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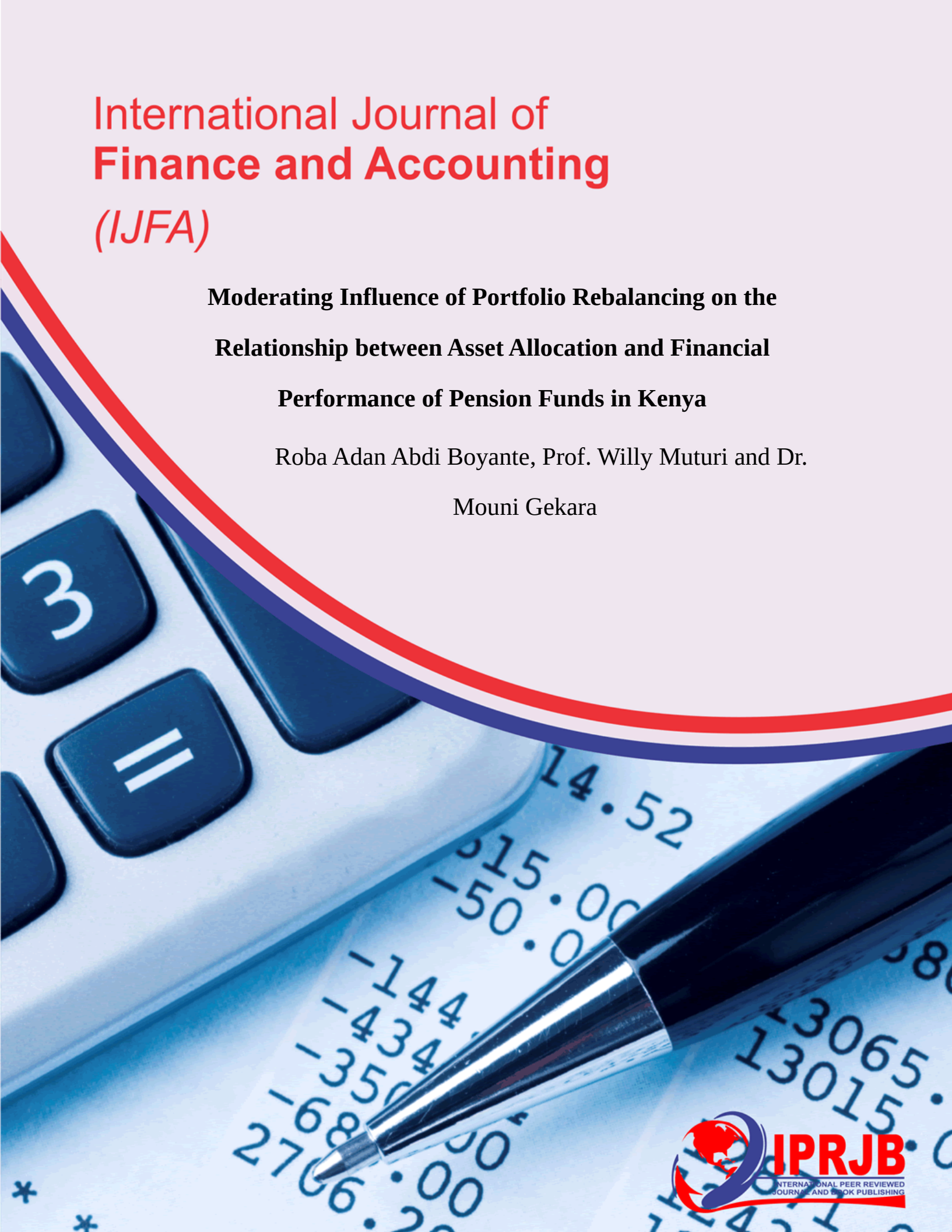
Roba Adan Abdi Boyante, Prof. Willy Muturi and Dr. Mouni Gekara



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[1*] Roba Adan Abdi Boyante
Post Graduate Student: School of Business: Jomo Kenyatta University of Agriculture and Technology
*Corresponding Author's E-mail: aroba99@gmail.com

[2] Prof. Willy Muturi
Associate Professor: School of Business: Jomo Kenyatta University of Agriculture and Technology

[3] Dr. Mouni Gekara
Lecturer: School of Business: Jomo Kenyatta University of Agriculture and Technology

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Abstract

Purpose: This paper examined the moderating influence of portfolio rebalancing on the relationship between asset allocation and financial performance of pension funds in Kenya.

Methodology: The study used a descriptive research design with data collection form used to gather secondary data. The target population for this study was 1,258 registered schemes as per RBA as of 31 December 2021. The sample consisted of 294 registered schemes. Secondary data was obtained from the Retirement Benefits Authority (RBA) for the study variables for the six-year period between 2016-2021. The data was analyzed using multiple linear regression and subjected to diagnostic tests.

Findings: The study findings revealed that portfolio rebalancing had a significant moderating influence on all the variables except guaranteed funds which was not significant. This is expected since return on guaranteed funds is fixed (minimum guarantee) and therefore, the return on investors' funds will remain constant overtime even with portfolio rebalancing of the fund's asset under management. The study findings resonate with policy discourses suggesting that active portfolio rebalancing may yield better returns to members through proactive management of portfolio risks.

Unique Contributions to Theory, Practice and Policy: validates the modern portfolio theory whose premise is selection and construction of asset portfolios to maximize the portfolio expected return and the concurrently minimize the attendant risk. The study can help policy makers such as Retirement Benefits Authority (RBA) in Kenya review investment ceilings imposed on different asset classes which restrict the range of asset allocation strategies available to those charged with pension fund asset management responsibilities by establishing quantitative limits on investment, typically by asset class. The trustees and fund managers can use the study findings to ensure adoption of an optimal mix of different asset classes that can maximize member's returns.

Keywords: *Moderating Influence, Portfolio Rebalancing, Financial Performance.*

INTRODUCTION

A pension plan is a retirement plan for the future benefit of employees that requires the employers to contribute money into a pool of funds (Jacobsson & Jacobsson, 2012). Investments are done from the pool of funds in the pension scheme and the earnings from the investments yield income to the worker on retirement. The importance of pension funds as a source of long-term capital in many countries is emphasized by Morales et al. (2017). A pension can perform two basic tasks. Firstly, it generates income for individuals based on their previous economic activity (Wang, 2016; Androniceanu, 2017; Papik, 2017). Secondly, a pension can be seen as a type of insurance based on long-term contracts between savers and pension administrators (Hainaut, 2014; De Hann, 2016; Alda, 2017; Wiafe et al., 2017).

A Citigroup Report, 2016, "The Coming Pensions Crisis" indicates that the combined worth of unfunded or deficit government pension liabilities for twenty OECD countries is an astounding $78 trillion, twice the $44 trillion published national debt obligation. Companies have also not been successful in steadily meeting their pension responsibilities. Many retirement programmes are facing a deficit. They have experienced negative or low returns on pension fund investments due to underperformance of equities and low returns on bonds, which are attributed to prevailing low interest rates as well as high unemployment rates (Amenc, Martellini, &Sender, 2009).

Meir (2015) avers that asset allocation refers the process of adjusting the relative proportion of different asset classes in an investment portfolio. It determines distribution of members contributions among different asset classes to maximize returns and minimize risks. Park, Kim and Lee (2022) aver asset allocation should be implemented from the asset liability management (ALM) perspective and they recommend asset allocation to maximize returns within a given constraint, such as shortfall risk because most pension funds are underfunded. Lyimo & Joachim (2022) did a study on the effectiveness of investment portfolio on financial performance of pension fund in Tanzania. They aver that treasury bonds, real estate investment and fixed deposits have an noteworthy effect on the financial performance of pension funds. A study by Owinyo (2017) to assess the determinants of financial outcome of pension funds in Kenya established that investing in guaranteed funds, quoted equity and government securities does not affect the financial outcome of pension funds. Mwachanya (2015) conducted a study on the impact of asset allocation on financial performance of pension funds in Kenya. The findings of the study were that asset allocation explains 28% of the variability of fund returns. The remaining 72% is explained by other factors such as asset class timing, security selections and manager selection. It is imperative that trustees and pension fund managers evaluate the relationship between asset allocation and financial performance of pension funds to enable them understand how choices of assets in their investment portfolios can either hinder or grow returns to members of the fund.

The studies above depict an existing relationship between asset allocation and pension fund performance. Empirical literature reveals research gap on the influence of asset allocation on the financial performance of pension funds in Kenya. The Retirement Benefits Authority requires that investment policies should be reviewed every three years. Consequently, this study will help regulators, pension funds trustees and fund managers understand how asset allocation and tactical shifts in their portfolios influence financial performance of pension funds. Such will be useful in their review of their investment policy statements for their pension schemes.

Statement of the Problem

Private and public pension schemes are currently facing several challenges (Mačí & Valentová Hovorková, 2017; Vychytilová, 2015). Sinicakova & Gavurova (2017) posits that the slow pace of economic growth reduces the scope for potential appreciation of retirement savings. Hannah (2011) posits that the growth of the schemes in Kenya is faced by multiple diverse problems. Muriithi and Wamari (2013) in their study pointed out that there were a frustrated lot of pensioners in Kenya who have not been paid or paid less than the minimum portfolio return based on their contribution and anticipated earnings of the schemes. In 2014, it was reported that Kenya Railways scheme sits on Sh30b as thousands of retirees live in misery (Dominic, 2016). The financial performance of pension funds schemes both public and private have in the past come under increased criticism (Gakure & Gakera, 2015). According to Mutuku, Kathurima, and Toroitich (2013) pension industry investments have been subject to significant volatility resulting in large variation in investment performance which contribute to negative returns periods, even to those schemes invested in guaranteed funds.

Pension funds invest in different assets in line with their approved investment policy statements. Consequently, choice of assets of different pension funds will vary in line with their respective investment policy statements. The investments and choice of assets must also be in compliance with government regulations on retirement schemes in Kenya. Available research reveals that there are variations in the returns declared to members of pension funds every year. The investment policy statement allows the fund managers to rebalance their pension fund portfolios to help investors maintain an asset allocation that aligns with their needs, goals, and risk tolerance.

Hong (2021) avers that as the performance of portfolio components varies over time, component weights may deviate from their target allocations, exposing investors to a different risk-return profile than that of the intended allocation. Rebalancing is a tool to manage such deviations). Andonov, Bauer, and Cremers (2012) posit that pension funds' active returns are roughly equally driven by asset allocation, market timing, and security selection. Bams, Schotman & Tyagi (2016) state that pension funds actively rebalance their portfolio to counteract the impact of return on their portfolios significantly more than the rebalancing estimated for households.

Fischer et al (2021) posits that when price shocks cause the portfolio weights to deviate from their

optimal risk-return maximizing values, investors rebalance their portfolios. Huss & Maloney (2017) aver that well-managed dynamic rebalancing processes may lead to more predictable risk characteristics, while seemingly passive buy-and-hold portfolios may have the most variable and least predictable risk outcomes. The most dynamic portfolios require a combination of several separate rebalancing processes, each of which has its own rationale and its own effects on risk and return expectations. Studies on the moderating effect of portfolio rebalancing on the relationship between asset allocation and financial performance of pension funds in Kenya have yielded mixed results. It is for the foregoing reason that this study was conducted.

LITERATURE REVIEW

Theoretical Framework

The study is underpinned by modern portfolio theory and the Black Litterman model since all of them support both the dependent and predictor variables. The Modern Portfolio Theory outlines the selection and construction of asset portfolios whose premise is to maximize the portfolio expected return and to concurrently minimize the attendant risk. The theory has four basic steps (Brodie, 2009); security valuation which describes a universe of assets in terms of expected return and expected risk; determining how assets are to be distributed among classes of investment (asset allocation decision); reconciling risk and return in selecting the securities to be included (portfolio optimization); and dividing each stock's performance (risk) into market-related (systematic) and industry/security-related (residual) classifications(performance measurement). The Black-Litterman model is an asset distribution model that was advanced by Fischer, Black and Robert Litterman at Goldman Sachs in 1990 (Polovenko, 2017). The model brings together ideas from the Capital Asset Pricing Model (CAPM), Bayesian Statistics and the Markowitz's mean variance optimization model to give investors a tool to estimate the optimal portfolio weights under specified constraints. The Black-Litterman Model (BLM) is assumed as fundamental and valuable contribution to the asset allocation management and optimization of financial investments. The idea of the BLM is to integrate the historical data about the asset returns with subjective views from experts about the future behavior of these returns. Such combinations of current and historical data are used for making investment decisions whose results will be seen in a future period.

Empirical Review

Park, Kim & Lee (2022) investigated asset allocation efficiency from dynamic and static strategies in underfunded pension funds. The study attempted to conduct a comparative analysis between dynamic and static asset allocation to achieve the long-term target return on asset liability management (ALM). Vector autoregression was used to estimate and forecast long-term interest rates. Based on asset allocation simulations, the study derived that dynamic asset allocation which has been mirroring economic changes actively has a higher annual yield and risk-adjusted return

than static asset allocation.

Using historical data to form hypothetical portfolios, Hong (2021) evaluated the impact of rebalancing methods on portfolio returns. The study tested a total of 14 different rebalancing approaches. The study found out that portfolios with fewer components can be more efficiently rebalanced than portfolios with many components. The study also did not find any evidence to the effect that rebalancing choices can reliably increase expected returns. Dayanandan & Lam (2015) did a study on portfolio rebalancing using data from the U.S. for the 20-year period 1983-2012 to examine whether there is evidence that statistically significant value exists for various portfolio rebalancing strategies. The study found that the differences in return from various periodic-cum-threshold rebalancing strategies compared to a buy-and-hold strategy is only 11 basis points and that the mean difference of various periodic rebalancing strategies from a buy-and-hold strategy is not statistically significant except for quarterly or semi-annual portfolio rebalancing strategies. The study also found out that gains from portfolio rebalancing may be eroded by the cost of rebalancing is substantial.

A study by Bams et al. (2016) investigated asset allocation dynamics of pension funds. The study used an international database that spans over 20 years and focus on portfolio rebalancing. The study findings indicated that a significant proportion of the change in the weight of equity is related to passive change in portfolio due to realized equity returns. Moreover, pension funds follow asymmetric rebalancing, they rebalance poorly when stock market is doing well but rebalance strongly when stock market is doing poorly. Actual change in equity portfolio only partially reflects strategic changes. The results of the study also indicated that US and defined benefit pension funds rebalance less. Moreover, external managers and active managers can be identified as the major source of poor rebalancing. Lastly, between asset classes, pension fund are more passive in alternative investments.

Kim & Lee (2020) investigated equity market integration and portfolio rebalancing. The study used EPFR database, which provides country allocation information of international mutual funds collected directly from fund managers or administrators. The study sample consisted of 385 equity mutual funds and the period from 1999m12 to 2017m12. The data was analyzed using regression. Study results indicated that the propensity to rebalance is stronger in bad times, especially during major international financial crises, than in good times.

From the empirical review, we observe that asset allocation decisions and portfolio rebalancing have attracted attention from researchers. Previous studies have presented opposing views on how portfolio rebalancing may influence the relationship between asset allocation and financial performance of pension funds in Kenya. The study differentiates itself from previous studies on several fronts. We try to explain how portfolio rebalancing affects major asset classes pension funds in Kenya invested as per latest reports by he Retirement Benefits Authority. As an

improvement over previous studies, we used Time Weighted Rate of Return to measure financial performance. Time Weighted Rate of Return (TWRR) measures the rate of return of a portfolio by eliminating the distorting effects of changes in cash flows.

METHODOLOGY

Sample Description

This study used epistemology, positivism and deductive approach for research design, choice of sampling technique, data collection and data analysis given that this the research variables revolved around resources available to pension schemes and how trustees and fund managers make investment decisions over these resources. The study used descriptive survey research design. The target population for this study was 1,258 registered schemes as per RBA as of 31 December 2021. The registered pension fund providers Kenya as at close of the year on the 31st of December 2021 constituted the sampling frame for this study. Cochran (1977) formulae was used to determine the sample for the study. The study used data collection form to obtain quantitative data for analysis. There are three categories of variables used in this paper:

(i) The independent variable which was asset allocation represented by investments in government securities, quoted equities, immovable property, guaranteed funds and listed corporate bonds.

(ii) Moderating variable which was the portfolio rebalancing measured by tactical shifts in individual asset classes year on year.

(iii) The dependent variable which was the computed scores of the financial performance as measured by the Time Weighted Rate of Return.

Model Specification

The study employed multiple linear regression model to analyze the moderating influence of asset allocation on the financial performance of pension funds in Kenya. The model analysis was used to test the statistical significance of the independent variable (asset allocation) on the dependent variable (financial performance as measured by the Time Weighted Rate of Return). In this study, the following linear regression equation was utilized to determine the moderating influence of asset allocation on the financial performance of pension funds in Kenya;

1 $Rit= \beta 0 + \beta 5PRit + ej$

2 $Rit= \beta 0 + \beta 5PRIit + ej$ [Baron & Kenny, 1986].

3 $Rit = b0+b1PRIit+e6$

Where:

Rit is TWRR for each firm i and year t

TWRR is Time Weighted Rate of Return

PR is Portfolio Rebalancing

βi, αi, λi, ai, bi and ci (i=0,1…,6) are the associated regression coefficients.

Ej is the error term (j=1,2…,6)

Time Weighted Rate of Return (TWRR) is computed as (Ending value – Beginning Value)/Beginning value. It measures the rate of return of a portfolio by eliminating the distorting effects of changes in cash flows

Government Securities is measured as proportion of government securities in the total assets of the fund . Government securities consists of total investments made in treasury bills and bonds.

Quoted Equity is computed as equity Investments divided by the total assets of the fund. It represents investments by pension funds in stocks of companies listed at the Nairobi Securities Exchange.

Immovable Property is computed as total investments in immovable property divided by the total assets of the fund.

Guaranteed Funds is computed as total investments in guaranteed funds divided by the total assets of the fund. It consists of investment by pension funds in guaranteed funds that promise minimum guaranteed return.

Listed Corporate Bonds is computed as investments in listed corporate bonds over the total assets of the fund. It represents investments by pension funds in corporate bonds issued by firms listed at the Nairobi Securities Exchange.

Portfolio Rebalancing is measured as tactical shifts in individual asset classes year on year.

RESULTS AND DISCUSSIONS

$H0_1$: Portfolio rebalancing has no moderating influence on the relationship between asset allocation and financial performance of pension funds in Kenya.

Table 1 indicates the descriptive statistics for portfolio rebalancing across the six-year period. The year that recorded the highest value was 2018 and the year that recorded the lowest average was 2019. There is a steady rise between the year 2016 to 2018. A sharp decline is observed between the year 2019 to 2020. The skewness values across the year 2018 to 2021 is positive but for the year 2017 is negatively skewed and the kurtosis is high more than 3 indicating that it is heavy tailed.

Table 1: Descriptive Statistics for Portfolio Rebalancing

Year	MEAN	MIN	MAX	STD.DEV	SKEWNESS	KURTOSIS
2016	Reference					
2017	-0.574	-0.00027	0.201	0.0339	-10.441	187.824
2018	-0.0205	0.00509	0.465	0.0295	10.815	141.824
2019	-3.48	0.0145	4	0.274	2.491	164.47
2020	-0.129	0.00674	0.574	0.0427	8.943	95.34
2021	-0.217	0.00609	0.529	0.0437	7.639	81.056

Table 2 indicates the descriptive statistics for the variable performance across the six-year period. The year that recorded the highest value was 2017 and the year that recorded the lowest average was 2018. There is a steady rise between the year 2016 to 2017. A sharp decline is observed between the year 2017 to 2018. The skewness values across the year 2016,2017,2019, 2020, and 2021 is positive but for the year 2018 is negatively skewed and the kurtosis is high more than 3 indicating that it is heavy tailed. Apart from 2019 the kurtosis value is kurtosis is less than 3 implying that it is almost platykurtic.

Table 2: Descriptive Statistics for Performance

Year	MEAN	MIN	MAX	STD.DEV	SKEWNESS	KURTOSIS
2016	-0.349	-2.866	11.586	1.277	0.947	18.142
2017	1.830	-4.484	81.200	9.339	6.123	40.993
2018	-1.160	-16.633	2.218	1.080	-9.542	112.647
2019	-0.497	-1.459	1.736	0.754	1.641	1.329
2020	0.171	-0.999	7.867	0.530	8.902	107.337
2021	0.333	-1.000	56.175	3.084	14.860	243.052

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Table 3: Model with Moderator

VARIABLE	ESTIMATE	Std. Error	t-value	Pr(>|t|)
Kenya Government Securities	-7.597464	1.3245	-5.7361	0.0000
Quoted Equity	-0.337703	0.1482	-2.2787	0.0114
Immovable Property	0.6239	2.4299	0.2568	0.6013
Guaranteed Funds	-9.0518	8.6521	-1.0462	0.1478
Listed Corporate Bonds	1.363756	0.19758	6.9023	0.0000
Kenya Government Securities: Portfolio	2.610415	0.4074	6.4075	0.0000
Quoted Equity: Portfolio	-2.569664	1.0439	-2.4616	0.0070
Immovable Property: Portfolio	-1.221392	0.11801	-10.3499	0.0000
Guaranteed Funds: Portfolio	4.369313	2.6372	1.6568	0.0489
Listed Corporate Bonds: Portfolio	-3.561372	0.37730	-9.4391	0.0000
Total Sum of Squares: 33688				
Residual Sum of Squares: 5003.9				
R-Squared: 0.85146				
Adj. R-Squared: 0.7217				
F-statistic: 502.956 on 10 and 932 DF, p-value=0.0000				

Table 3 gives the moderating effect of portfolio rebalancing on the relationship between the asset allocation and financial performance of pension funds in Kenya. As shown, the Kenya Government Securities had a negative and a significant influence on the performance of pension funds in Kenya (coefficient -7.597464 and p value < 0.05). This implies that Kenya Government Securities has a significant relationship with financial performance of pension funds in Kenya. With the moderating variable, Kenya Government Securities and portfolio is significant (p value < 0.05) implying that portfolio rebalancing has a moderating effect on the relationship between Kenyan government securities and financial performance of pension funds in Kenya. Quoted Equity on its own has a significant influence on the financial performance of pension funds in Kenya (p value 0.0114 < 0.05). This implies that the quoted equity has a negative influence on the financial performance of pension funds in Kenya. On the effect of the moderating variable on the relationship between quoted equity and financial performance of pension funds in Kenya, there is a negative moderating influence of portfolio rebalancing on the relationship between quoted equity and financial performance of pension funds in Kenya, p value < 0.05. Immovable property has a positive and a non-significant influence on the financial performance of pension funds in Kenya, p value = 0.6013 > 0.05. On the moderating influence of the portfolio rebalancing on the relationship between immovable property and financial performance of pension funds in Kenya, there is a negative and a significant influence of portfolio rebalancing as a moderating variable on the relationship between immovable property and financial performance of pension funds in Kenya,

p value = 0.0000 < 0.05.

On the relationship between guaranteed funds and the financial performance of pension funds in Kenya, there is a negative and a non-significant relationship between guaranteed funds and the financial performance of pension funds in Kenya, p value 0.1478 > 0.05. On the moderating effects of the portfolio rebalancing on the relationship between guaranteed funds on the financial performance, there is a moderating influence of portfolio rebalancing on the relationship between guaranteed funds and financial performance of pension funds in Kenya, p value 0.0489<0.05. Listed corporate bonds had a positive and a significant influence on the financial performance of pension funds, p value 0.000 < 0.05. On the moderating influence of portfolio rebalancing on the relationship between listed corporate bonds and financial performance of pension funds, there is a moderating influence of portfolio rebalancing on the relationship between listed corporate bonds and financial performance of pension funds, p value < 0.05.

CONCLUSIONS AND POLICY RELEVANCE

The negative or low performance of pension funds and increasing deficit and its likely effects on pensioners or retirees motivated this study. The rational is that, if we can optimally manage members funds and actively manage the assets under management; then we can reduce the deficits due to low or negative pension fund performance. Our finding echoes policy debates by suggesting that optimal portfolio rebalancing has a significant effect on the relationship between asset classes adopted and pension fund performance.

Secondly, our study findings observed that guaranteed funds is the only asset class not significantly affected by portfolio rebalancing. This is expected since return on guaranteed funds is fixed (minimum guarantee) and therefore, the return on investors' funds will remain constant overtime even with portfolio rebalancing of the different asset.

Lastly, the study recommends that trustees and pension fund managers give cognizance to optimal portfolio management strategies as portfolio rebalancing has a significant effect on the relationship between asset classes adopted and pension fund performance. The study further recommends that policymakers and regulators should regularly evaluate legal and regulatory provisions to ensure they don't create adverse incentives that might undermine or inhibit the ability of pension fund asset managers to implement optimum portfolio management strategies.

REFERENCES

Alda, M. (2017). The relationship between pension funds and the stock market: Does the aging population of Europe affect it? International Review of Financial Analysis, 49, January 2017, 83–97. https://doi.org/10.1016/j.irfa.2016.12.008.

Amenc, N. O. Ë. L., Martellini, L. I. O. N. E. L., & Sender, S. J. (2009). Impact of regulations on the ALM of European pension funds.

Andonov, A., Bauer, R., & Cremers, M. (2012). Can large pension funds beat the market? Asset allocation, market timing, security selection and the limits of liquidity. Asset Allocation, Market Timing, Security Selection and the Limits of Liquidity (October 2012).

Androniceanu, A. (2017). The three-dimensional approach of Total Quality Management, an essential strategic option for business excellence. Amfiteatru Economic, 19(44), 61–78

Bams, D., Schotman, P. C., & Tyagi, M. (2016). Asset allocation dynamics of pension funds.

Bartram, S. M. (2016). Corporate post-retirement benefit plans and leverage. Review of Finance, 20 (2), 575–629. https://doi.org/10.1093/rof/rfv021.

Coletta, M., & Zinni, M. B. (2013). Insurance corporations and pension funds in OECD countries. *Bank of Italy Occasional Paper*, (165).

Dayanandan, A., & Lam, M. (2015). Portfolio Rebalancing–Hype or Hope?. The Journal of Business Inquiry, 14(2), 79-92.

De Hann, L. (2016). Recovery measures of underfunded pension funds: higher contributions, no indexation or pension cuts? Journal of Pension Economics and Finance,17 (4), 437–468, https://doi.org/10.1017/S1474747216000287.

Dominic. O. (2016). Railway Scheme sits on 30 billion as thousand sof retirees live in misery. The Standard, 2016 https://www.standardmedia.co.ke/business/article/2000223418.

e Antonio, J. R. H. O., & de Almeida Silva Jr, F. (2014). Testing the Liquidity Preference Hypothesis using Survey Forecasts.

Fabuš, M. (2017). Current development of business environment in Slovakia and Czech Republic. Entrepreneurship and Sustainability Issues, 5 (1), 127–137. https://doi.org/10.9770/jesi.2017.5.1(10).

Farias, P. (2017). Determinants of perceived and actual knowledge of commission paid by contributors in the pension funds industry. BRQ Business Research Quartery, 20 (1), 18–27. https://doi.org/10.1016/j.brq.2016.09.001.

Fischer, A. M., Greminger, R., & Grisse, C. (2017). Portfolio rebalancing in times of stress. Available at SSRN 3006525.

Fischer, Andreas M., Rafael P. Greminger, Christian Grisse, and Sylvia Kaufmann. "Portfolio rebalancing in times of stress." Journal of International Money and Finance 113 (2021): 102360.

Gakure SW & Gekara M (2015) Analysis of the financial performance of registered individual retirement schemes in Kenya. IJCBSS-International Journal of Current Business and Social Sciences

Gavurova, B., Belas, J., Kocisova, K., Dapkus, R., & Bartkute, R. (2017). Revenue and Cost Efficiency of Banking Sectors in the European Union Countries: Do they Depend on Size, Location or Crisis Period? Transformations in Business & Economics, 16(2), 124–146.

Hainaut. (2014). Impulse control of pension fund contributions, in a regime switching economy. European Journal of Operational Research, 239 (3), 810–819. https://doi.org/10.1016/j.ejor.2014.06.016.

Hong, X. (2021). Portfolio Rebalancing: Tradeoffs and Decisions. Available at SSRN 3858951.

Huss, J., & Maloney, T. (2017). Portfolio Rebalancing—Common Misconceptions. AQR white paper.

Mollik, A. T., & Bepari, M. K. (2015). Risk-return trade-off in emerging markets: evidence from Dhaka Stock Exchange Bangladesh. *Australasian Accounting, Business and Finance Journal*, *9*(1), 71-88.

Morales, W., Ubeda, F., & Barbero, J. (2017). Pension Funds Development and Its Impact on Economic Growth: The Moderating Effect of the Financial System. *Available at SSRN 3771370*.

Omollo, H., Olweny, T., Oluoch, O., & Wamatanda, J. (2021). Financial Structure and Growth of Pension Funds in Kenya.

Owinyo, J. A. (2017). Evaluation of determinants on the financial performance of retirement benefit schemes in Kenya (Doctoral dissertation, Strathmore University).

Papik, M. (2017). Composition of equity and mixed pension funds in Slovakia. Oeconomia Copernicana, 8(1), 51–64. https://doi.org/10.24136/oc.v8i1.4

Park, C., Kim, D. S., & Lee, K. Y. (2022). Asset allocation efficiency from dynamic and static strategies in underfunded pension funds. *Journal of Derivatives and Quantitative Studies: 선물연구*.

Park, C., Kim, D.-S. and Lee, K.Y. (2022), "Asset allocation efficiency from dynamic and static strategies in underfunded pension funds", *Journal of Derivatives and Quantitative Studies:*

선물연구, Vol. 30 No. 1, pp. 2-22. https://doi.org/10.1108/JDQS-10-2021-0025

Sinicakova, M., Sulikova, V., & Gavurova, B. (2017). Twin Deficits Threat in the European Union. E & M Ekonomie a Management, 20(1), 144–156. https://doi.org/10.15240/ tul/001/2017-1-010.

Sun, Y., Aw., G., Loxton, R., Teo, K. L. (2017). Chance-constrained optimization for pension fund portfolios in the presence of default risk. European Journal of Operational Research, 256 (1), 205–214. https://doi.org/10.1016/j.ejor.2016.06.019.

Tao, Q., Chen, C., Lu, R., & Zhang, T. (2017). Underfunding or distress? An analysis of corporate pension underfunding and the cross-section of expected stock returns. International Review of Economics and Finance, 48 (1), 116–133. https://doi.org/10.1016/ j.iref.2016.11.009.

Thomas, A., Spataro, L., & Mathew, N. (2014). Pension funds and stock market volatility: An empirical analysis of OECD countries. Journal of Financial Stability, 11 (1), 92–103. https://doi.org/10.1016/j.jfs.2014.01.001

Vassallo, J. M., Rangel, T., De Los Angeles, B. M., & Bueno, P. C. (2017). The Europe 2020 Project Bond Initiative: an alternative to finance infrastructure in Europe. Technological and Economic Development of Economy, 24 (1), 229–252, https://doi.org/10.3846/20294913.2016.12 09251.

Wang, H., Koo, B., & O'Hare, C. (2016). Retirement planning in the light of changing demographics. Economic Modelling, 52 (1), 749–763, https://doi.org/10.1016/ j.econmod.2015.10.014.

Wang, Q., & Peng, J. (2016). An empirical analysis of state and local public pension plan funded ratio change, 2001-2009. *The American Review of Public Administration*, *46*(1), 75-91.

Were, F. O., Iravo, M. A., & Wanjala, M. Y. (2017). Determinants of financial performance on pension schemes: A case of Kenya retirement benefits authority. *International Journal of Management and Commerce Innovations*, *5*(2), 161-166.

Wiafe, O. K., Basu, A. K., & Chen, J. (2017). The effects of age pension on retirement drawdown choices. Finance Research Letters, 20 (1), 81–87. https://doi.org/10.1016/ j.frl.2016.09.019.

Ząbkowicz, A. (2016). A paradox of reforming pensions in Poland, Equilibrium. Quarterly Journal of Economics and Economic Policy, 11(3), 585–602. https://doi.org/10.12775/ EQUIL.2016.026 Gavurova, B., Belas, J., Kocisova, K., Dapkus, R., & Bartkute, R. (2017). Revenue and Cost Efficiency of Banking Sectors in the European Union Countries: Do they Depend on Size, Location or Crisis Period? Transformations in Business & Economics, 16(2), 124–146.