



ABSTRACT

Investment of occupational pension fund assets was intended to enhance retirement savings account balances of the employees. There have been growing concerns about the need to address the sustainability challenge of occupational pension fund assets in Nigeria. The study investigated the effect of investment risks on occupational pension fund

INVESTMENT RISKS AND SUSTAINABILITY OF OCCUPATIONAL PENSION FUND ASSET IN NIGERIA

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Introduction

Generally, in the developed economies, pension funds play a substantial role in the provision of long-term funds to the corporate sector. The mechanisms through which this intermediation takes place vary significantly: in those economies where capital markets are robust and large (for instance in the United States), pension funds acquire, directly or indirectly, long-term securities, stimulating simultaneously the primary and secondary capital markets. In developed economies dominated by universal banks, pension funds acquire long-term bonds (certificates of deposits, for instance) issued by banks, allowing the latter to provide their corporate clients with loans with different maturities (Studart, 2000). Globally, the largest pension funds are in North America, followed by Europe and the Asia-Pacific



assets in Nigeria. The study adopted a descriptive research design, using correlation and multiple regression analysis to analyze the data extracted from the distributed questionnaires. Taken investment risks proxy by (Purchasing power risk (PPR); market risk (MAR); interest rate risk (IRR); and business risk (BUR) as the set of independent variables, while occupational pension fund assets (PFA) are taken as the dependent variable. Population of the study comprised the risk management and compliance personnel of PFAs in Nigeria while the sample size comprised One hundred selected employees through purposive sampling technique. Ninety five (95) copies of returned questionnaire were analysed for the study. The findings of the study revealed that the set of independent variable (IRR) and (BUR) have significant effects on the dependent variable (PFA) with the coefficient (0.416 & 0.691) and associated probability (0.000 & 0.000) respectively. Also, set of independent variables (PPR) and (MAR) have effects but not significant on dependent variable (PFA) with coefficient (0.133 & 0.044) and associated probability (0.086 & 0.414) respectively. The study concludes that Investment Risks such as Purchasing power risk and Market risk significantly effects sustainability of pension fund assets in Nigeria. It also concludes that Investment Risks such as Interest rate risk and Business risk has effects but not significant on sustainability of pension fund assets in Nigeria. The study recommends that investment risks needs careful consideration when planning investment of pension fund assets in Nigeria.

Keywords: Investment Risks, Pension Fund Asset, Purchasing Power Risk, Market Risk, Interest Rate Risk, Business Risk.

region (Juvonen, Kumar, Ben Ayed, & Marin, 2019). The largest reserve is held by the US Social Security Trust Fund at USD 2.8 trillion, followed by Japan's Government Pension Investment Fund (GPIF) at USD 1.1 trillion. As of 2016, global pension funds had allocated their assets by investing about 46% in equities, 28% in bonds, 24% in other investments, and held 3% in cash (Willis Towers Watson, 2017). The asset allocation of pension funds is influenced by a variety of factors, including market trends, investment strategy, regulation, risk appetite, liability



considerations, governance structures, tax issues and domestically available assets to invest in (Juvonen, Kumar, Ben Ayed, & Marin, 2019). Nigeria undertook a reform of its public pension system in 2004 in which it changed the funding modality from pay-as-you-go to the contributory pension scheme. An ostensible goal of that reform was to raise the level of aggregate saving in the economy (Asekunnowo, 2009).

A critical element of the Contributory Pension Scheme as enshrined in the PRA 2014, is the mandatory investment of pension funds by the Pension Fund Administrators. As a cardinal hallmark of the scheme, investment of pension funds is intended to enhance the Retirement Savings Account balances of the workers (Ezenwa & Obiagwu, 2020). The PRA of 2004 came into being with a view to reducing the difficulties encountered by retirees in Nigeria under the old pension scheme. The new scheme is regulated and supervised by the National Pension Commission. The Commission has the power to formulate, direct and oversee the overall policy on pension matters in Nigeria (Shimawua, 2020). It is in recognition of this laudable vision that the PRA 2014 in PART XII, section 85(1) states that: all contributions made under the Act shall be invested by the pension fund Administrators with the objectives of safety and maintenance of fair returns on amount invested (Ezenwa & Obiagwu, 2020).

However, in Nigeria, observation from Nwawolo and Nwogwugwu (2017) has revealed that most employees are ignorant of the investment strategies and performance indicators on their contributions. These indicators include the risk factors on the fund to which the contributors or retirees would bear full responsibility in case of poor investment performance. Nwawolo and Nwogwugwu (2017) further explains that the contributors' lack of awareness and participation in the investment of their contributions minimize the opportunity to take decisions to change a non-performing investment portfolio or fund administrator despite the fact that many retirees have to wait for one to two years before receiving their pension lump sum after retirement. The study however examined the effects of investment risks on sustainability of occupational pension fund assets in Nigeria. It investigated the influence of purchasing power risk, interest rate risk, market risk and business risk respectively on sustainability of occupational pension fund assets in Nigeria.



Literature Review

Conceptual Review

Concept of Pension

Pension may be defined as a regular flow of income paid by an employer to a previous worker who is currently in retirement (Odo, Ani & Agbo, 2021). Anyafo (2000) defines pension as a periodic payment or allowance to an individual or his family given because of some meritorious work or when certain conditions such as age, length of service, desired degree of contributions, etc, have been met. Jane (2000) described pension as a method where by an individual pay into a pension scheme a proportion of his earnings during his working life. The contributions provide an income (pension) on retirement that is treated as earned income and is taxed at the investors' marginal rate of income tax. It is a tax deferred savings vehicle that allows for the tax-free accumulation of a fund for later use as a retirement income. Pensions should not be confused with severance packages; the former is paid in regular installments, while the latter is paid in one lump sum (Chukwuma & Pretoria, 2018). Pension as a scheme is designed to cater for welfare of the pensionable retired worker and had long gained global recognition and acceptance.

Workers generally, whether those in the public or private sectors are expected to live a comfortable life devoid of any form of dependency after their successful retirement from service (Egolum & Ndum, 2021). In general, a pension is an arrangement to provide people with an income when they are no longer earning a regular income from employment (Chukwuma & Pretoria, 2018). Pension Scheme has increasingly attracted the attention of policy makers in many countries as a means of facilitating privately funded retirement income savings by an ageing workforce (World Bank, 2009). Armstrong (2010) affirms that pension help employees to readjust themselves properly into the society.

Investment Risk

Investment is an instrument of generating funds involves deployment of money in securities or assets issued by any financial institution with a view to obtaining the targets returns over a specified period of time (Perpetua, 2017). Nwaru (2002) implicated that investment is the conversion of money the insurance funds and reserves into some, species of propriety from which an income or profit is



expected date to be served either immediately or at some future date in the normal course of business. Investment is the process by which people will available resources put them at the disposal of company, building sureties, public arteries and other bodies in return for certain right embodied in share, stock or other forms of securities (Perpetua, 2017). Victor (2004) says that investment involves the allocation of monetary resources to assets that are expected to yield some positive returns over a given period which comprises of the sacrifice of the present consumption for the prospect of uncertain reward, basically resulting to increase in future output.

The term 'investment risk' is often used loosely, and frequently confused with the notion of short-term price volatility, particularly for equity instruments. For the long-term investor, however, what is most apposite is the ability to meet future real cash flows as they become due (Hue, Jinks, Spain, Bora, & Siew, 2019). Investment risk can also be systemic in nature when all pension plans are affected by financial meltdowns or other economic catastrophes (International Organisation of Pension Supervisors (IOPS), 2012). Investment risk is defined as the probability or uncertainty of losses rather than expected profit from investment due to a fall in the fair price of securities such as bonds, stocks, real estate, etc. Each type of investment is exposed to some degree of investment risk like the market risk i.e., the loss on the invested amount or the default risk i.e., the money invested is never returned back to the investor (Thankur, 2022).

Investment risk is the possibility that changes in the values of, or income from, assets cause a long-term investor to fail to achieve its goals over its investment horizon. The categories of long-term investor covered will include those which have liabilities based on some demographic factors and some form of real value or inflation-based guarantees, i.e. a pension fund or insurer with long-term liabilities (Hue *et al.*, 2019). Investment risk can be defined as the probability or likelihood of occurrence of losses relative to the expected return on any particular investment (The Economic Times, 2022).

Investment Risks Dimension and Sustainability of Occupational Pension Fund Asset.

Purchasing Power Risk

Essentially pension funds want investment returns to hedge against the risk the purchasing power pose to the level of contribution rates and benefits paid (Hue



et al., 2019). The pension firm is a return oriented and the operations of pension companies are sensitive to the purchasing power risks. The high and uncertain Purchasing Power Risk is a challenge to any economic growth and Development and if not checked, instead of Economic development, the developing Economies will continue borrowing and repaying endless debts (Ogutu. 2014). The value of pension benefits decreases primarily as the result of the progressive inflation. Inflation weakens pension benefits by decaying its purchasing power (Dorfman, 2009). Pension system is considered as adequate when it manages to maintain the purchasing power of pension benefits and this can be possible only if pension benefits are significantly indexed otherwise retirees will suffer from poverty (International Labor Office, 2018). Several scholars empirically indicate that inflation weakens pension benefits when it is not indexed because it declines the purchasing power of pension benefits progressively (Stewart, 2009). According Ogutu (2014) the purchasing power risk in the developing economies has been characterized by high and unpredictable and uncertainty. Hue et al. (2019) asserted that, to the long-term investor, a shortfall could occur if the total investment return is lower than the targeted real return, thus a so-called 'safe' asset which is likely to preserve original capital but simultaneously likely to fall short of preserving the investor's purchasing power over the targeted time horizon might in fact be highly risky with regard to investment risk. Pensioners, above all, want to minimize the risk and uncertainty in their purchasing power of their retirement incomes. This is because retirees cannot change their earlier work and savings decisions should real benefits prove less than expected (Edward, 2009).

Market Risk

Market risk refers to changes in the value of an investment due to changes of market factors, such as interest rates, exchange rates or stock markets (Franzen, 2010). To measure the degree of market risk is necessary to use the CAPM model (the pricing model of capital assets - CAPM (Capital Asset Pricing Model), which analyzes the mutual connection between the risk and the return norms (Shaqiri, 2015). Market risk can be defined as the risk of loss because of unfavorable market movements. its belong to the category of the asset-liability risks (Valsecchi, 2017). Market risk can lead to variable losses resulting "from fluctuations in equity and



commodity prices, interest and foreign exchange rates" (Sugita, 2009). The amount of portfolio that is invested in equity, therefore, depends on the risk of negative variations of prices and it may vary from the estimate (Valsecchi, 2017). One of the market risks in pension fund assets is that retirement schemes often issue liabilities with a shorter maturity than investments in loans or bonds. Market risk applies to all asset classes and so to some extent the market risks faced by an entity can be further split or categorized differently – for example, for bonds these can be categorized as interest rate risk, credit risk, and currency risk (Hue *et al.*, 2019). Each market risk investment portfolio carries market risk. In order to address market risk, the Fund Pensioner try to find alternative investments that are affordable and which minimize the risk of investment, reorient placements of investment risk-traders with low or risk management with high, with the purpose of realization of the strategy which provides that the rate of return to be more secure (Shaqiri, 2015). However, financial derivatives may be used by pension funds for hedging market risks. The most common ones in the balance sheets of retirement schemes, are interest rate swaps and inflation swaps (Valsecchi, 2017). The "use of derivatives allows asset managers to change asset allocations more cheaply and rapidly than by selling or buying a large volume of assets" (David, 2000). Market risk, for example, is due to fluctuations of the companies' portfolio's values. Several risk measurement techniques, such as "concentration analysis or portfolio simulation", could be adopted to manage it (Valsecchi, 2017). In order to reduce market risk, "the composition of the fund's real estate investments was continuously evaluated", taking into account geographical, industrial and time-related variables (NBIM's real estate investments 2016).

Business Risk

Doff (2008) stated that business risk is the risk that operating income is lower than expected because of lower than expected revenues (e.g. lower margins, lower market share, market downturn) or higher than expected costs, not being caused by one of the other risk types. Crouhy, Galai, & Mark (2006) correctly remark that business risk has been the core task of management for ages. What is new about business risk is that it is incorporated in banks' formal risk management frameworks, including measurement of this risk type. Measuring business risk requires a definition. The literature is far from unanimous on the definition of



business risk, especially because business risk is used in various contexts. Sometimes business risk is defined as the aggregate of all risks (Balou and Knechel, 2002; Marshall, 2001). Business risk describes the risk we assume due to potential changes in general business conditions, such as our market environment, client behavior and technological progress. This can affect our earnings if we fail to adjust quickly to these changing conditions (Doff, 2008).

The business of pension, apart from fiduciary responsibilities, should take shareholder value into account. At a minimum, corporate pension plans should not destroy shareholder value. However, because of corporations' responsibilities to their retirees and other pension plan stakeholders, strategic pension decisions are not made solely based on shareholder interest (Huang & Lalani, 2015). Business risk is the risk of adverse outcomes resulting from a weak competitive position or from poor choice of strategy, markets, products, activities or structures. Major potential sources of business risk include: (1) revenue volatility due to factors such as macroeconomic conditions; (2) inflexible cost structures; uncompetitive products or pricing; and structural inefficiencies

Interest Rate Risk

Realistically, long-term fixed-income securities, such as bonds and preferred stock, subject their owners to the greatest amount of interest rate risk. Short-term securities, such as Treasury bills, are influenced much less by interest rate movements (Shehu, 2013). Most of the asset classes have generated good, and even great, returns for pensions funds over the last years and a decade despite the continuing low interest rate environment (Pension Europe, 2020). Sustainable finance has been the big megatrend in pension funds' investment policies already for some years, and the new national and EU legislation (taxonomy, disclosures, and benchmarks) will increasingly enable pension funds' responsible investment strategies (Pension Europe, 2020). Interest rate risks as part of the systematic risks therefore need to be analyzed properly by pension funds manager in order to make proper investment at the right time (Shehu, 2013). In some countries, the share of pension funds' investments in equities has increased in recent decades and the main drivers have been low interest rates, a search for yield, and risk diversification (Pension Europe, 2020). Real and nominal interest rates have been declining for decades. The declines were largely unanticipated by economic



forecasters and were a global phenomenon and this has important implications for retirement security. First, if past retirement plans and saving decisions were based on expectations that interest rates and asset returns would be higher than they are now, savers may not have accumulated enough wealth to support planned retirement spending. Second, the worldwide decline in real interest rates makes it difficult, or impractically expensive, for savers to offset the impact of the decline by holding a globally diversified portfolio of interest-bearing assets (Yin, Boyd, & Sun, 2021).

Theoretical Review

Capital Asset Pricing Model (CAPM)

Capital Asset Pricing Model (CAPM) was introduced by Jack Treynor (1961). The model describes the relationship between systematic risk and expected return for assets. CAPM is widely used throughout finance for the pricing of risky securities, generating expected returns for assets given the risk of those assets. CAPM has been adopted in this study because of its relevance to financial risks and financial performance as the model takes into account the asset's sensitivity to non-diversifiable risk (also known as systematic risk or market risk), as well as the expected return of the market and the expected return of a theoretical risk-free asset (Omwaka & Malenya, 2020). According to Capital Asset Pricing Model (CAPM), if the number of assets included in the portfolio is high and these assets are not perfectly correlated, the unsystematic component of the portfolio risk diminishes (Monda, Giorgino, & Modolin, 2013). The CAPM says that the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat the required return, then the investment should not be undertaken. Therefore, CAPM has been adopted in this study as it suggests that a relationship exists between risks and returns and further, CAPM is used to help determine the return investors require for a given level of risk. CAPM is used to calculate the required rate of return for any risky asset (Omwaka & Malenya, 2020).

Modern Portfolio

Modern Portfolio Theory (MPT) originates from the work of Markowitz (1952). This theory attempts to maximize portfolio expected return for a given amount of



portfolio risk, or equivalently minimize risk for a given level of expected return, by carefully choosing the proportions of various assets (Omisore, Yusuf & Christopher, 2012). The portfolio theory explains that some sources of risk associated with individual assets can be eliminated or diversified away, by holding a proper combination of assets. Modern Portfolio Theory (MPT) proposes how rational investors should use diversification in order to optimize their portfolios. It also discusses how a risky asset should be priced (Bodie, Markus & Kane 2009). This theory was adopted by this study due to its relevance on financial risks and financial performance. The theory acknowledged that there need for understanding financial risk facing firms so as to influence the performance of their portfolios (Diamond & Rajan, 2001).

The proponents of this theory argued that, proper risk management can ensure that institutions manage and reduce risks. Modern portfolio theory (MPT) is a theory on how risk-averse investors can construct portfolios to optimize or maximize expected return based on a given level of market risk, emphasizing that risk is an inherent part of higher reward. To understand whether an organization is likely to make adaptive changes or not and whether it is likely to grow or not, there is need to understand its degree of risk. Therefore, this theory is relevant to the study on grounds that the portfolio of pension schemes has financial risks and therefore, maximization of the portfolio expected return related to the amount of portfolio risk. The theory therefore relates returns of organizations to risks faced. It was on these grounds that the MPT was adopted (Omwaka & Malenya, 2020).

Empirical Review

Łukasz & Mosionek-Schweda (2021) examined the impact of reforms introduced in the operation of Polish open pension funds on management style, risk exposure and related investment performance, using panel estimation to directly take into account the impact of the internal benchmark on herd behavior. The results of the study indicate that highly regulated funds may slightly outperform passive benchmarks and their unregulated competitors. In the case of Polish open pension funds, limiting investments in Treasury debt instruments clearly resulted in increased risk and volatility of returns. However, it also raised competition between funds and decreased the herd behavior. Additionally, the withdrawal of



the mechanism evaluating funds based on the internal benchmark was also important in reducing herd behavior.

Ezugwu & Alex Abiremi (2014) investigated on the portfolio of pension funds investment by Pension Funds Administrators in Nigeria, employing ex-post facto research designs. For the study, data generated through the secondary source were subjected to empirical test and statistical analysis using multiple Regression and Covariance\Correlation Matrix. The result of the study showed that equity which had the highest percent in the portfolio also returned the highest value. Also, the consistent increase in return over an increase in the weight of the asset classes in the portfolio suggests a direct relationship between size of asset in a portfolio and its return. The study therefore recommend that capital market operators are enjoined to continuously scan the macro-economic environment and liaise with institutional investors, in order to develop investible products that will satisfy the risk-reward profile of institutional investors.

A study was done on the effect of risk based supervision on the financial performance of pension schemes in Kenya (Makau, 2014). The study was done on Kenyan pension funds at aggregate level using quarterly data on fund value as well as the asset classes in which the scheme funds were invested. The data was from between June 2008 through June 2013. Multiple regression model was used to determine the relationship between financial performance before and after the implementation of risk based supervision. The study established that financial performance of pension funds in Kenya was better in the period after which risk based supervision was adopted and implemented. The study recommended further studies to be done focusing on evaluation of the various risks facing pension schemes from different perspectives so as to identify the most prevalent. Shehu (2011) did a study on financial risk analysis in pension funds investment. The research tried to unveil the multifarious risks that were contained in pension fund investment. The major risks unveiled include financial market related risks and non-financial market risks. This study, despite revealing the existence of financial related risks, did not show the relationship between it and the financial performance of pension schemes. It only recommended that pension funds companies should endeavor to establish an ERM unit to be managed by risk and investment expert who can accurately evaluate risks. The current study seeks to



reveal the relationship between financial risk and financial performance of pension schemes.

In a study conducted by Njuguna (2010) on the agency problems and the resolution mechanisms among pension schemes in Kenya and recommended for effective supervision of pension schemes citing that RBA should focus on plans which focus on legal compliance, financial control and supervision of managers. He further recommended increased resilience on modern and effective risk management. The study made recommendations on ensuring effective risk management.

Methodology

The study adopted a descriptive research design based on ex-ante research approach. The study was conducted in Lagos based on the presence of most pension fund administrators. The population of the study comprised the 22 Pension Fund Administrators (PFA). The sample size for the study was 100 arrived at through purposive sampling technique on the employees in Risk management and compliance unit of the PFAs. Ninety five (95) returned copies of returned questionnaire were administered for the study. The study employed Statistical Package for Social Sciences (SPSS) to perform the analysis. Quantitative analysis was analyzed through calculating the frequencies, means and Standard deviations as this is an appropriate statistical tool as it will aim to show the distribution against each of the variable under investigation for descriptive statistics. The resulting data will be presented by using tables, and figures appropriately to aid in making observation, conclusions and recommendations on the problem under study. For inferential statistics, the study employed multiple regression analysis to establish the existing relationships between investment risk as the independent variable and pension fund assets, proxy by (purchasing power risk, market risk, interest rate risk, and business risk). Regression was used to determine the type of relationship. This will assist in determining the level of influence of the independent variables on the dependent variable

Data Analysis

Frequency Analysis

The table 1 below reveals the frequency of respondents that participate in the field survey, that were analyzed by the researcher.



Table 1. Frequency Statistic

Demographic Characteristics	Frequency	Percentage
Sex	F	%
Male	60	63.2
Female	35	36.8
Total	95	100.0
Age		
20 – 29	21	22.1
30 – 39	55	57.9
40 and above	19	20.0
Total	95	100.0
Marital Status		
Single	39	41.1
Married	56	58.9
Total	95	100.0
Educational Qualification		
B.Sc/HND	50	52.6
MBA/M.Sc	31	32.6
OND/NCE	14	14.8
Total	95	100.0
Position		
Executive Officer	54	56.8
Manager	41	43.2
Total	95	100.0

Frequency results of bio data of the respondents from the survey are presented in Table 2. above. Genders of respondents includes 63.2% of males and 36.8 % of them are females. The age analysis of the respondents shows that 22.1% of the respondents are within the age bracket of 20-29 years, 57.9% percent of the respondents are within the age bracket of 30-39, while 20.0% are within the age bracket of 40 and above, implying that majority of the respondents are experienced enough to observe things in their business operations and give accurate information about consumer behavior and buying of motor insurance.



The marital status analysis indicates that the majority of the respondents are married people with 58.9%; and the single people are 41.1%. The educational qualification analysis of the respondent shows that majority of those participated in the survey have B.Sc/HND with 52.6%; follow by M.Sc/ M.B.A with 32.6%; and OND/NCE with 14.8%. Respondents' position in insurance company, with respect to experience also brought to light shows that 56.8 % of the respondents are executive officers, and 43.2 % of the respondents are managers.

Correlation Analysis

The study examined the correlation between the set of independent variables (Purchasing power risk (PPR); market risk (MAR); interest rate risk (IRR); and business risk (BUR)); and sustainability of occupational pension fund asset (SPF) as dependent variable. Correlation coefficient, (r) is the statistic which measures the relationship between the ranges of -1 to +1. The detailed information of the correlation analysis appears in the table 2 below:

Table. 2. Correlations Analysis

		SPF	PPR	MAR	IRR	BUR
SPF	Pearson Correlation	1	.519**	.367**	.698**	.786**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	95	95	95	95	95
PPR	Pearson Correlation	.519**	1	.361**	.429**	.680**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	95	95	95	95	95
MAR	Pearson Correlation	.367**	.361**	1	.382**	.311**
	Sig. (2-tailed)	.000	.000		.000	.002
	N	95	95	95	95	95
IRR	Pearson Correlation	.698**	.429**	.382**	1	.475**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	95	95	95	95	95
BUR	Pearson Correlation	.786**	.680**	.311**	.475**	1
	Sig. (2-tailed)	.000	.000	.002	.000	
	N	95	95	95	95	95



****.** Correlation is significant at the 0.01 level (2-tailed).

In Table 2. Above the correlation analysis for the set of independent variables (PPR, MAR, IRR, and BUR) and dependent variable (SPF) and shows that:

- i. A moderate and positive relationship occurs between PPR and sustainability of SPF in Nigerian pension firms at 0.01 level of significant, where ($r = 0.519^{**}$, $n = 95$, $p=0.000$), what this implies is that purchasing power risk has been able to influence the occupational pension fund assets in the country positively, which means that significant relationship exists between these two variables since their P-value is lesser than 0.02 (level of significance);
- ii. Again, the table 2. above shows that a moderate positive relationship transpires between MAR and SPF in the Nigerian pension business at 0.01 level of significant, where ($r = 0.367^{**}$, $n = 95$, $p=0.000$), what this infers is that market risk has been able to affect the sustainability of business among the pension companies in Nigeria, this therefore means that significant relationship exists between these variables since their P-value is lesser than 0.01 (level of significance);
- iii. Also, the table 2. reveals that a moderate and positive relationship exist between IRR and SPF in the Nigerian pension market at 0.01 level of significant, where ($r = 0.698^{**}$, $n = 95$, $p=0.000$), what this suggests is that interest rate has really influence the sustainability of pension business organizations in Nigeria. Therefore, significant relationship exists between these variables since their P-value is lesser than 0.01 (level of significance);
- iv. Finally, the correlation table above shows that a strong and positive relationship exists between BUR and SPF in Nigerian pension industry, at 0.01 level of significant, where ($r = 0.786^{**}$, $n = 95$, $p=0.000$), what this implies is that business risk has influenced the sustainability of pension firms in the economy. Therefore, significant relationship exists between BUR and SPF, since their P-value is lesser than 0.01 (level of significance).

Regression Analysis

This part of the chapter used linear regression analysis, a form of general linear modeling basically to predict the significant relationship between the dependent variable and independent variables, with the aim of examining the predictive



ability of independent variables on the dependent variable. By applying linear-regression analysis, the relative contribution of each independent variable in explaining variance in the criterion variable can be well determined.

Table. 3. Model Summary Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.873 ^a	.763	.752	1.74148

a. Predictors: (Constant), PPR, MAR, IRR, BUR

The four independent variables that were studied, explain 0.763% of the consumers' behavior when purchasing motor insurance (PMI) products in Nigeria as represented by the R^2 . This therefore means the four variables contribute to 76.3% of pension's fund assets sustainability in Nigeria, while other factors not studied in this research contributes 23.7%. of the pension's fund assets sustainability in Nigeria. Therefore, further research should be conducted to investigate the other (30.6%) factors influencing pension's fund assets sustainability in Nigeria.

The Adjusted R^2 -squared statistic, which is more suitable for comparing models with different numbers of independent variables, is 0.752%. The standard error of the estimate shows the standard deviation of the residuals to be 1.74148.

From the findings, 87.3% of changes in the pension's fund assets sustainability in Nigeria were attributed to the four independent variables in the study. Positivity and significance of all values of R shows that model summary is significant and therefore gives a logical support to the study model. This implies that about 87.3% % of the total variation in the dependent variable i.e. pension's fund assets sustainability (SPF) in Nigeria is being explained by the independent variables i.e PPR, MAR, IRR, and BUR. While the remaining 12.7% is due to error term or factors not capture within the model.

Table. 4. ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	876.778	4	219.195	72.276	.000 ^b
	Residual	272.948	90	3.033		
	Total	1149.726	94			



- a. Dependent Variable: SPF
b. Predictors: (Constant), PPR, MAR, IRR, BUR

In order to measure the statistical significance of the output of the analysis it is necessary to look in the table 6. (ANOVA) above. The F calculated at 5% Level of significance was 72.276. Since F calculated is greater than the F critical (value = 3.63), this shows that the overall model was significant i.e. The effective management of investment risks is efficient enough in guaranteeing the pension's fund assets sustainability in Nigeria. The ANOVA table also shows the absence of committing a statistical type I error since the P-value in the ANOVA table is less than 0.05, meaning that there is a statistically significant relationship between the variables at the 95.0% confidence level.

Table. 5. Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.912	1.423		1.343	.183
	PPR	-.133	.077	-.125	-1.734	.086
	MAR	.044	.054	.047	.821	.414
	IRR	.416	.060	.423	6.907	.000
	BUR	.691	.077	.655	8.992	.000

- a. Dependent Variable: SPF

Source: SPSS Version 20.0, 2022

Purchasing power risk (PPR); market risk (MAR); interest rate risk (IRR); and business risk (BUR)

From the regression findings in above table, the substitution of the equation:

$(Y = a_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4)$ becomes:

$SPF = 1.912 + (-0.133) PPR + 0.044 MAR + 0.416 IRR + 0.691 BUR$

Where: Y is the dependent variable i.e sustainability of pension fund assets (SPF); and where for independent variables: Purchasing power risk (PPR); market risk (MAR); interest rate risk (IRR); and business risk (BUR).



The model indicates that the Y-intercept is -1.357 which means that 1.912 is an autonomous component of investment risk (independent variable) proxy by: PPR; MAR; IRR; and BUR.

The output shows the results of fitting a multiple linear regression model to describe the relationship between SPF and the set of four (4) independent variables. The equation of the fitted model is $SPF = 1.912 + (-0.133) + 0.044 + 0.416 + 0.691$

In determining whether the model can be simplified, we considered P-values on the independent variables in table 5. The multiple regression result shows that MAR; IRR; and BUR have positive impact on SPF, but with only IRR and BUR are significant during the period of this investigation. However, PPR has negative and not significant effect on SPF as at the time of this study. During this period a unit increment in MAR; IRR; and BUR tends to increase SPF by 0.044, 0.416, and 0.691 respectively. The result also shows that MAR; IRR; and BUR have positive effect on SPF. However, from the result also, an increase in PPR will lead to decrease in the sustainability of pension fund assets (SPF) by -0.133. The output of multiple regression analysis presented in table 5 indicated that two (2) independent variables (IRR and BUR) achieved the p-values less than 0.05 (5%) level of significance; while the remaining two (2) independent variables (PPR and MAR) achieved the p-values greater than 0.05 (5%) level of significance.

Result of the Findings

From the analysis conducted on the effect of investment risks (proxied by purchasing power risk (PPR), market risk (MAR), interest rate risk (IRR) and business risk (BUR) on sustainability of occupational pension fund assets in Nigeria, the result of the findings are as detailed below:

A positive relationship occurs between PPR, MAR, IRR & BUR and sustainability of SPF in Nigerian pension firms at 0.01 level of significant, where for PPR ($r = 0.519^{**}$, $n = 95$, $p=0.000$), MAR ($r = 0.367^{**}$, $n = 95$, $p=0.000$), IRR ($r = 0.698^{**}$, $n = 95$, $p=0.000$), and BUR ($r = 0.786^{**}$, $n = 95$, $p=0.000$),

- i. From the regression result, market risk, interest rate risk, and business risk have positive relationship, while purchasing power risk has negative relationship with sustainability of occupational pension fund asset in Nigeria.



- ii. Also, as shown in table 5, interest rate risk, and business risk have significant effect, while purchasing power risk and market risk have insignificant on the sustainability of occupational pension fund asset in Nigeria within the period of this research.
- iii. The regression table above reveals that R-square is 0.763. this means that 76.3% of Y (SPF) is jointly explained by the four explanatory variables (PPR, MAR, IRR, and BUR). The remaining 23.7% variation of Y can be explained by other variables not considered by this study.

Conclusion

The study has empirically verified how the investment risks have affected the sustainability of occupational pension fund asset in Nigeria. The study empirically revealed that purchasing power risk has negative, market risk has positive effect on the sustainability of occupational pension fund asset in Nigeria insignificantly, which implies that this sector needs to improve their measures on these risks.

Generally, it was observed from empirical findings that both Interest rate risk and business risk have positive and significant effect on the sustainability of occupational pension fund asset in Nigeria. This indicates that in the Nigerian pension companies these two risks have impacted the sustainability of occupational pension fund asset.

Recommendations

Based on the findings of the study and the conclusions made, this study recommends that insurers:

- i. The pension firms need to diversify their investment portfolios. By investing in various portfolios, some portfolios are less sensitive to inflation while some are very sensitive to inflation but very profitable when the inflation risk fails to harm the investment.;
- ii. Pension firms in the economy should consider investing in the mutual funds. This is a vehicle that is made up of a pool of funds from many investors with aim of investing in securities like stocks, bonds.
- iii. Pension firms need to advertise their products to the public so as to attract large market.



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