EFFECT OF MARKET RISK ON PENSION FUND’S INVESTMENT PERFORMANCE IN NIGERIA

Halimah Sani Sambo

Abstract

The objective of this study is to empirically assess the effects of market risk on pension fund investments in Nigeria; considering the relationship between return on a portfolio and risk-free rate plus other factors such as stock market returns. The essence of pension funds investment is to create a portfolio with assets which maturity will align with the expected return that can off-set such responsibilities despite volatilities in the market place. Using risk-adjusted return as a proxy for investment performance and market risk as the explanatory variable; the study utilized the ordinary least square (OLS) regression using panel data for sampled PFAs between 2007 to 2015. Results revealed that the coefficient of market risk is not significant at any of the conventional levels signifies that the effect is statistically negligible. The paper recommends PFAs should increase their investment in risky assets to give them the opportunity of reaping more returns and portfolio performance. It further recommends that efficient and optimal investment portfolio mix on behalf of retirees to hedge against risk of eroding the long term funds and thus ensuring more returns on investment.

Keywords: Pension fund, Market risk, Investment performance

Introduction

The portion of financial stability and security that pension funds provide in any economy cannot be overstressed. The aggregate global population in the last few decades has led to the shift by many economies from the Defined Benefit (DB) to Defined Contributory (DC) to enable them manage their pension liabilities (Doyle, 2006). Nigeria successfully shifted to the DC in 2004 as a result of the outstanding pension liabilities against the Nigerian government in the DB scheme and as at 2015 and 2017 contributions amounted to 5.3 and 7.52 trillion naira respectively (PenCom, 2017). In the DC scheme arrangement pension administrator are trusted with accumulated pension contributions to invest and manage such funds on behalf of the employee, subject to stipulated guidelines, until the employee retires (Sambo, 2016).

1 Department of Actuarial Science & Insurance, ABU Business School, Ahmadu Bello University, Zaria. halimahssambo247@gmail.com; hssambo@abu.edu.ng +23408(0)8023242786; +234(0)8052427236
The Nigerian pension industry under the new DC pension plan experienced its major challenge in 2008 when the Nigerian stock market experienced significant attrition in the worth of both individual and institutional shareholders as an aftermath of the global financial crisis which has its roots in the U.S. Throughout the decay in the value of stock, the Nigerian stock market lost about 44.38 percent of its capitalization and the Nigerian Stock Exchange (NSE) All Share Index (ASI) declined by approximately 68.62 percent (Mohammed, 2010).

The turmoil in the Nigerian stock market raised a lot of concerns among analysts and experts in the industry as to the extent to which pension funds already invested in the market will be affected. Public analysts have opined many times that the crisis may have eroded the value of pension assets, a reasonable proportion of which had been invested in the capital market. However, these opinions were not backed by empirical evidence. It is a fact that the performances of portfolios have traditionally being associated with the degree of market risk. According to Chirchir (2014), the effect of market risk on pension fund performance is a function of the composition of the portfolio in terms of asset classes. A portfolio with more risk-free assets will be less sensitive to market risk relative to a portfolio mainly composed of risky assets. Even though studies have established market risk of pension fund assets (Chirchir, 2014) as a fact that determines pension fund investment return. None was conducted in the Nigeria context.

Chirchir (2014) and Chandra (2010) argued that the market risk that pension fund assets are exposed to is crucial in determining the return on pension investment portfolios. Fluctuations or volatilities in market value of assets invested in by pension fund managers will either attenuate the chances of achieving higher return, or increase the possibility of earning higher return. Understanding this risk by pension managers therefore helps mitigate poor investment selection by pension fund managers. Furthermore, in an effort to tranquil the anxieties of prospective retirees, PenCom had continuously restated that despite the erosion in market value, pension’s funds were not significantly affected. Again, the position of the regulator was not backed by research evidence. This study therefore finds it advantageous to investigate the effect of pension funds asset in Nigeria considering the turbulent nature of the stock market. Hence, the objective of this paper is to assess the effect of market risk on investment performance of pension funds in Nigeria.

In addition, the contributory pension scheme in Nigeria was introduced as a mitigant to the challenges faced under the DB scheme. While significant funds have been contributed under the new DC scheme and their management entrusted to PFAs, stakeholders including pension analysts, employees and retirees have continuously expressed concerns about the investment performance of the Nigerian pension industry portfolio in terms of the return being generated by such invested funds. The average return on
pension investment portfolio over the period 2009 to 2015 was 8.20%, which is less than the average risk-free rate (Treasury bill rate) rate of 8.82%, and average inflation rate of 10.72% (PenCom, 2010, 2011, 2012, 2013, 2014, 2015). These stakeholders have argued that unless pension fund managers are able to grow pension funds through profitable investments, accumulated pension assets are bound to be eroded over time and will thus be unable to cover future pension liabilities of retirees. Pension industry analysts have opined that identifying all the factors that explain growth of pension funds in Nigeria therefore becomes imperative.

It is equally fundamental to understand how market risk determines the performance of pension funds because according to Tonks (2006), the knowledge of factors is critical to the pension portfolio allocation decision of PFAs. However, there is no known published study on the determinants of pension funds' performance in Nigeria to serve this purpose. The paper tries to find out the effect of market risk on investment performance of pension funds in Nigeria and states the hypothesis as: Ho1: Market risk has no significant effect on investment performance of pension funds in Nigeria.

Finally, a number of investment institutions and corporate bodies in Nigeria would benefit from this study. Among the investment institutions where accumulated pension funds can be invested is the Nigerian stock market. Thus, the findings of this study would enlighten companies listed on the Nigerian stock market on the role pension industry can play in strengthen the market. Similarly, insurance companies listed on the market would also be exposed to the effect of market risk on investment performance of pension funds in Nigeria. The remainder of the paper is structured as follows: section two reviews literature and presents the theoretical framework underpinning the study, section three discusses the methodology adopted for the study, section four presents the results/findings, section five discusses the findings; and section six draws conclusions and makes recommendations.

Literature Review

This section is dedicated to the review of previous literature on the investment performance and market risk of pension funds. Most of the studies on pensions fund investment performance come from the U.S., U.K., and other European countries such as Poland, Hungary and Australia, and the reasons for this development are not farfetched. These countries have well-established privately funded pension systems that have steadily grown over the years (Tonks, 2006).

Bhattacharya and Rastogi (2016) utilized a sample of 225 pension fund trusts to conduct a study in India, consisting of 51 self-managed trusts from public sector units, and 174 self-managed trusts from private corporate bodies, to examine the determinants of performance of privately managed pension funds in India. The study used Structural Equation Modelling (SEM)
basically primary data. The constructs remained unchanged even after conducting Confirmatory Factor Analysis (CFA). The results revealed that trust composition and function, investment policy and investment strategy have positive and significant effect on investment performance of pension funds while management purview has insignificant relationship. The study concluded that governance practices indirectly influence the relationship between investment and performance of pension funds in India. However, the study relied on qualitative data only.

Mittelstaedt and Olsen (2003) tested the investment performance of 19 Chilean pension funds using multi-index model and the Sharpe ratio. Monthly return data was compared against risk adjusted returns of the pension system to those of the Chilean stock indices, debt instruments, and mutual funds. The multi-factor Jensen alpha suggests that the pension returns are consistent with the overall riskiness of the economy. Nderitu (2012) employed a sample of 384 pension schemes in Kenya to investigate the determinants of investment decisions of pension funds. Annual pension data from 2002 to 2011 as used with pension risk, expected return and investor characteristics as independent variables. It was found that pension risk and investors’ characteristics have negative but insignificant coefficients of -5.0202 and -2.261 respectively, while expected return has a positive and insignificant effect of 5.14 on investment return of pension funds in Kenya. However, the study omitted a number of theoretically important determinants of pension funds.

Chirchir (2014) examined the effect of risk on return of a sample of 45 pension funds in Nairobi. The study utilized rate of return for the sample pension funds in Kenya as measure of performance over the period 2009 to 2013. The study established positive performance of the Kenyan pension funds. Acikgoz, Uygurturk and Korkmaz (2015) examined the factors affecting the performance of mutual pension funds using a sample of nine pension mutual funds in Turkey from January 2006 to September 2013. The study employed panel regression models. The study found positive performance using Turkish data. Andonov, Bauer, and Cremers (2015) conducted a comparative study on U.S., Canada, and Europe using panel regression to investigate whether performance and asset allocation of these pension funds are related with different regulation concerning their liability discount rates. The study found negative performance which may be attributed to its unique risk taking on a comparative basis. However, this is evident in the underperformance of U.S funds that place asset in risky investments. Nevertheless, this study reveals heavy investments in equity as against other investment outlet.

Matek et al. (2016) utilized monthly gross of fees return of the Croatian pension fund from January 2005-December 2014 to examine the investment performance and efficiency of fund managers. The study's sample
covers all the four mandatory pensions’ funds in Croatia. To achieve its objective, the study employed the Sharpe ratio, the Sortino ratio, Treynor ratio, information ratio and Jensen's alpha as measures of investment performance. The study established positive betas and Treynor measures for all the four mandatory Croatian pension funds, with the highest beta and Treynor measure of 0.96 and 4.96% respectively, and the lowest of 0.63 and 2.07% respectively. The study concluded that all the four Croatian mandatory pension funds performed better than all their set benchmarks of risk-free rate and target return during the period under study and found negative effect of market risk.

**Theoretical Frame Work**

The paper is hinged on the Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965). It is an economic model developed due to the mechanical complications of the Markowitz portfolio mode (MPT). Markowitz portfolio model is a mean-variance approach to investing pioneered by Markowitz as it is based on some assumptions amongst which is that all investors follow Markowitz approach to advocate that expected return of an asset to be positively and linearly related to the level of its beta. The beta is a measure of the sensitivity of the returns to changes in the macro-economic factors. Accordingly, the integral dissimilarity in investment manners steered the birth of CAPM to explain in what way assets are priced in the market place as it is taken appropriate for this study since it explains how return on a portfolio is associated with the risk-free rate and other macro-economic factors such as stock market returns. The CAPM offers the theoretical basis for this study. Furthermore, it clarifies why pension fund managers should be concerned about the performance of their funds relative to the stock market which is essentially a vehicle for long term investments needed by the pension industry stakeholders to off-set long term pension liabilities without fear of erosion of such funds.

**Methodology**

This paper applied the Ordinary Least Square (OLS) to establish the relationship between market risk and investment performance. The market risk measured as standard deviation of annual rate of return for PFA i during the period while investment performance measured as annual risk-adjusted rate of return on the investment portfolio of PFA i. The population of this study consists of all PFAs and Closed PFAs (CPFAs) registered and recognized by the PenCom as at 31st December, 2015. There are twenty-one PFAs and seven CPFAs registered during the period, bringing the total population to twenty-eight firm observations. The study thus utilized a final sample of nineteen PFAs, representing approximately 68% of the population after filtering. Therefore, generalizations proffered cover this whole population of PFAs and CPFAs in Nigeria.
The data was collected from audited and published annual reports of the sample PFAs on annual rate of return, while information on annual rate of inflation and annual Treasury Bill (TB) rate were collected from the relevant statistical bulletin of the Central Bank of Nigeria (CBN) for the analysis. The relationship estimated can be presented in the following functional form:

\[ INP = f(MRK) \] .................................................. (1)

Where:

\( INP \) = investment performance
\( MRK \) = market risk of pension investments

The explicit model is specified as:

\[ INP_{i,t} = \alpha_0 + \beta_1 MRK_{i,t} + \varepsilon_{i,t} \] .............. (2)

Where:

\( INP_{i,t} \) = the investment performance, measured as risk-adjusted annual rate of return of PFA\(_i\)
\( \alpha_0 \) = the intercept of the model
\( MRK_{i,t} \) = the market risk of PFA\(_i\) at time \( t \)
\( \beta_1 \) = the coefficient of the market risk, and
\( \varepsilon_{i,t} \) = the random disturbance term of PFA\(_i\) at time \( t \)

Risk adjustment for annual rate of return on pension portfolios of the sample PFAs was undertaken by dividing the annual return of each PFA by its average standard deviation (measure of risk) over the period of the study. The annual return on the portfolio of PFA\(_i\) was computed in line with the mandatory procedures set out in PenCom (2006).

**Results Discussion/Findings**

**Table 1. Descriptive Statistics of Panel Regressor**

<table>
<thead>
<tr>
<th>Market Risk</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.74157</td>
</tr>
<tr>
<td>Standard Dev.</td>
<td>3.48427</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.01000</td>
</tr>
<tr>
<td>Maximum</td>
<td>22.7200</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.46054</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>7.82232</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>176.15***</td>
</tr>
<tr>
<td>Observations</td>
<td>133</td>
</tr>
</tbody>
</table>

***and**** imply significance at the 10%, 5% and 1% levels respectively.

**Source:** Eviews8 output, 2018

It can also be observed from table 1 that the mean value of market risk for the Nigerian pension industry investment portfolio is approximately 4.74%, while the standard deviation of 3.48% suggests dispersion around the mean pension industry market risk value. The minimum and maximum
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pension industry market risk values of 0.01% and 22.72% respectively imply relative variability in the observation. Furthermore, the skewness of 1.4605 is indicative of positive skewness and a longer right tail, while the excess kurtosis of 7.8223 means that the distribution of pension industry investment portfolio market risk is peaked at the surface around the mean and is thus leptokurtic. The Jarque-Bera value of 176.1561 which is strongly significant at the 1% level implies that the observation of pension industry portfolio market risk is not normally distributed.

In summary, the descriptive statistics for market risk of the investment performance of pension funds in Nigeria have shown that most of the variables have relatively high dispersion around their mean values, and also exhibit relatively high variability. Similarly, the variable also depicted abnormal skewness and kurtosis which culminated in their overall non-normality. However, such non-normality poses no harm to the study as the most important thing to establish is not the normality of the individual variables but that of the residuals from the model estimated using such variables.

Table 2. Regression Results for Investment performance and Market Risk

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>5.0137</td>
<td>35.506***</td>
</tr>
<tr>
<td>Market risk</td>
<td>-0.0454</td>
<td>-1.8842</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.0269</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.0193</td>
<td></td>
</tr>
<tr>
<td>Durbin-Watson</td>
<td>2.4518</td>
<td></td>
</tr>
<tr>
<td>F-statistics</td>
<td>0.0618***</td>
<td></td>
</tr>
</tbody>
</table>

*,**, and *** imply significance at the 10%, 5% and 1% levels respectively.

In addition, table 2 also shows the regression results coefficient of market risk is approximately -0.045 with a corresponding t-statistics of -1.884 which is statistically insignificant at all the conventional levels. The negative coefficient of market risk indicates that the relationship between the market risk and pension fund portfolio performance are negative. However, the fact that the coefficient of market risk is not significant at any of the conventional levels signifies that the effect is statistically insignificant. The result further indicates that the coefficient of determination (R²), which explains the total variation in pension fund investment performance explained by market risk, is approximately 2.70% which means that 97.30% is explained by other variables not captured in this model. Similarly, the adjusted R² value of approximately 1.94% is indicative of the explanatory power of adding more regressors (determinants of pension funds investment performance) to the model. In the same vein, the Durbin-Watson statistics of 2.4518 is not quite far away from the value of two as to create room for suspecting the possibility of positive auto-correlation in the residuals of the estimated model. Also, the
F-statistics of 3.5503 which is strongly significant at the 5% level is an indication that the model is fit and does not suffer from any form of mis-specification.

This study failed to reject the null hypothesis that market risk has no significant effect on investment performance of pension funds in Nigeria. Thus, the test of hypothesis has established that pension industry portfolio market risk has no significant effect on investment performance of pension fund in Nigeria. The findings of this study support Matek, et al. (2016) but negates the work of Oluoch (2013), Acikgoz, Uygurturk and Korkmaz (2015) and Chirchir (2014) which found negative and statistically significant effect of pension industry market risk (volatility) on the investment performance of Kenyan pension funds.

Conclusion and Recommendation

The study concluded that the insignificant negative effect of pension industry portfolio market risk on investment performance of pension funds in Nigeria is consistent with the fact that the proportion of assets in the portfolio that are allowed to earn risky return is negligible and thus the portfolio is not competitive and less value-adding. This implies that the Nigerian pension industry portfolio is compliant to its guideline for investment of these funds. The study therefore recommends a review of the investment guideline done in 2012 as it may be strict on investment in risky securities that are more likely to earn more returns on investment. Thus, the growth rate may not adequately compensate for time value of money in the future.

In terms of market risk, the study recommends PFAs to improve portfolio performance, subject to the use of effective investment strategies in combining risky assets. The services of qualified portfolio and investment analysts can be sort who can suggest to them a combination of risky securities with the appropriate co-variances and correlation of return for risky investments such as equity. By doing this, PFAs can increase overall portfolio performance and at the same time keep market risk under control.
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References


Madura, J. (2010). *Financial Institutions and Markets.* (9th ed.). South-WesternCengage Learning, USA


Appendix 1

Market Risk

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>5.013771</td>
<td>0.141209</td>
<td>35.50608</td>
<td>0.0000</td>
</tr>
<tr>
<td>MARKET_RISK</td>
<td>-0.045406</td>
<td>0.024098</td>
<td>-1.884238</td>
<td>0.0618</td>
</tr>
</tbody>
</table>

R-squared     | 0.026989    | Mean dependent var | 4.798348   |
Adjusted R-squared | 0.019387 | S.D. dependent var | 0.954251   |
S.E. of regression | 0.944956 | Akaike info criterion | 2.739907   |
Sum squared resid  | 114.2964 | Schwarz criterion | 2.784023   |
Log likelihood    | -176.0940 | Hannan-Quinn criter. | 2.757833   |
F-statistic       | 3.550353 | Durbin-Watson stat | 2.451821   |
Prob(F-statistic) | 0.061801   |                     |            |