAs) who follow MPT principles allocate funds across asset classes, including equities, bonds and money market instruments, to minimize risk while achieving sustainable returns. This diversification not only mitigates unsystematic risks but also increases market liquidity through consistent investment activities. Empirical evidence underscores the role of MPT in reducing market volatility, improving capital allocation efficiency, and promoting long-term investment growth. In addition, PFAs use MPTs to meet regulatory requirements and meet contributors' expectations of stable financial returns. By managing diversified portfolios, PFAs contribute to market stability and liquidity and are consistent with the objectives of the CPS. Over two decades, this theoretical framework has proven its usefulness in explaining how pension fund governance affects the efficiency and resilience of the Nigerian capital market.

Financial Intermediation Theory (FIT)

Developed by Gurley and Shaw in 1955, this theory emphasizes the essential role of financial intermediaries such as banks and financial institutions in facilitating the flow of funds between savers and borrowers. This theory emphasizes how intermediaries reduce transaction costs, diversify risk, and provide liquidity, thereby increasing the efficiency and stability of the financial system. By

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channelling savings into productive investments, financial intermediaries contribute to economic growth and support deeper and more liquid capital markets. FIT is particularly relevant to the study of the contributory pension scheme (CPS) in Nigeria because it explains how pension fund managers (PFAs) act as intermediaries in investing pension contributions in various financial instruments, including stocks, bonds and real estate. This process increases market liquidity, increases trading activity and stabilizes prices, contributing to the overall efficiency and depth of the Nigerian capital market. Through their intermediary role, PFAs effectively allocate resources, balance the needs of pension contributors (savers) with investment opportunities (borrowers) and promote long-term economic stability and growth.

The theory also emphasizes the role of PFA in reducing risk through portfolio diversification and compliance with regulatory requirements, which increases investor confidence and facilitates sustainable market development. Using FIT principles, this study examines how PFA investment activities under the CPS affected market liquidity and efficiency in Nigeria between 2004 and 2023. FIT provides a robust framework for understanding the dynamics of pension fund governance and its impact on capital market stability, highlighting the broader economic implications of financial mediation based on CPS.

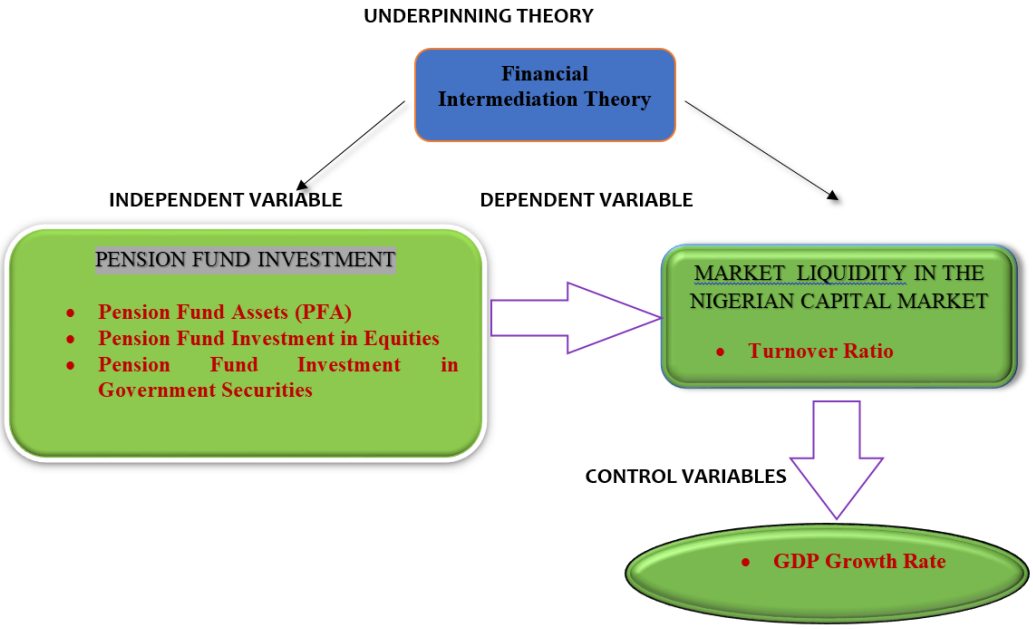


Figure 1: Conceptual Model for the Study

Source: *Authors conceptualization developed from the major variables of the study, 2024*

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The conceptual framework shown in Figure 1 provides a visual representation of the relationships between the main elements of the study. It is anchored in a basic theory, which serves as a theoretical basis explaining the interaction between independent and dependent variables. This theory provides a rationale for how the independent variable affects the dependent variable and guides the overall direction of the study. The core of the framework is the independent variable and the dependent variable, which form the primary focus of the research. An independent variable is a factor or set of factors that is expected to influence or predict changes in the dependent variable that serves as the outcome or effect under study. This relationship reflects the key hypothesis or research question of the study. In addition, control variables are included to account for extraneous factors that may affect the dependent variable. These variables are controlled or accounted for to isolate the effect of the independent variable on the dependent variable, thus providing a more robust and accurate analysis. As a result, the framework underlines the logical flow of the study and connects the theoretical foundations with the empirical relationships between the main variables. It reflects the researcher's conceptualization of how study variables interact to produce meaningful findings.

Empirical Review

Empirical Review of the Contributory Pension System and Performance

Ayegba (2018) in "Pension Administration in Nigeria" evaluated the effectiveness of Nigeria's contributory pension system using secondary data analysed using Chi-Square. The study highlighted the need for public education on the Pension Reform Act of 2004 to increase participation, including among Nigerians abroad. She emphasized penalizing mismanagement of funds and creating robust structures for quick pension payments to boost economic development. Recommendations included improving remittance systems by integrating payroll banks with pension fund managers. However, the study's descriptive methodology and narrow focus on administration leave gaps for further investigation. In contrast, this study uses advanced econometric tools to examine the impact of the pension plan on capital market liquidity over the period 2004–2023.

Dagauda and Oyadiran (2019) in "Impact of the Nigerian Civil Servant Pension Scheme on the Nigerian Capital Market" reviewed pension fund operations in five federal ministries in Abuja. On a sample of 1,500 respondents, the data was

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analysed using regression and percentage analysis. The findings showed that pension funds make a significant contribution to capital market operations, but pointed to problems such as corruption and budget shortfalls. Recommendations included strengthening regulatory frameworks and enforcement of sanctions. However, the study's reliance on primary data and the limited scope of the public sector limits its applicability. This study bridges the gap by using secondary data and econometric models to analyse the broader impacts on market liquidity. Onakeke and Falope (2020) in "Impact of Contributory Pension Scheme on Economic Development of Nigeria" examined the relationship between Contributory Pension Scheme (CPS) and GDP growth using secondary data analysed by correlation and ANOVA methods. The study revealed a significant contribution of CPS to GDP growth, but identified risks in fund management. She recommended adopting less risky portfolios to ensure quick payout to pensioners. However, its narrow focus on GDP growth excludes aspects of capital market liquidity. This study addresses this gap by analysing the long-term impact of CPS on market liquidity over a 20-year period using turnover ratios.

Ikwor and Nkwagu (2020) in "The Post-2014 Pension Reform Act and Nigeria's Economic Growth" examined the performance of various pension portfolios and their impact on economic growth. Using an ex-post facto design and OLS analysis on quarterly data from 2011–2019, the study found significant positive contributions of these portfolios to GDP growth. It recommended the improvement of the policy for the outlet of investing in pension funds. Although robust in analysing portfolio performance, the study did not address market liquidity, which this research examines using proxies such as turnover ratio and advanced econometric tools. Ilodibe and Okonkwo (2020) in "Pension Fund Managers and Financial Transparency of Pension Saving Funds in Nigeria" analysed how PFAs improve financial transparency and reduce corruption using a survey design and Z-tests. The findings showed significant improvements in transparency and access by pensioners, with recommendations for stricter enforcement of pension reform laws and penalties for defaulters. However, its narrow focus on PFA excludes the systemic effects of the CPS on the financial market. This study fills the gap by investigating the effect of CPS on market liquidity using a comprehensive data set and advanced methods.

Gómez-Déniz *et al.* (2022), in "Analysis of how the Social Security Fund in Spain affects the sustainability of the pension system", used probabilistic modelling on data from 2000–2019 to assess the sustainability of pensions in Spain. The findings

showed that a growing deficit and a shrinking reserve fund threaten sustainability. Recommendations included maintaining sufficient reserve funds. However, his analysis focused on Spain limits its applicability to developing economies. This study extends the scope to Nigeria and analyses the role of CPS in market liquidity along with macroeconomic variables. Afolabi *et al.* (2024), in "Corporate Governance Mechanisms, Investment Policy, and Financial Sustainability of Pension Fund Administrators in Nigeria", investigated the factors affecting financial sustainability of PFAs using PLS-SEM on cross-sectional data from 19 PFAs. The results showed no significant impact of governance and investment policies at the 5% significance level. Recommendations included improving management practices and risk management tools. However, self-reported bias and a narrow focus on governance preclude broader market impacts. This study addresses these issues by examining the impact of CPS on financial market liquidity using macroeconomic controls and econometric models for a holistic view.

Empirical Overview of Pension Fund Assets and Performance

Several studies have examined the impact of pension funds on capital market performance and economic growth in Nigeria, using different methodologies and yielding valuable insights. Orbunde *et al.* (2019) in "Impact of Pension Fund Investments on Capital Market Performance in Nigeria" analysed the impact of pension fund net asset value on market capitalization, all-equity index and debt capitalization using OLS regression for the period 2008-2018. They found a significant positive impact on market capitalization and debt capitalization, but an insignificant negative impact on the all-share index. The authors recommended better monitoring of the Pension Reform Act of 2004 and asset diversification. Criticism of their work lies in the limited time frame and methodology that does not fully capture dynamic market behaviour. The current study extends this and uses a wider period (2004–2023) and advanced econometric models to examine market liquidity through the turnover ratio.

Amahalu (2019) in "Pension Fund Asset Investment and Economic Growth in Nigeria" used OLS regression and unit root analysis on 2006-2017 data which revealed significant positive effects of pension fund investment on GDP. The study suggested favouring asset diversification in capital market instruments, but was limited by its focus on GDP rather than market measures such as liquidity. Similarly, Ndum *et al*. (2019) also investigated the impact of pension fund assets on GDP

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using OLS techniques with findings that highlighted effective capital market asset management. However, their focus on economic growth omitted direct insights into capital market dynamics. Kamaldeen *et al.* (2019) investigated the long-run relationship between pension fund assets and capital market development using the ARDL bound testing approach. They found co-integration and significant short-run causality, recommending disciplined management of pension fund assets to stimulate positive market trends. This study aligns with the current research's interest in market liquidity but emphasizes long-term relationships rather than immediate market dynamics.

Patrick and Akinwunmi (2019) examined the interaction between pension assets and stock market indices through OLS regression, concluding that monetary policies should lower short-term interest rates to boost pension asset inflows into the market. This focus on interest rates and their indirect effects complements the present study's emphasis on direct pension fund impacts on market liquidity. Sugeng *et al*. (2020) analysed asset allocation strategies in Indonesian pension funds, using Structural Equation Modelling (SEM) to highlight the positive influence of asset allocation and diversification on portfolio performance. Although this study focused on portfolio performance in a different geographical context, its emphasis on strategic management is relevant to pension fund impacts on market liquidity.

Udeh *et al*. (2022) explored the contributory pension fund's effect on market capitalization using ARDL models. Their findings indicated a significant positive relationship, recommending increased investments in market instruments to stimulate credit and economic growth. The study's focus on capital market development resonates with the present research, which expands the analysis to liquidity measures. Nwala *et al*. (2024), in "Effect of Pension Fund Assets and Savings on Pension Fund Performance in Nigeria," analysed the impact of assets on benefits paid from 2013–2022 using OLS regression. They found a negative relationship between assets and benefits paid, recommending reallocation toward stable investments. However, the study's narrow focus on benefits paid omits broader market dynamics, a gap addressed in the current study through its focus on turnover ratio and market liquidity. However, these studies collectively emphasize the pivotal role of pension funds in economic and capital market development, but they often overlook liquidity dynamics. The present study addresses this gap by examining the impact of pension contributory funds on

turnover ratio in the Nigerian capital market, employing advanced econometric techniques over a 20-year period to provide a more comprehensive analysis.

Empirical Review on Pension Fund Investment in Equities and Performance

The empirical review reveals diverse perspectives on the relationship between pension fund investments and economic performance, particularly focusing on equities and their implications for retirees and capital markets. Nwawolo and Nwogwugwu (2019) emphasized contributors' involvement in pension fund equity decisions, finding a positive impact on retirees' standard of living, albeit limited to a single institution. Similarly, Amahalu (2019) established a significant positive relationship between pension fund assets and Nigeria's GDP, recommending robust asset management but neglecting market liquidity considerations. Expanding beyond Nigeria, Babalos and Stavroyiannis (2020) explored the dynamic relationship between pension fund investments and stock market development across OECD countries, confirming bidirectional causality but leaving the specific dynamics of emerging markets unaddressed.

In Nigeria, Nanshuwan and Moses (2021) highlighted the role of sectoral pension fund contributions in enhancing economic growth through investments in capital markets, though their study lacked control variables for macroeconomic influences. Togan and Kayhan (2022), analysing Turkey's voluntary private pension funds, revealed their positive impact on market depth but complex interactions with liquidity and turnover rates, offering a nuanced view of pension funds' role in market development. Yaki and Yashim (2022) and Inim *et al.* (2023) both underscored the significant contributions of pension fund investments to market capitalization and capital market performance in Nigeria. However, Yaki *et al.* noted limitations in causal analysis, while Inim *et al*. primarily focused on equity markets, leaving other investment avenues unexplored. Lastly, Nwala *et al.* (2024) examined pension fund performance indicators, finding positive effects of investments on benefits paid but challenges with equity-derived income. While their study recommended optimizing returns through strategic investments, it lacked an exploration of external regulatory and economic factors. The current study builds on these findings, addressing limitations by adopting a comprehensive approach that incorporates macroeconomic control variables and analyses broader market liquidity impacts over a longer period (2004–2023).

Empirical review of pension fund investments in government securities and their performance

In their 2021 study Pension Fund Investment in Federal Government Securities and Nigeria's Economic Growth, Adekoya and Nwaobia examined the relationship between pension fund investment in Federal Government Securities (FGNS) and Nigeria's economic growth as represented by gross domestic product (GDP). Using an ex-post facto research design, the study analysed secondary data from 2010 to 2019 originating from PENCOM and the National Bureau of Statistics (NBS). The findings showed a significant positive impact of pension fund investment in FGNS on Nigeria's GDP, suggesting that such investment stimulates economic growth. The study recommended increased investment in FGNS to support further growth. However, the study's focus only on FGNS limits its applicability to other investment channels and does not take into account regulatory challenges or external factors influencing the investment decisions of pension fund managers.

Bakare in his 2022 study, Impact of Contributory Pension Funds on Capital Market Performance in Nigeria, investigated the impact of pension fund investments on the performance of the Nigerian capital market using time series data from 2005 to 2019. The research used stationarity test and Johansen cointegration test. The results showed that pension fund investments in government and corporate securities significantly affected capital market performance, while real estate investments did not have a significant effect. Bakare recommended prioritizing investments in government securities and increasing exposure to corporate debt securities. A limitation of the study is its focus on a limited set of investment options, neglecting the broader spectrum of available investment avenues and their collective impact on market liquidity, which the current study aims to address.

Afolabi *et al*. (2023) in their study Adequacy of Financial Performance of Pension Fund Managers in Nigeria examined the impact of pension costs, returns, inflation rates and contributions on pensioner benefits and cash flows. Using time series data and using autoregressive distributed lag (ARDL) cointegration and multiple regression techniques, the study found that higher pension costs and investments in federal government bonds, particularly Treasury bills, positively affected investment income. They conclude that reducing pension costs and increasing investment in real assets will improve performance. However, the study did not address how these investments affect broader market liquidity, a key aspect of the current research. Dibal *et al*. (2024) in their study Pension Fund Investment and Capital Market Development in Nigeria: The Moderating Role of Inflation examined the relationship between pension fund investment in government securities and capital market development, considering inflation as a moderating variable. Using monthly time series data from 2013 to 2020 and an Autoregressive Distributed Lag (ARDL) model, they found that pension fund investments

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positively affected market performance, with inflation moderating these effects. Although this study provides insight into the role of inflation, it does not fully explore the broader macroeconomic factors affecting pension fund performance and market liquidity that this study intends to address.

Afolabi *et al.* (2024), in Factors Influencing the Financial Sustainability of Nigerian Pension Fund Administrators, focused on corporate governance and the influence of investment policies on the financial sustainability of pension fund administrators. A study using primary data and partial least squares structural equation modeming (PLS-SEM) revealed that corporate governance and investment policies had a negligible effect on financial sustainability. The study recommended improving governance structures and investment strategies. However, it did not examine the role of pension fund investments in increasing market liquidity, which is a key element of this study. Yana and Harjum in their 2024 study Impact of Asset Allocation on Financial Performance of Pension Funds: An Analysis in Indonesia analysed the impact of different asset classes on the performance of pension funds in Indonesia, namely term deposits, government securities, stocks and corporates. bonds. The study found that government securities and corporate bonds had a positive impact on pension fund returns, while term deposits and stocks had a negative impact. The authors suggested that an appropriate asset allocation strategy could increase performance. However, the study's focus on Indonesia and ROI limits its applicability to broader market impacts such as market liquidity, which is the focus of current research on Nigeria's capital market.

METHODOLOGY

The methodology of this study follows an ex-post facto research design that examines relationships between variables without directly manipulating them. This approach is particularly suitable for analysing existing conditions and identifying potentially contributing factors, as noted by Kerlinger and Rint (1986). The study focuses on understanding the relationship between Superannuation Pension Insurance (CPS) and market liquidity using secondary data from reputable institutions. The target population includes pension fund investment data and macroeconomic indicators from 2004 to 2023, including various asset categories such as stocks, government securities and real estate, along with GDP growth and turnover ratios. A comprehensive secondary data collection process is employed using sources such as the Central Bank of Nigeria (CBN) Statistical Bulletin and PenCom Annual Reports which provide key data on market capitalization, pension fund assets, contributions and economic indicators. The study uses this complete data set to avoid sampling bias, which ensures a detailed and accurate analysis of the investigated variables. Information is gathered from various sources including

library reviews, academic articles, websites and government publications to ensure a good understanding of the research topic.

Data analysis includes both descriptive and inferential statistics, with correlation analysis used to assess the relationship between independent and dependent variables. In addition, unit root tests determine the stationarity of the data. Depending on the results, various econometric techniques are used to test the long-run and short-run relationships, including ordinary least squares (OLS), Johansen cointegration test, and the Auto-Regressive Distributed Lag (ARDL) approach. The ARDL method, especially its bounds testing approach, is preferred because of its flexibility with mixed data series and ease of interpretation. The model is adapted from previous studies by Ogonda and Okiakpe (2022) and Yakubu et al. (2023), which provides a solid theoretical foundation for testing and analysing the study's hypotheses. However, the relationship between dependent and independent is shown below:

LTOR = L$\beta 1_0$ + $\beta 1_1$LPFA + $\beta 1_2$LPFIE + $\beta 1_3$LPFIGS + $\beta 1_4$LGDPGR + ε_1 --- (1.1)

Where:

LTOR = Log of Turnover Ratio

LPFA = Log of Pension Fund Asset

LPFIE = Log of Pension Fund Investment in Equities

LPFIGS = Log of Pension Fund Investment in Government Securities

LGDPGR = Log of Gross Domestic Product Growth Rate

$\beta 1_0$ is the intercept of the regression model of Log of Market Liquidity in the Nigerian Capital Market.

$\beta 1_1$, $\beta 1_2$, $\beta 1_3$, and $\beta 1_4$ are rates of change of the Contributory Pension Scheme variables with respect to Market Liquidity in the Nigerian Capital Market variable.

ε_1= is the error term associated with the model of the Contributory Pension Scheme variables with respect to Market Liquidity in the Nigerian Capital Market.

Re-writing equation (1.1) in general Error Correction Model (ECM) form to capture the dynamic relationship among the variables in the short and long-run, the model becomes:

$$\Delta \mathrm{LTOR} = \alpha_0 + \sum_{g=1}^{l} \alpha_{1i}\, \Delta \mathrm{LTOR}_{t-i} + \sum_{i=1}^{n} \alpha_{2i}\, \Delta\, \mathrm{LPFAF}_{t-i} + \sum_{i=1}^{n} \alpha_{3i}\, \Delta \mathrm{LPFIE}_{t-i} + \sum_{i=1}^{n} \alpha_{4i}\, \Delta \mathrm{LPFIGS}_{t-i} + \sum_{i=0}^{n} \alpha_{8i}\, \Delta L\mathrm{GDPGR}_{t-i} + ECM_{t-1} + \varepsilon_t \quad (1.2)$$

Therefore, equation (1.2) was used to estimate and analyse the short-run and long-run impacts of Contributory Pension Scheme on the Market Liquidity in the Nigerian Capital Market. However, from equation (1.2), $\Delta \mathrm{LTOR}_{t-i}$ is the lag 1 of the Log of Turnover Ratio in the Nigerian Capital Market which is the dependent variable. The following are the independent variables: $\Delta L\mathrm{PFA}_{t-i}$ is the lag 1 of the Log of Pension Fund Asset; $\Delta \mathrm{LPFIE}_{t-i}$; is the lag 1 of the Log of Pension Fund Investment in Equities; $\Delta \mathrm{LPFIGS}_{t-i}$; is the lag 1 of the Log of Pension Fund

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Investment in Government Securities; and $\Delta \mathrm{LGDPGR}_{t-i}$; is the lag 1 of the Log of Log of Gross Domestic Product Growth Rate in Nigeria. The model, that is equation (1.2) above was used to adjust the estimation until the ECM turned negative. The negative sign of the coefficient of the error correction term ECM (-1) shows the statistical significance of the equation in terms of its associated t-value and probability value.

A Prior Expectation

The a priori expectation is that $\beta 1_1$, $\beta 1_2$, $\beta 1_3$, and $\beta 1_4 >< 0$ indicating a positive or negative relationship between the Pension Fund Asset, Pension Fund Investment in Equities, Pension Fund Investment in Government Securities, and Gross Domestic Product Growth Rate in Nigeria, and the Turnover Ratio in the Nigerian Capital Market, that is increase/decrease.

Table 1

Definition of Variables in the Model

Variable	Type	Measurement	Source
Turnover Ratio	Dependent	$\frac{\text{Total Value of Shares Traded}}{\text{Market Capitalization}} \times \frac{100}{1}$	However, Ogonda and Okiakpe (2022)
Pension Fund Asset	Independent	Total annual value of assets held by pension funds (in Billion ₦)	Bayar *et al*. (2022)
Pension Fund Investment in Equities	Independent	Total annual value of pension fund investments in stock market equities (in Billion ₦)	Adebayo *et al*. (2020)
Pension Fund Investment in Government Securities	Independent	Total annual value of pension fund investments in government bonds or treasury bills (in Billion ₦)	Bakare (2022)
Fund Investment in Real Estate Property	Independent	Total annual value of pension fund investments in real estate (in Billion ₦)	Mirza *et al*. (2021)
Gross Domestic Product Growth Rate	Control	Growth rate of GDP over a specific period, representing economic growth. (in %)	Togan and Kayhan, (2022)

Source: *Author's Compilation, 2025*

RESULTS AND DISCUSSION

This section presents the results obtained from the tests conducted on the data collected for the study. The section begins with the descriptive statistics, correlation analysis, unit root test, Bound Test of Co-integration, Lag Selection,

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ARDL Long Run Form and Bounds Test, hypotheses testing, and discussion of findings.

Data Presentation

Descriptive Statistics

Descriptive statistical analysis serves to provide an initial understanding of the characteristics of the raw data collected for a study.

Table 2

Descriptive Statistics

	TOR (%)	PFA (₦B)	PFIE (₦B)	PFIGS (₦B)	GDPGR (%)
Mean	6.830531	21367.54	2030.866	14115.31	4.784774
Median	5.985058	15863.02	2437.306	10172.34	4.768993
Maximum	17.55881	59296.22	4762.995	36996.40	9.250558
Minimum	2.216389	1454.549	6.400000	499.0000	0.805887
Std. Dev.	3.938664	19825.92	1586.304	13316.34	2.483202
Skewness	0.950838	0.687620	0.124781	0.517368	0.036081
Kurtosis	3.757263	2.134694	1.943513	1.767816	1.809829
Jarque-Bera	3.491513	2.200036	0.982038	2.157465	1.184762
Probability	0.174513	0.332865	0.612002	0.340026	0.553009
Sum	136.6106	427350.7	40617.31	282306.2	95.69548
Sum Sq. Dev.	294.7485	7.477009	47810875	3.377009	117.1595
Observations	**20**	**20**	**20**	**20**	**20**

Source: *Output from E-views 12 (2025)*

Table 2 presents descriptive statistics for various variables related to pension fund investment and economic performance in Nigeria, covering 20 observations. Variables include turnover ratio (TOR), pension fund assets (PFA), pension fund investment in equities (PFIE), pension fund investment in government securities (PFIGS) and GDP growth rate (GDPGR). Average values indicate average values for each variable over the period under review, with Turnover Ratio (TOR) averaging 6.83%, Pension Fund Assets (PFA) averaging ₦21,367.54 billion, Pension Fund Investments in Equity (PFIE) averaging ₦2,030.87 billion, pension fund investment in government securities (PFIGS) averaged 14 ₦115.31 billion, and the GDP growth

rate (GDPGR) averaged 4.78%. The median values show the middle point in the distribution, with TOR at 5.99%, PFA at ₦15,863.02 billion, PFIE at ₦2,437.31 billion, PFIGS at ₦10,172.34 billion and GDPGR at 4.77%, reflecting a slight bias towards higher variable values, especially for PFA and PFIGS.

The maximum and minimum values provide an insight into the range of the data, with TOR reaching a maximum of 17.56% and a minimum of 2.22%. PFA shows a wide range, from a low of ₦1,454.55 billion to a high of ₦59,296.22 billion, reflecting significant fluctuations over time. Similarly, PFIE and PFIGS show significant differences, with PFIE ranging from ₦6.4 billion to ₦4,762.99 billion and PFIGS ranging from ₦499 million to ₦36,996.40 billion. HDPGR varies between a minimum of 0.81% and a maximum of 9.25%. The standard deviation values indicate a high degree of variability in all variables, with PFA having the highest standard deviation (₦19,825.92 billion), indicating significant fluctuations over time. Skewness values indicate that the distributions of these variables are mostly positively skewed, with the exception of GDPGR, which exhibits a nearly normal distribution. Kurtosis values show that most variables exhibit a platykurtic distribution (with values below 3), indicating a relatively flatter distribution compared to a normal distribution.

The Jarque-Bera test statistics and corresponding probabilities provide further evidence of the normality of the data. While most variables show p-values above 0.05, indicating that they are approximately normally distributed, TOR and PFA have p-values below 0.05, indicating some deviation from normality. The total sum of the variables and their sum of squared deviations provides further insight into the overall size and variance of the data across all observations. However, the table shows a different distribution of the data, with some variables showing significant variation and others being more stable, reflecting the complex and dynamic relationship between pension fund investment and macroeconomic indicators in Nigeria.

Correlation analysis

This section measured the correlation between pension fund investments and market liquidity in the Nigerian capital market. Pearson's correlation coefficient is one of the analytical tools used in this research. Pearson's correlation coefficient was used to test the strength of the relationship that exists between the variables of interest. The results of the correlation analysis were examined and interpreted in accordance with the specified model and therefore discussed accordingly. The

value that the correlation coefficient can take ranges from -1 to +1. The closer the value of the correlation coefficient is to one, the stronger the correlation, and the closer the correlation coefficient is to zero, the weaker the correlation. The correlation result is shown in Table 3.

Table 3
Correlation Analysis
Covariance Analysis: Ordinary
Date: 03/01/25 Time: 12:04
Sample: 2004 2023
Included observations: 20

Correlation					
Probability	**LTOR**	**LPFA**	**LPFIE**	**LPFIGS**	**LGDPGR**
LTOR	1.000000				
LPFA	0.850951	1.000000			
	0.0000	-----			
LPFIE	0.609167	0.883703	1.000000		
	0.0044	0.0000	-----		
LPFIGS	0.817183	0.993916	0.899271	1.000000	
	0.0000	0.0000	0.0000	-----	
LGDPGR	0.629377	0.683306	0.556454	0.699539	1.000000
	0.0029	0.0009	0.0108	0.0006	-----

Source: *Output from E-views 12 (2025)*

Table 3 presents the correlation analysis between the variables of interest: turnover ratio (LTOR), pension fund assets (LPFA), pension fund investment in shares (LPFIE), pension fund investment in government securities (LPFIGS) and GDP growth rate (LGDPGR) from 2004 to 2023. The table contains correlation coefficients as well as their associated probabilities that show the strength and significance of the relationships between these variables. The correlation between Turnover Ratio (LTOR) and Pension Fund Assets (LPFA) is 0.850951, which is a strong positive relationship indicating that as pension fund assets increase, so does the market turnover ratio. This relationship is statistically significant with a probability value of 0.0000, indicating a very high level of confidence in the correlation.

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Similarly, there is a strong positive correlation between LPFA and pension fund investment in equities (LPFIE), with a correlation coefficient of 0.883703. This suggests that higher pension fund assets are associated with greater equity investment. The relationship is also highly significant (probability 0.0000). In addition, LPFIE shows a positive correlation with Pension Fund Investments in Government Securities (LPFIGS) at 0.899271, indicating that increases in pension fund equity investments are associated with higher investments in government securities. This relationship is statistically significant with a probability value of 0.0000.

The correlation between LPFA and LPFIGS is particularly strong, at 0.993916, suggesting an almost perfect positive relationship between pension fund assets and investment in government securities. It follows that as pension fund assets grow, investment in government securities tends to increase proportionally, with a probability value of 0.0000 confirming statistical significance. The relationship between turnover (LTOR) and GDP growth rate (LGDPGR) is moderately positive with a correlation coefficient of 0.629377. This suggests that economic growth is positively related to market turnover, indicating that when GDP growth increases, the market turnover ratio tends to increase as well. The relationship is statistically significant with a probability value of 0.0029. In addition, LPFA has a slight positive correlation with LGDPGR at 0.683306, indicating that as pension fund assets increase, the GDP growth rate tends to increase, with a probability of 0.0009 confirming statistical significance.

There are also moderate correlations between LPFIE and LGDPGR (0.556454) and between LPFIGS and LGDPGR (0.699539), both of which are statistically significant with probability values of 0.0108 and 0.0006. These correlations indicate that investments in stocks and government securities are positively associated with GDP growth, reinforcing the idea that economic performance plays a role in shaping pension fund investment strategies. As a result, the table shows a strong network of positive correlations between variables, especially between pension fund assets and investments in stocks and government securities. In addition, economic growth (GDP growth rate) is positively associated with both market turnover and pension fund investment activities, highlighting the interconnectedness of macroeconomic performance and Nigerian capital market dynamics.

Pre-Diagnostic Tests

Unit Root Test

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Data analysis began by assessing the stationarity of the data used in this study, specifically focusing on the presence of unit roots in an econometric context. Stationarity testing for variables involved in regression analysis usually involves performing unit root tests. Stationarity is determined by assessing whether the mean and variance of a variable remain constant over time. If both parameters remain constant, the data are considered stationary, indicating the absence of unit roots. However, if the mean or variance is different, it indicates the presence of a unit root in the data. Gordon (2017) points out that the stationarity of the time series used in regression is crucial because non-stationary time series cannot reliably extend beyond the present, making predictions based on them impractical. Additionally, regression analysis performed without subjecting the data to unit root testing may yield biased and inconsistent parameter estimates that pose potential risks. To mitigate this problem, a unit root test was performed using the Augmented Dickey-Fuller (ADF) statistic to detect the presence of unit roots.

Decision Criteria

To determine the significance of the tested variables adopted in the model, we assess the absolute values of the test statistic against the absolute critical value at the 5% significance level. We accept the null hypothesis if the absolute test statistic is less than the absolute critical value; or we accept the null hypothesis if the Probability value is greater than 0.05 and conclude that the variable under consideration has a unit root. On the other hand, we reject the null hypothesis if the absolute test statistic is greater than the absolute critical value; or we reject the null hypothesis if the Probability value is less than 0.05 and conclude that the variable under consideration does not have a unit root. The Unit Root Hypothesis is expressed as follows:

Ho: The variable is not stationary (the variable has a unit root)
Ha: The variable is stationary (the variable has no unit root)

Unit Root Testing Procedure

Data stationarity is tested either at level, first difference, or second difference. A procedure that could be included in the test equation was done using the intercept (by default). Based on this, this study conducted a test using the intercept equation. Finally, the Unit Root Coefficient value must always be negative.

Table 4

Summary of Augmented Dickey-Fuller Unit Root Test

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Variables	ADF P-value @ 5% Level	ADF P-value @ 5% 1st Difference	Order of Integration
LTOR	0.9994	0.0003	I(1)
LPFA	0.0015	-	I(0)
LPFIE	0.1578	0.0016	I(1)
LPFIGS	0.0190	-	I(0)
LGDPGR	0.0056	0.0075	I(1)

Source: *E-views 12 Output (2025)*

Table 4 presents the results of the Augmented Dickey-Fuller (ADF) unit root test, which is used to check the stationarity of the variables in the data set. The test is performed on both the level and the first difference to determine the order of integration for each variable. A p-value below 0.05 means that the null hypothesis of a unit root (non-stationarity) is rejected, indicating that the variable is stationary. For the LTOR (log of turnover ratio) variable, the p-value is at the 0.9994 level, which is significantly higher than the 5% level of significance, indicating that the variable is non-stationary at the level. However, at the first difference, the p-value drops to 0.0003, which is less than 0.05, indicating that the variable becomes stationary after differentiation. Therefore, the LTOR is integrated to order 1, or I(1).

For LPFA (log of pension fund assets), the p-value is at 0.0015, which is less than 0.05, indicating that the variable is stationary. Since there is no need to differentiate, the LPFA is integrated to order 0, or I(0). LPFIE (log of pension fund investment in shares) has a p-value of 0.1578 at the level, which is greater than 0.05, indicating non-stationarity at the level. However, the p-value at first difference is 0.0016, which is less than 0.05, indicating that the LPFIE becomes stationary at first difference and is integrated to order 1, or I(1). For LPFIGS (log of pension fund investment in government securities), the p-value is at 0.0190, which is less than 0.05, indicating that the variable is stationary and therefore LPFIGS is integrated of order 0 or I (0).

Finally, for LGDPGR (logarithm of GDP growth rate), the p-value is at 0.0056, which is less than 0.05, indicating stationarity at the level. However, the p-value for the first difference is 0.0075, which is also less than 0.05, indicating that LGDPGR is stationary at both levels and after differentiation, indicating that it is integrated of order 1, or I(1). In conclusion, LPFA and LPFIGS are stationary at level (I(0)), while LTOR, LPFIE and LGDPGR are non-stationary at level but become stationary after differentiation (I(1)). These results determine the appropriate treatment of variables in subsequent analysis. Based on Table 4 above, the results of our results revealed that the series are integrated in different series. Therefore, we cannot

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use the Johansen cointegration test in this case; we can only use the Bound Test of Co-integration proposed by Pesaran, *et al.* (2001).

Lag Selection

The next step after the test of stationary is to determine the lag length that is appropriate to be used for the model. Basically, there are four criteria for lag selection that can be adopted in this study, they include; Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan-Quinn information criterion (HQC).

Table 5
Lag Selection

VAR Lag Order Selection Criteria
Endogenous variables: LTOR
Exogenous variables: C LPFA LPFIE LPFIGS LGDPGR
Date: 01/03/25 Time: 12:11
Sample: 2004 2023
Included observations: 18

Lag	LogL	LR	FPE	AIC	SC	HQ
0	0.063021	NA*	0.102865	0.548553	0.795879	0.582656
1	0.328778	0.354342	0.112899*	0.630136*	0.926926*	0.671059*
2	0.419366	0.110719	0.127010	0.731182	1.077437	0.778926

Source: *E-views 12 Output (2025)*

From the VAR Lag Order Selection Criteria result in table 5, all the four Order Selection Criteria advised us to use the Optimal Lag of 1. This is because they all have * at the values which indicates lag order selected by the criterion. Thus, Lag One (1) is selected as the best lag for model one.

Co-integration ARDL Bound Test

The next step after choosing the lag is to determine the ARDL Bound Test to check the long-run relationship between the variables. The ARDL bounds testing approach is a cointegration method developed by Pesaran et al. (2001) to test the presence of a long-run relationship between/between variables. This procedure, a relatively new method, has a number of advantages compared to classic cointegration tests. First, this approach is used regardless of whether the series are I(0) or I(1). Second, an unconstrained error correction model (UECM) can be derived from ARDL bounds testing using a simple linear transformation. This model has both short-term and long-term dynamics. Third, empirical results show that the approach is superior and provides consistent results for a small sample.

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After finding that the variables are a mixture of I (0) and 1 (1) orders of integration. An ARDL bounds test for cointegration was performed.

Co-integrating Hypothesis:

H_o: There is no long-run relationship
H_i: There is long-run relationship

Decision Criteria:

The null hypothesis is rejected if the F-value of the F-bound test is greater than 5% of the critical value for the upper bound series; otherwise, we fail to reject the Null if the F-value of the F-bound test is less than 5% of the critical value for the upper bound series. Similarly, the null hypothesis is rejected if the T-value of the F-bound test is greater than 5% of the critical value for the upper bound series; otherwise, we fail to reject the null if the T-value of the F-bound test is less than 5% of the critical value for the upper bound series.

Table 6

Co-integration ARDL Bound Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.661573	10%	2.45	3.52
K	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06
Actual Sample Size	19		Finite Sample: n=35	
		10%	2.696	3.898
		5%	3.276	4.63
		1%	4.59	6.368
			Finite Sample: n=30	
		10%	2.752	3.994
		5%	3.354	4.774
		1%	4.768	6.67
t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-4.072613	10%	-2.57	-3.66
		5%	-2.86	-3.99
		2.5%	-3.13	-4.26
		1%	-3.43	-4.6

Source: *E-views 12 Output (2025)*

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Table 6 reports the results of the tied autoregressive distributed lag (ARDL) test for cointegration, which assesses whether there is a long-run relationship between the variables in the data set. The test is based on two statistics: the F-statistic and the t-statistic. The null hypothesis for both tests is that there is no level relationship (ie, no cointegration). The value of the F-statistic in the table is 4.661573. Critical values at different significance levels for both I(0) and I(1) are given for different sample sizes. For a true sample size of 19 observations at the 5% significance level, the critical value for I(0) is 2.86 and for I(1) is 4.01. Since the F-statistic (4.661573) is greater than the critical value for I(1) at the 5% significance level (4.01), we reject the null hypothesis of no long-run relationship and conclude that there is a cointegrating relationship between the variables at 5 % significance level.

Additionally, the t-Bounds test statistic is -4.072613. Critical values for I(0) and I(1) at various significance levels are also given for the t-statistics. At the 5% significance level, the critical value for I(0) is -2.86 and for I(1) is -3.99. Since the t-statistic (-4.072613) is smaller (more negative) than the critical value for I(1) at the 5% level (-3.99), we again reject the null hypothesis and conclude that there is a cointegrating relationship at the 5% level of significance.

However, both the F-statistic and the t-statistic indicate the presence of a significant long-run relationship between the variables in the model, as the test statistic exceeds the critical limits at the 5% significance level. This suggests that the variables are cointegrated, meaning they move together in the long run. Thus, we estimate a long-run model and extract the residual using regression analysis and an error correction model.

Test of Research Hypotheses

In time series regression analysis, the ultimate goal is estimation of the relationship between dependent and independent variables. This goal can be achieved through the estimation of the coefficients of each independent variable in the model.

Decision Rule

With the ARDL Model (OLS and ECM Approach), the hypotheses are tested. By measuring the probability value to the degree of significance (0.05), the importance of the variables evaluated in the model is measured. If the probability value is less than the significance level, the Ho is dismissed and we thus infer that

the variable under consideration is significant. Otherwise, the null hypothesis is accepted and we assume that the independent variable under consideration has no important influence on the dependent variable.

Table 7

Regression Analysis and Error Correction Model

Dependent Variable: D(LTOR)
Method: Least Squares
Date: 01/03/25 Time: 12:24
Sample (adjusted): 2006 2023
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.131588	0.173035	0.760471	0.4630
D(LTOR(-1))	0.433340	0.410222	1.056355	0.3135
D(LPFA(-1))	0.303353	0.394629	0.768704	0.0083
D(LPFIE(-1))	0.303615	0.150636	2.015557	0.0189
D(PFIGS(-1))	-5.922005	6.666005	-0.887572	0.3938
D(LGDPGR(-1))	-0.006900	0.201873	-0.034178	0.9733
ECM(-1)	-0.969672	0.484355	-2.001986	0.0006
R-squared	0.811385	Mean dependent var		-0.078262
Adjusted R-squared	0.810322	S.D. dependent var		0.379596
S.E. of regression	0.362047	Akaike info criterion		1.091218
Sum squared resid	1.441862	Schwarz criterion		1.437474
Log likelihood	-2.820966	Hannan-Quinn criter.		1.138962
F-statistic	1.281322	Durbin-Watson stat		2.662495
Prob(F-statistic)	0.000853			

Source: *E-views 12 Output (2025)*

Table 7 presents the results of the regression analysis and the Error Correction Model (ECM) for the relationship between various independent variables (Pension Fund Asset (PFA), Pension Fund Investment in Equities (PFIE), Pension Fund

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Investment in Government Securities (PFIGS), and Gross Domestic Product Growth Rate (GDPGR)) and the dependent variable, Turnover Ratio (TOR). The regression method used is least squares, and the sample spans from 2006 to 2023, with 18 observations included after adjustments. The coefficients of the variables indicate the direction and strength of their relationships with the dependent variable.

The coefficient for D(LTOR(-1)), which represents the lag of the Turnover Ratio, is 0.433340, though its p-value (0.3135) is not statistically significant at the 5% level, suggesting that the previous period's Turnover Ratio does not significantly affect the current Turnover Ratio. For D(LPFA(-1)), which represents the lag of Pension Fund Assets, the coefficient is 0.303353, and the p-value is 0.0083. This indicates that the lag of Pension Fund Assets has a statistically significant positive effect on the Turnover Ratio at the 5% significance level. Similarly, D(LPFIE(-1)), which represents the lag of Pension Fund Investment in Equities, has a coefficient of 0.303615, with a p-value of 0.0189. This also suggests a statistically significant positive impact of Pension Fund Investment in Equities on the Turnover Ratio at the 5% level. The coefficient for D(PFIGS(-1)), representing the lag of Pension Fund Investment in Government Securities, is -5.922005, but the p-value (0.3938) shows that this variable is not statistically significant at the 5% level and thus does not significantly affect the Turnover Ratio. For D(LGDPGR(-1)), the coefficient is -0.006900 with a p-value of 0.9733, indicating no statistically significant relationship between GDP Growth Rate and the Turnover Ratio at the 5% level.

The ECM(-1) term, which captures the long-term adjustment towards equilibrium, has a coefficient of -0.969672 with a p-value of 0.0006, suggesting that there is a statistically significant long-term relationship, and the Turnover Ratio adjusts to its long-term equilibrium at a rate of approximately 97%. The R-squared value of 0.811385 indicates that approximately 81.14% of the variation in the Turnover Ratio is explained by the independent variables in the model, which is a good fit. The F-statistic of 1.281322, with a p-value of 0.000853, indicates that the overall model is statistically significant.

Hypotheses:

H_{01}: Pension Fund Asset (PFA) has no significant impact on the Turnover Ratio (TOR) in the Nigerian capital market.

Findings: The coefficient for D(LPFA(-1)) is 0.303353 with a p-value of 0.0083, which is less than 0.05. This indicates that Pension Fund Assets (PFA) have a

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positive and statistically significant impact on the Turnover Ratio (TOR) in the Nigerian capital market. Therefore, we reject the null hypothesis (H_{01}), confirming that PFA has a positive significant impact.

H_{02}: Pension Fund Investment in Equities (PFIE) does not have a significant impact on the Turnover Ratio (TOR) in the Nigerian capital market.

Findings: The coefficient for D(LPFIE(-1)) is 0.303615 with a p-value of 0.0189, which is less than 0.05. This shows that Pension Fund Investment in Equities (PFIE) has a positive and statistically significant impact on the Turnover Ratio (TOR). Therefore, we reject the null hypothesis (H_{02}), confirming that PFIE has a positive significant impact.

H_{03}: Pension Fund Investment in Government Securities (PFIGS) does not have a significant impact on the Turnover Ratio (TOR) in the Nigerian capital market.

Findings: The coefficient for D(PFIGS(-1)) is -5.922005 with a p-value of 0.3938, which is greater than 0.05. This suggests that Pension Fund Investment in Government Securities (PFIGS) has a negative and insignificant impact on the Turnover Ratio (TOR) in the Nigerian capital market. Hence, we fail to reject the null hypothesis (H_{03}), confirming that PFIGS has an insignificant impact.

Furthermore, the Prob(F-statistic) is 0.000853, which is less than 0.05. This indicates that the overall regression model is statistically significant. This means that at least one of the independent variables (PFA, PFIE, PFIGS, and GDPGR) significantly explains the variation in the Turnover Ratio (TOR) in the Nigerian capital market. Finally, the Durbin-Watson stat is 2.662495, which is close to 2. This value suggests that there is no significant autocorrelation in the residuals of the regression model. In other words, the error terms are not correlated, which is a desirable property for the validity of the model's results.

Post Diagnostic Test

To validate and make the regression results on table 4.6 more reliable, and to ensure that the regression results provide the best linear unbiased estimator (BLUE), we conducted the following post diagnostic tests: Residual Diagnostic Test (Serial Correlation Test) and Stability Test (Cusum Stability Test).

Serial Correlation LM Test

Serial correlation occurs in a time series when a variable and a lagged version of itself (for instance a variable at times T and at T-1) are observed to be correlated with one another over periods of time. Repeating patterns often show serial

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correlation when the level of a variable affects its future level. In finance, this correlation is used by technical analysts to determine how well the past price of a security predicts the future price. The following is the Serial correlation hypothesis:

H_O: There is no serial correlation
H_1: There is serial correlation hypothesis:

Decision Rule:
Accept H_o if the Obs*R-squared Prob. Chi-Square value is greater than 0.05 (5% level of significant). Otherwise, do not accept H_o.

Table 8
Breusch-Godfrey Serial Correlation LM Test
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	7.136806	Prob. F(1,10)	0.1234
Obs*R-squared	7.496292	Prob. Chi-Square(1)	0.1162

Source: *Output from E-views 12 (2025)*

Based on the above rule of thumb, the Breusch-Godfrey Serial Correlation LM Test result in table 8 shows that the Obs*R-squared Prob. Chi-Square value is 0.1162, greater than 0.05; thus, we conclude that the regression model is free from Serial Correlation problem.

Stability Test (Cusum Test)
When time-series regression is fixed, it is assumed that the coefficients are stable over time. estat sbcusum tests that assumption. It bases its result on whether the time-series abruptly changes in ways not predicted by your model. Said more technically, it tests for structural breaks in the residuals. It uses the cumulative sum of recursive residuals or the cumulative sum of Ordinary Least Square (OLS) residuals to determine to test whether there is a structural break. Under the null hypothesis, the cumulative sum of residuals will have mean zero. i.e.

H_O: The model is no stable
H_1: The model is stable.

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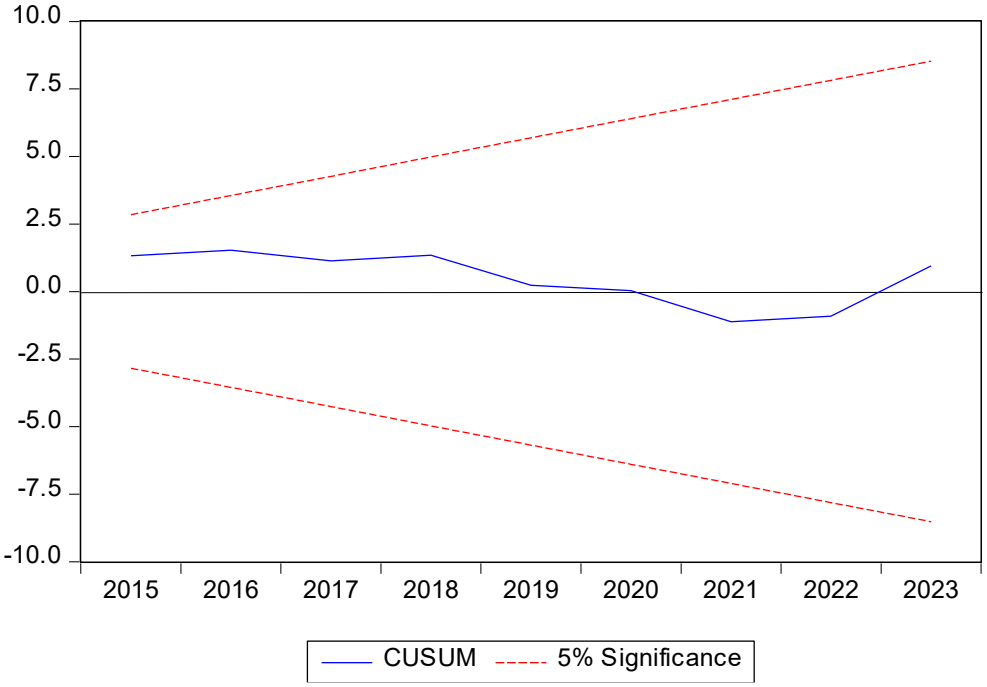


Figure 2: *Cusum stability Test*

Figure 2 displays the Cusum series, positioned within the range delineated by the lower and upper critical limit values of 5%, suggesting that the model maintains stability.

Discussion of Findings

The results of this study indicate that pension fund investment significantly affects market liquidity in the Nigerian capital market, both in the short and long run. The findings, evidenced by a Prob(F-statistic) value of 0.000853 (below the 0.05 threshold), suggest that the combined effect of macroeconomic variables, including gross domestic product growth rate (GDPGR), plays a critical role in increasing market liquidity. These findings are consistent with the conclusions of previous empirical studies, but also address some gaps and limitations.

Ayegba (2018) emphasized the need for robust pension governance structures and public education, but did not delve into the broader economic impacts of the pension system. While his work provided basic insights into governance reforms, this study extends his findings by using advanced econometric tools to examine the impact of pension provision on market liquidity. The results support Ayegbo's contention that effective pension systems can drive economic development by

demonstrating how pension investments improve capital market liquidity. Similarly, Dagauda and Oyadiran (2019) found significant contributions of pension funds to capital market operations. However, their study focused primarily on the limited scope of public sector pension contributions and highlighted corruption as a barrier. In contrast, this study confirms their findings on the importance of pension funds, but extends the analysis by using secondary data and advanced econometric methods to capture the systemic effects of pension investments on market liquidity.

The findings of this study are also consistent with Onakeke and Falope (2020) who identified significant contributions of the Contributory Pension Scheme (CPS) to GDP growth. However, their focus on GDP growth excluded the liquidity aspects of the capital market. By addressing this gap, this study complements their work and reveals how CPS contributes to liquidity, a fundamental indicator of market efficiency. Furthermore, the results are consistent with the findings of Ikwor and Nkwag (2020) who reported positive contributions of pension portfolios to GDP growth. While their analysis was robust to examining economic growth, this study extends their scope by using turnover measures to examine the long-run effects of pension funds on market liquidity.

Unlike the limited focus on financial transparency in Ilodibe and Okonkwo (2020), this study examines the broader market implications of the pension plan and shows its systemic effect on liquidity. Similarly, Gómez-Déniz et al. (2022) focused on pension sustainability in Spain with limited relevance for developing economies. Shifting the focus to Nigeria, this study highlights the applicability of pension systems in promoting liquidity in emerging markets. Finally, Afolabi et al. (2024) examined corporate governance and financial sustainability in pension fund management, finding no significant impact on market liquidity. This study deviates from their findings by showing a clear and significant influence of pension funds on market liquidity, emphasizing the importance of macroeconomic variables and systemic analysis.

Pension Fund Assets and Liquidity in the Nigerian Capital Market

The coefficient for D(LPFA(-1)) is 0.303353 with a p-value of 0.0083, indicating a positive and statistically significant impact of pension fund assets (PFA) on turnover ratio (TOR) in the Nigerian capital market. This finding leads to the rejection of the null hypothesis (H_{01}), confirming that pension fund assets significantly affect market liquidity. In addition, the findings of this study are

consistent with and consistent with several previous studies, while addressing gaps in their scope and methodology. For example, Orbunde *et al*. (2019) found a significant positive impact of pension fund net asset value on market capitalization and debt capitalization, but overlooked liquidity dynamics. This study extends their analysis by focusing on the turnover ratio as an indicator of liquidity using a wider time frame (2004–2023) and more sophisticated econometric methods. Similarly, Amahalu (2019) and Ndum et al. (2019) highlighted the positive effects of pension fund investments on GDP, but did not directly examine market liquidity. This research complements their findings by highlighting how PFA affects liquidity and provides a market-specific measure beyond GDP growth.

Kamaldeen *et al*. (2019) identified significant short-run causality and long-run relationships between pension fund assets and capital market developments. While they focused on long-term trends, the current study concurs with their conclusions by showing an immediate and statistically significant impact of PFA on liquidity. Patrick and Akinwunmi (2019) examined the interaction of pension assets with stock market indices, suggesting that monetary policy could influence the inflow of pension assets. This study complements this study by providing insight into macroeconomic factors affecting pension fund efficiency, which indirectly supports this study's finding of liquidity enhancement. Furthermore, Udeh *et al*. (2022) report a significant positive relationship between contributory pension funds and market capitalization, recommending more investment in market instruments. This is consistent with the findings of this study, but adds a new dimension by focusing on liquidity rather than market size. The broader context of asset allocation and diversification, as discussed by Sugeng *et al*. (2020) and Nwala *et al.* (2024), emphasizes the strategic management of pension funds. While these studies examined portfolio performance and the impact of savings, their findings support the importance of effective asset allocation, which is indirectly supported by this study's findings on liquidity.

Retirement Fund Stock Investment and Liquidity in the Nigerian Capital Market

The coefficient for D(LPFIE(-1)) is 0.303615 with a p-value of 0.0189, indicating that investment in pension fund shares (PFIE) has a positive and statistically significant impact on turnover ratio (TOR). This result is consistent with the findings of several previous studies and strengthens the argument that pension fund investments play a key role in capital market dynamics. For example, Babalos and

Stavroyiannis (2020) found a significant positive relationship between pension fund investments in stocks and stock market performance, supported by bidirectional causality. Similarly, Amahalu (2019) and Yaki *et al*. (2022) reported that pension fund assets and investments contribute positively to Nigeria's GDP and market capitalization. Together, these studies highlight the crucial role of pension funds in supporting economic and capital market growth.

However, the findings of this study diverge from the findings of Nwala *et al*. (2024) who highlighted the challenges in generating income from equity investments, suggesting that the relationship between pension fund investments and financial performance may be affected by broader market and economic conditions. Furthermore, the complex interaction between pension funds and market liquidity observed by Togan and Kayhan (2022) in Turkey highlights that such relationships may vary depending on regional and market dynamics. By confirming the significant and positive impact of PFIE on TVZ, this study confirms much of the existing literature while addressing gaps related to macroeconomic controls and effects on liquidity. It further broadens understanding by highlighting the importance of pension fund investments in enhancing market activity, thereby contributing to the broader discussion on optimizing pension fund strategies for sustainable economic and capital market development.

Pension Fund Investment in Government Securities and Liquidity in the Nigerian Capital Market

The coefficient for D(PFIGS(-1)) is -5.922005 with a p-value of 0.3938, which indicates that pension fund investment in government securities (PFIGS) has a negative and insignificant impact on the turnover ratio (TOR) in the Nigerian capital city. market. Consequently, we failed to reject the null hypothesis (H_{03}), confirming that PFIGS does not significantly affect TOR. This finding partly differs from some previous studies, while concurring with others, highlighting the context-dependent nature of this relationship. Adekoya and Nwaobia (2021) found that pension fund investment in Federal Government Securities (FGNS) contributed significantly to Nigeria's GDP and boosted economic growth. This contrasts with the current study's finding of an insignificant impact on capital market liquidity as measured by the turnover ratio. A difference in focus—economic growth versus market liquidity—could explain this difference, as investments in FGNS may stimulate broader economic outcomes without directly increasing trading activity in the market.

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Bakare (2022) also reported a significant positive effect of pension fund investment in government and corporate securities on capital market performance, which seems to contradict the current findings. However, Bakare's emphasis on broader market performance rather than liquidity-specific metrics such as TOR could explain the difference in results. In addition, his study highlighted the importance of diversifying investments to include corporate debt securities, a recommendation that complements the broader context of pension fund strategies. Conversely, Afolabi *et al.* (2023) noted that investments in federal government bonds, especially T-bills, positively affected investment returns, but did not address their effects on liquidity. Similarly, Dibal *et al.* (2024) noted that pension fund investments positively influenced capital market developments, moderated by inflation, but their study did not specifically analyse turnover indicators. These findings suggest that the impact of PFIGS may vary depending on the outcome metric being pursued, with potential benefits for market depth and revenue generation but limited effects on liquidity. Yana and Harjum (2024) further confirmed the role of government securities in increasing pension fund returns in Indonesia, but also noted that asset allocation strategies play a key role. Their findings are consistent with the current study's proposition that the effectiveness of PFIGS investments may depend on broader allocation strategies and market conditions.

CONCLUSION AND RECOMMENDATIONS

The study examines the impact of pension funds (PFIs) on market liquidity in the Nigerian capital market and highlights their importance in both the short and long run. The results, supported by a Prob(F-statistic) value of 0.000853, which is well below the significance threshold of 0.05, confirm the critical role of PFIs in enhancing liquidity. This underscores the importance of the combined effect of macroeconomic variables, including the growth rate of gross domestic product (GDPGR), in driving market efficiency and fluidity. Analysis of PFI dynamics shows that strategic investment practices can significantly improve market liquidity, which is a crucial factor for the development and sustainability of the capital market. The findings highlight that aligning pension fund allocations with broader macroeconomic objectives can optimize their impact, making them a key contributor to economic growth and financial market stability. These findings provide valuable advice to policymakers, regulators and pension fund managers

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aiming to leverage PFIs for sustained market development and increased liquidity in Nigeria.

The first objective examines the impact of pension fund assets (PFA) on market liquidity. The coefficient for D(LPFA(-1)) is 0.303353 with a p-value of 0.0083, indicating a positive and statistically significant effect of PFA on turnover ratio (TOR). This result leads to the rejection of the null hypothesis (H_{01}), confirming that PFA significantly affects market liquidity. The findings support the theoretical framework of liquidity preference theory, which posits that a larger asset base can increase market liquidity. Policymakers should encourage pension fund managers to expand their asset portfolios through diversified and strategic investments to maintain capital market liquidity levels. In practice, this suggests that efficient asset allocation can serve as a tool to stabilize the financial system and boost investor confidence.

The second objective examines the impact of the Pension Fund Investment in Equities (PFIE) on market liquidity. The coefficient for D(LPFIE(-1)) is 0.303615 with a p-value of 0.0189, indicating that PFIE has a positive and statistically significant effect on TOR. This finding confirms the hypothesis that PFIE contributes significantly to the increase in liquidity in the capital market. It is consistent with portfolio theory, which emphasizes the importance of capital investment in optimizing returns and mitigating risk. Policy recommendations include incentives for pension funds to allocate a substantial portion of their portfolios to equities, as these investments not only provide growth opportunities but also stimulate trading activity and thereby increase liquidity. In practice, this highlights the need for fund managers to balance equity exposure with risks to maximize market benefits.

The third objective assesses the impact of PFIGS on market liquidity. The coefficient for D(PFIGS(-1)) is -5.922005 with a p-value of 0.3938, indicating a negative and statistically insignificant relationship with TOR. As a result, the null hypothesis (H_{03}) is not rejected, which confirms that PFIGS does not significantly affect market liquidity. This result may reflect the less dynamic nature of government securities in supporting business activities. The findings are consistent with empirical studies that highlight the limited impact of fixed income investments on market liquidity. Policymakers should reconsider the heavy dependence of pension fund investments on government securities and explore alternative asset classes that can contribute more effectively to liquidity. From a theoretical perspective, this is consistent with modern portfolio theory,

suggesting the need for diversification to optimize portfolio outcomes. In practice, fund managers should evaluate the trade-offs between stability and liquidity when allocating assets to government securities.

Finally, the study highlights the crucial role of strategic pension fund investments in managing market liquidity. Policymakers and regulators should create frameworks that support diversified investment portfolios and balance the need for stability, growth and liquidity. These findings contribute to the theoretical discourse on liquidity and portfolio management and offer practical insights for fund managers and financial market participants to enhance the efficiency and resilience of the Nigerian capital market.

Based on the findings of this study, several key recommendations emerge to improve the market liquidity impact of pension funds (PFIs) in the Nigerian capital market.

i. Given the significant positive relationship between pension fund assets (PFA) and market liquidity, it is crucial for policymakers to incentivize pension fund managers to expand and diversify their asset portfolios. This can be achieved through regulatory frameworks that support investment across a range of assets, including equities, real estate and infrastructure. Diversified and strategic investments will help stabilize the financial system and strengthen investor confidence and promote greater market liquidity. Fund managers should also be trained to optimize asset allocation strategies and ensure that pension funds contribute to increased liquidity while managing risks effectively. This approach is consistent with liquidity preference theory, which suggests that a larger asset base leads to more liquid markets.

ii. The study underlines the importance of Pension Fund Investment in Equities (PFIE) in increasing market liquidity. Given the statistically significant positive effect of PFIE on the turnover ratio (TOR), policymakers should encourage pension funds to allocate more of their portfolios to equities. This would not only provide long-term growth opportunities for retirees, but would also stimulate market activity, which is critical to improving liquidity. To maximize benefits, it is essential that fund managers strike a balance between equity exposure and risk and ensure that their investment strategies are aligned with the broader objective of increasing market efficiency. This finding

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supports portfolio theory, which advocates optimizing investment returns and reducing risk through strategic equity investments.

iii. The study reveals that pension fund investment in government securities (PFIGS) does not have a significant impact on market liquidity. This result suggests that excessive reliance on government securities may not be the most effective strategy for enhancing market liquidity. Policymakers should reassess the role of government securities in pension fund portfolios and explore alternative investment avenues such as corporate bonds, infrastructure funds and real estate that have the potential to generate higher liquidity. From a theoretical perspective, the findings are consistent with modern portfolio theory, which emphasizes diversification to optimize returns and manage risk. Fund managers should consider the trade-offs between stability and liquidity when making investment decisions and ensure that their portfolios are well balanced and consistent with the broader objectives of increasing market liquidity.

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APPENDIX
RAW DATA

YEAR	TOR (%)	PFA (₦B)	PFIE (₦B)	PFIGS (₦B)	GDPGR (%)
2004	10.69	2,450.00	10.30	1,361.00	9.25
2005	9.07	2,030.00	8.10	829.00	6.44
2006	9.18	1,530.00	6.40	499.00	6.06
2007	8.16	1,637.00	6.80	503.00	6.59
2008	17.56	1,454.55	212.69	803.03	6.76
2009	9.75	2,546.63	247.20	1,391.09	8.04
2010	8.07	7,325.30	1,422.69	2,903.33	8.01
2011	6.22	9,030.24	1,611.79	4,822.58	5.31
2012	5.47	11,380.41	1,502.57	7,226.31	4.23
2013	12.32	14,667.29	2,323.37	9,241.15	6.67
2014	7.93	17,058.75	2,585.96	11,103.54	6.31
2015	5.75	20,156.46	2,551.35	13,946.29	2.65
2016	3.57	23,312.75	2,551.24	16,814.47	1.62
2017	5.10	27,928.33	2,923.95	20,794.57	0.81
2018	4.49	33,159.24	3,113.12	24,260.75	1.92
2019	3.60	38,157.60	2,667.45	27,718.59	2.21
2020	2.81	45,287.19	3,110.37	30,759.96	1.79
2021	2.27	51,423.13	4,468.19	34,443.79	3.65
2022	2.38	57,519.61	4,530.78	36,996.40	3.25
2023	2.22	59,296.22	4,762.99	35,888.33	4.13

Source: *Central Bank of Nigeria (CBN) Statistical Bulletin and PenCom Annual Reports (2004-2023)*

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