

Pension risk management in a developing economy: lessons from the nigerian capital market

~ **Onafalujo** (Lagos State University, Ojo, Lagos, Nigeria)

~ **Akin K.** (Lagos State University, Ojo, Lagos, Nigeria)

~ **Eke** (Lagos State University, Ojo, Lagos, Nigeria)

~ **Patrick O.** (Lagos State University, Ojo, Lagos, Nigeria)

Abstract: The killer risk in any pension scheme is the failure of pension asset sufficiency to meet the promised benefits to retirees. A Pension Risk Management aims at ex ante arrangement to protect retirees' standard of living. Nigeria introduced pension reforms in 2004 fatefully at the same time when extensive reforms were made in the banking sector. Prior to the Act being passed, there was a major proposition that pension funds should not be invested in Nigerian capital market. This paper reviews pension risks of the new DCS (Defined Contributory Scheme) and the implications of investing pension fund in the capital market of a developing economy. A trend analysis was performed on market index and capitalization and a simulated pension asset was subjected to pension risks. Despite the asset allocation guideline on investments by the Pension Commission, there is certainly uncertainty concerning guaranteeing pension payments in future due to unmanaged pension risks. This paper suggests investment policy should accompany a DCS based on the risk appetite of workers, minimum guarantee of returns on investment of pension assets and a range of interest rates for actuarially determined annuities. Further studies may examine whether PFAs should operate as closed end or open end mutual funds.

Keywords: Pension risks, Actuarial risks, Defined Contributory Scheme, Annuity, Privatized pensions

1.0 Introduction

In 1944, the ILO (International Labour Organization) conference recognized that the

nations of the world must set in motion an agenda to give minimum social security to workers and their dependants who need protection depending on each level of economic

development. This declaration and others had been basic drive for social security programmes, particularly pensions.

Pension plans are savings or promises to take care of old age living, and was seen as part welfare package for workers. Post-independence Nigerian workers from 1960s up to early 1990s perceive job security to be availability of an attractive pension scheme. The popular plans in Nigeria prior to 2004 were classified as public and private. The public scheme was government sponsored non-contributory and unfunded DBS (Defined Benefit Scheme); while the private schemes were a mixed grill of DBS and DCS (Defined Contributory Scheme). The global crisis of underfunding of pension pre-empted by World Bank in 1994 became more pronounced in Nigeria. There were no actuarially determined salary projections; longevity risks, survivor rates and interest rate structure. To add to the complexities Nigeria's life expectancy at birth was estimated to be about 47 years (CIA World Fact book, 2009). Pension risk management is a process that makes pre-loss plan to hedge retirement benefits receivable or benchmark from high volatility.

The significant difference between DBS and DCS is the degree of certainty of benefits payable post retirement. DBS benefit is pre-specified and linked to terminal or average salary, and therefore to a greater extent more certain than DCS- a contribution linked to salary growth and accumulation rate of return (Modigliani and Muralidhar, 2004).

A switch to DCS by a developing country with an "infant" capital market, fragile banking sector and a nascent insurance connotes pension risk management may have to innovatively control pension risks to comply with ILO convention 102. Pension funds

objective is to provide minimum certain benefit for the greatest number of old age persons. It is a risk management tool or insurance against post retirement life and survivor benefit in the absence of life insurance or other social assistance schemes sponsored by government.

According to PENCOM (Pension Commission of Nigeria) Act (2004), The Pension Fund Administrators (PFA) relay electronically daily returns to the commission on how pension funds are invested. Against this backdrop, there should be fewer worries about non-compliance and sharp practises against regulations due to almost seamless monitoring by PENCOM.

However, the moral hazard of not deploying high technical and fiduciary responsibilities by investment managers seems unattended to. The PFAs and PFCs (Pension Fund Custodians) are compensated by statutorily combined fees of 3% of collected pension fund; and are only additionally incentivised to earn more if returns on invested fund exceed a benchmark determined by PENCOM. There is no incentive to be morally and legally responsible to investment actions taken. To add more to the uncertainties of pension benefits under DCS, PFAs are for now not required to incorporate the risk tolerance of account holders into their investment policy and risk management strategy. Instead, PFAs are required to have Risk Management Committee and Investment Strategy Committee without stating their statutory objectives.

The market capitalisation and index of Nigerian Capital Market respectively grew from N276.1b and 6440.51 in 1998 to N748.73b and 12140.27 in 2003; a 171.2% growth in capitalization and 88.5% index growth within

five years annualised to 34% and 17.7% respectively. In another one year, by April 2004 index and capitalization grew by 66.9% per annum and 78.1% per annum respectively. This rosy investment environment can be perceived as a continuous trend; and sudden unforeseen circumstances such as a dangerously bearish capital and mortgage markets that are globally contagious set in. Then, pension assets can vaporize to the extent of jeopardising pension objectives.

Shaoul (2001) claims Holzmann predicts a few years back that by 2000, just under 20% of the age 65 and above and less than 30% of age range 15-64 would have some formal pension coverage. Aside from other old age stochastic liabilities, any effective pension scheme need to assure that there is confidence of receiving benefits of a minimum standard of living in old age. A non-specific rule or law on pension fund management is more or less likely to increase pension risks which comprises actuarial and investment risks.

Pensions provide a mechanism to reduce the risks of old age poverty and a means to smooth lifetime income to maintain living standards in retirement. Very often referred to as, a safety net for workers or deferred savings.

'Bailey's canons of investment-security of capital, profitability, liquidity and social objective- is still much applicable today as were in his time (Mishra, 2007). The delicate balancing of the four explanatory variables determines the efficiency of pension risk management, particularly in developing economies, such as Nigeria without deep financial markets.

The period 2004 -2009 experienced a sudden market bubble and burst unseen in the last 25-year history of Nigerian capital

market. Financial experts believe the misfortunes of the capital market which escalated to the property market, may have been caused by poor financial expertise, regulatory lapses and shallowness of the financial market. Pension risks ownership transferred to the worker in DCS may be uncontrollably accentuated by lack of contractually defined investment policy between retirement account holder and pension administrators.

This paper focuses on analysing how a DCS can satisfy the cardinal objectives of pensions as a unique part of social security provision. After the introduction; section (11) reviews the literature, examining pension risks embedded in DCS in Nigerian financial market, section (111) analyses the performance of Nigerian capital market, section (iv) discusses probability of achieving Guaranteed Minimum pensions in view of pension, actuarial and investment risks, embedded in DCS and a weak financial market in Nigeria, and section (v) summarizes with concluding remarks made on prospects of developing economies having weak financial market adopting a privatized DCS model.

1.1 Statement of Problem

Post retirement life of the pensioner in a developing economy is the focus of this paper. Of relevance is the work of Modigliani and Ando (1963) referred to as the "life cycle theory" and that of Friedman (1957) the "permanent income theory". In either theory, the pensioner is visualized as having not only a current income from work and wealth but a meaningful expectations and plans about his future incomes from work and wealth. The retiree's future income from wealth will of course be higher to the extent that he chooses to save today, thus adding to wealth

(pensions saving) and its earnings; future income from wealth will be lower to the extent that he now reduces its wealth through this savings (Ackley 1978, 540).

There is a popular saying that “the end justify the means” which brings us to the question of what will justify the essence of the pension reform in Nigeria, for a worker who retires from active service of the private and public sector at a certain age, and is unable to maintain a minimal standard of living till the end, that is death, which globally is the essence of pension. A Review of the Pension Reform Act (2004), reveals several future pit falls awaiting Nigerian retirees particularly the first set retiring from the DBS between January 2008 and December 2010, considering unmanaged pension risks.

Both schemes have different investment options provided by Section 4 (1) of the Act which stipulates that “A holder of a retirement savings account upon retirement or attaining the age of say 50, whichever is later shall utilize the balance standing to the credit of his retirement saving account for a programmed monthly or quarterly withdrawals, calculated on the basis of an expected life span; annuity for life purchased from life insurance company licensed by the National Insurance Commission with monthly or quarterly payment; and a lump sum from the balance standing to the credit of his retirement savings account: provided that the amount left after lump withdrawals share be sufficient to procure an annuity or fund programmed withdrawals that will produce an amount not less than 50% of his annual remuneration as at the date of his retirement”. Our view is that not up to 10% of the Nigerian work force is employed in the organised labour market. As it is pension risks may be increasing and

unmanaged because of undeveloped financial market, lack of financial expertise, weak regulations, unstructured interest rate and double digit inflation. It is therefore a need to examine the probability of a retiree turning to a beggar after 70 years in developing economy such as Nigeria. Another concern is that this one sided approach by all the intending retirees signal danger of poverty at older age with everyone taken to the programme withdrawal after the programme period which is usually 20years as the case may be, a lot of beneficiary who lived longer might have to beg to survive. Similarly, many of them would not be looking at the long term effect of their decisions.

1.2 Research Questions

- Is there any influence of capital market returns on the overall return of pension fund?
- Is the bond market return guarantee minimum return to pension fund investment?
- Can the property market rate of return be predicted in Nigeria?
- Does current investment guideline by Nigeria Pension Commission protect old age living in view of pension risks?
- Are there financial expertises to manage pension fund in Nigeria?

2.0 Literature review

2.1. Background of The Study

Old age is a certainty just like death of human life. The age at which ‘old age’ commences is generally agreed to be between ages 55 to 65. Every human being is expected to have working life which begins at about

ages 20 to 25, and to work for about 30 years, and then retire. Pension is a financial plan to assist individual to live normally when he retires from active paid or self employment. A plan that goes on for over 30 years is long enough for uncertainties to vitiate the best financial plan.

Ogunshola (1984) citing Nigerian Income Tax Management Act 1961 defines Pension Fund as "any society, fund, contract or scheme, the assets of which are under irrevocable trusts and any scheme established by law in Nigeria or elsewhere, the main objects of which are, in the opinion of the Board the provision of non-commutable and non-assignable retirement pensions or annuities for an individual or his dependants after death, or for any group or class of such individuals and their dependants."

This was distinguished from a 'provident fund' defined as "any society, fund, contract or scheme not being a pension fund, established under irrevocable trusts or law in Nigeria, or elsewhere, the object of which are the provision of retirement benefits for an individual or benefits for his dependants after his death, or for any group or class of individuals and their dependants. "The non-commutability categorically places pension fund ahead of provident fund as a retirement plan; the cardinal objective of any pension plan being enablement of improvident individuals to plan for old age (Pension Reform Act, 2004).

Pension functional definition ensures non commutability of payments of benefits, but some form of annuitization. But, is there a guarantee that the promised annuities are adequate and available after retirement considering the combined effects of investment and actuarial risks?

Prior to 1994, when the World Bank instituted an investigation into a looming pension crisis; because facts and figures are already underscoring that funded pension plans are inadequate to meet pension liabilities, accentuated by pension risks (investment risks and actuarial risks); subsequently the research outcome of World Bank (1994) recommends a multi-pillar pension system with:

- A mandatory tax-financed public program designed to alleviate poverty
- A mandatory funded, privately managed program (based on personal savings account or occupational plans) for savings
- A supplementary voluntary option (through personal saving or occupational plans) for people who want more protection

This sweeping recommendation to adopt DCS as the main element of pension system may have not considered the peculiarities of the financial market of developing countries.

Pension risks (potential of outliving retirement income or asset diminutions below benchmark) could be very high if the correlation of shallow financial market combines with poor expertise and undefined regulation of risk management practises. Pension risks of DCS include: investment risks- the probability that investment made will not meet the target, and actuarial risks- the probability that actuarial assumptions used in generating estimates are wrong.

Technical expertise on pension investment and financial risk management are evidently still lacking particularly in developing countries. Modigliani and Muralidhar (2004); Muralidhar (2001) estimate that it will take over 50 years of data collation in order to differentiate superior managers from low

skilled ones, in volatile markets of developing economies like Nigeria.

As demographic forces continue to change the social insurance culture traditionally prevalent in African societies, the need for an effective pension risk management is unarguably must be sought to ensure social security in these developing economies.

2.2. Theoretical Framework

A DBS is more or less a regulated compulsory private saving and investment scheme to meet old age living or post-retirement life.

Human Life Value

The value of human life is quantifiable (Mehr, 1970), as a function of his *expected annual earnings, his life expectancy and an inverse linear function of his expected tax liability and his expected personal maintenance expenses.*

Personal expenditure is seen as inverse because during early life, it is rational to expect cost of living to continue to rise due to increasing family responsibilities of feeding higher number of people, education costs and health maintenance costs. This gradually declines as members of the family graduate into independent living. Pension is conceptualised to manage this reduced cost of personal maintenance in post-retirement life. A DCS is an accumulation of compulsory level savings and investment for the period of working life, and thereafter to immediately start earning from the accumulation based on life expectancy. This is more or less from actuarial perspective a Deferred Annuity.

If l_x represent number of persons living at age x , and l_{x+n} , number living at age $(x+n)$; survivorship rate = l_{x+n} .

Deferred Annuity as a net single premium (NSP) represents the accumulated value of pension assets.

Then, the actuarial expression for:

$$NSP = \frac{V^{t+1}l_{x+t+1} + V^{t+2}l_{x+t+2} + \dots + V^{t+n}l_{x+t+n}}{X}$$

Where 'x' represents years of working life, 't' is the retirement date and 'n' represents the annuity period.

'V' is the discount factor at an assumed actuarially determined discount rate for the present value of annuity payment.

It implies pension risk can be further impacted by a wrongly assumed discount factors and life expectancy.

The elements of DCS are to privately manage pension asset by maximising returns and minimising risk in a strongly efficient financial market. Hence, managing defined contributions does not differ from finance and portfolio theories.

Finance Theory

Finance theory explains direct linear relationship between risk and return, that is, the higher the risk the greater is the return. When an investment is made, income as cash flow is generated, but the uncertainties of the amount and the time of the cash flow is the risk.

If a pension fund invests at time interval t , the return R , is given by:

$$R = CV - IV + D/IV$$

Where CV = the cumulated value of pension fund at the end of interval t

IV = initial value of pension fund

D = cash distributions received by the pension fund

Risk is the variance or standard deviation of the probable distributions of returns received from a particular selected portfolio of assets. In the case of pension fund, financial assets are the only permissible investments in Nigeria.

Interest is the price paid by a borrower of fund to the lender for use of the fund within a specific period of time.

$$CV = IV (1 + i)^n \dots \dots \dots \text{equation 1}$$

Where n is the time interval of investment, i is the per cent interest rate.

When series of fund like pension is invested (contract of borrowing/lending), Then, $CV = [IV (1 + i)^n - 1] / i \dots \dots \dots \text{equation 2}$

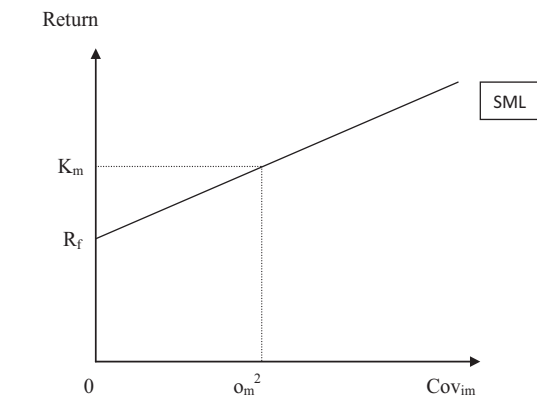
Portfolio Theory

By nature, investors are expected to seek maximal returns with minimal risk. Portfolio theory states that "the standard deviation of an investment's return is not of particular interest to investors holding diversified portfolios." A portfolio is a selection of various securities to earn an objective return. Managing the risk of a portfolio means effective measuring the risk. Increase in risk

is measured by the degree of correlation between the existing portfolio variation and risk of the added stock. Modern portfolio theory identifies two types of risks; systematic and unsystematic, the systematic (market) risk cannot be diversified or reduced but unsystematic (unique) risk can be diversified.

Kevin (2006), Banerjee (2009), Crabb (2003) and Olowe (1997) cite the development of the Capital Asset Pricing Model, (CAPM) by Sharpe (1964), Lintner (1965) and Mossin (1966) discovering the systematic risk relationship with an asset return, and says that "the expected return on asset is the sum of the return of risk-free asset and the return commensurate with the asset risk." The risk of a stock beta, ' β ' is a measure of systematic risk estimated by the slope of the Security Market Line (SML).

Figure 1: Calculating beta from SML



Source: Crabb (2003)

$$K_i = \frac{R_f + (K_m - R_f) \text{Cov}_{im}}{(\sigma_m^2 - 0)} \dots \dots \dots \text{equation 3}$$

$$K_i = \frac{R_f + \text{Cov}_{im} (K_m - R_f)}{\sigma_m^2} \dots \dots \dots \text{equation 4}$$

$$K_i = R_f + b_i (K_m - R_f) \dots \dots \dots \text{equation 5}$$

The implication of these theoretical concepts mean, a level of risk or risk appetite (understanding the role security beta) must be assumed for a retirement account holder in order to achieve expected return. This also depends on return distributions peculiarities of the domicile capital market. A distribution

having fat tails have the probability of extreme values referred to as Paretian distribution (Fabozzi and Modigliani, 2009). A retirement account holder is exposed to these financial risk based theories under the DCS. This explains why new measures of risk are still being explored in finance theory to interpret extreme value behaviour.

2.3. What is Pension Risk Management?

Risk is defined by Banerjee (2009) as "the likelihood that the actual return from an investment may be less than the forecast return." Put in a different form, risk may be defined as the variability of returns from an investment. Fisher and Jordan (1995) share the same view by stating risk to be "the standard deviation around the expected return." The literature over the years have various understanding of risk. It is generally presumed to be a possibility of danger or probability of a loss. These conceptual definitions track our vision of risks in investment management that mirrors pension risk management. This study views risk in line with Banerjee and (Fisher and Jordan), because of the approach to managing pension risks. Variability measured by standard deviation around an expected return (benchmark) will more or less assure a pension fund of a guaranteed minimum return on pension asset in future.

A traditional meaning of risk management is the use of insurance to protect tangible assets and legal liabilities; but generally, it is a pre-loss arrangement to protect the attainment of an objective. Mangiero (2005) suggests a more comprehensive adaptation of the definition of risk management to mean "management of multiple risk types-such as financial, operational and legal risks." The complexity of these risks is more when

investment risks and actuarial risks feature under the financial risk.

Pension risk management connotes hedging investment and actuarial risks embedded in pension management in other to guarantee some minimum annuity payments to satisfy post retirement life. A DCS is essentially an individual savings programme targeting future benefits to meet a contingent retirement life. Mangiero notes "how fiduciaries carry out their duties is a question of increasing interest to beneficiaries and regulators. Is there any incentive to manage pension risks?"

The 'Black Monday' stock market crash of October 19, 1987 saw the Dow Jones Industrial Average lost 22.61% of its value-its largest one-day drop for more than 70 years. In the same vein, 'the Black Friday' of September 24, 1929 brought about a stock market crash that never came back to its 1929 peak until 1954. Investments in equities heuristically and empirically have demonstrated short and long term risks. Sometimes, it can wipe lifelong saving of 50 years in a 'buy and hold' strategy without appropriate diversification. Against the backdrop of 1987, financial analysts develop robust financial risk management devices called derivatives-futures, options, forwards and swaps. The market for derivatives is not yet available in developing economies such as Nigeria. Pension risk management in the Nigerian financial market deductively rests on portfolio diversification-selecting assets of a portfolio to minimize risk and maximize returns (Fabozzi and Modigliani, 2009). What then happens in shallow financial markets with; low volume trading, fewer listed equities, no market makers, no credible rating agencies, few Actuaries and undeveloped bond and mortgage markets. Ologunde, Elumilade and

Asalu, (2006:156) reiterate that Nigeria lacks a well developed capital market. How can a PFA manage pension assets to outperform a benchmark in Nigerian financial market?

Such markets characteristics require greater regulatory monitoring and control of DCS if old age living is to be sustained. Are there financial experts that can perceive a catastrophic stock market crash and move to prevent its effect on pension asset?

2.4. Investment of Pension Fund

The major shift in transiting from DBS to DCS is the privatization of pension management and transfer of pension risk ownership with the focus of providing consumption smoothing. The strategy to achieve this second pillar- type of pension is to provide a framework for pension risk management.

The admissible assets for investment as specified in PENCOM Regulation on Investment of Pension Fund Assets (2008) cited by Henshaw (2008) at www.pencom.gov.ng retrieved on 4th January, 2010 are a maximum of: (1) federal government bonds-100%, (2) 35% treasury bills, (3) 20% state government bonds, (4) corporate debt securities, (5) 25% quoted equities, (6) bank deposits and acceptances, (7) 30% mortgage backed securities (MBS) and real estate investment trusts (REIT), (8) 5% close-end and open-end funds.

The allocation of assets to each class becomes an investment strategy to achieve risk adjusted return. This portends that the managers are knowledgeable about asset class risks and portfolio management. In order to reduce investment risk the Nigerian regulators prescribed limits (attached as appendix 1) for investment in each asset class. The accumulation period of DCS carries unmitigated investment risk despite the statutory guide.

2.5. Regulation of Pension Fund in Nigeria

Nigerian financial market has had its heuristics undertones of fiducially irresponsible financial management resulting in bankruptcies of banks and financial companies in early 1990s. This occurring after wide deregulations in the banking subsector was implemented-relaxing the rules of licensing and allowing market driven interest rates.

Recently the banking reforms (Re-capitalization) process just concluded in 2008 have nearly collapsed both money and capital markets due to unmanaged regulatory and market risks. Transiting from publicly sponsored DBS to a privatized DCS attracts new knowledge management, particularly pension risk management. Pension regulatory authorities (PENCOM) who are saddled with oversight functions for the administration of pensions may have come late in 2008 in prescribing investment rules for PFAs.

Pension reform (2004) prescribes that PFAs could only invest in: securities issued by federal or state government of Nigeria, bank deposits and shares of companies who have continuously paid dividend in the last five years. The period 2004 to 2008, PENCOM reported that the aggregate Return on Investment (ROI) on pension assets is about 0.83% per annum.

PENCOM may have sensed danger in pension management by 2008 by swiftly designing new investment rules. Investment in guided securities now requires credit ratings (attached as appendix 2). On the other hand payment of benefits is now to be guided by annuity guideline jointly issued by PENCOM and National Insurance Commission (NAICOM) is attached as appendix 3.

2.6 Financial Market Returns In Nigeria

The financial market in Nigeria can broadly be divided into money and capital markets, without Real Estate Investment Trusts (REIT) and Derivatives Market. The money market displays active instruments such as, bank deposits and treasury bills; while capital market offers investment opportunities in equities and bonds. Of particular interest is the equity market which is reported as one of the fastest growing in emerging markets.

3.0. Data and methodology

Secondary data is collated from websites of Securities and Exchange Commission (SEC), Central Bank of Nigeria (CBN), Pension Commission of Nigeria (PENCOM); the daily official list of Nigeria Stock Exchange (NSE), and the 30-year price movement from research office of NSE.

A comparison of Nigerian capital market with other markets of the world is captured in the attached appendix 6, Table 1a and Table 1b.

Figure 2: A pie chart comparing Nigerian capital market variables with other countries in other economic zones

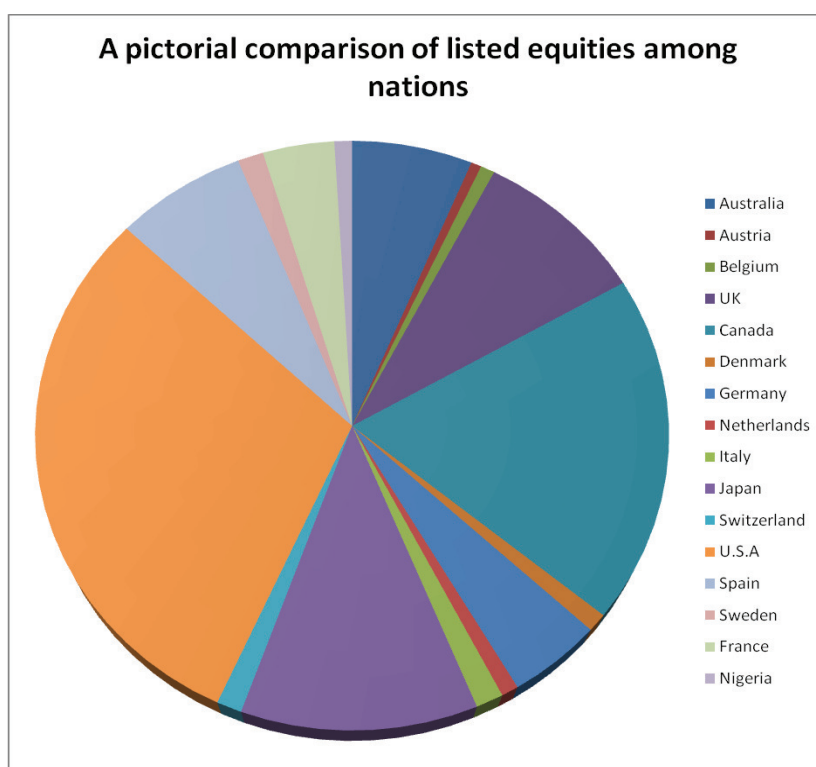
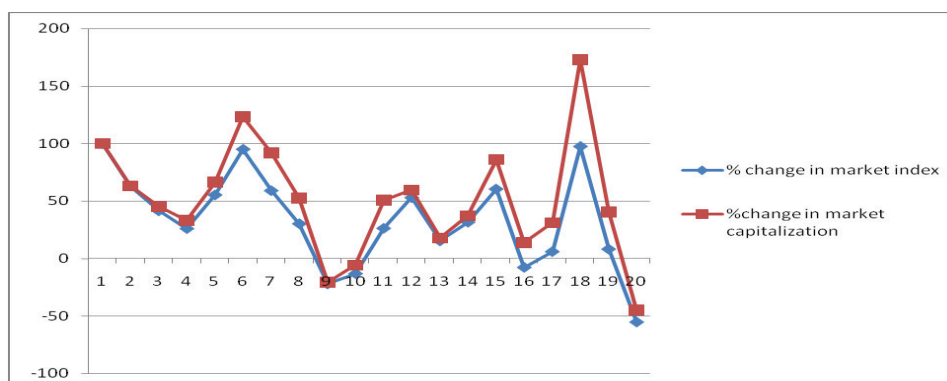


Figure 3: The rate of change in market capitalization and market index 1990-2009 in Nigeria is presented below.



The figure above show no regular pattern for market capitalization or index rate, thereby making investment planning a difficult aberration. A general overview of the irregularity in the period under study is that the market capitalization exhibit high erratic pattern than the market index. Specifically, from 1990 to 1993 while the market capitalization fell by 150% the index dropped by 125%. They both rose at different rate in the next two (2) years i.e. 1994-1995 by 175% and 75% respectively. Between 1996 and 1997 the market capitalization volatility was - 275% while the index dropped by 175%. An average

volatility of 200% and 125% was experience by both variables respectively through 1998 and 2006 before the Nigerian capital market fell into recession following the global economic crises. The market capitalization had extreme volatility of 200% between 2006 and 2007, and -375% between 2007 and 2009 while the market index was less volatile with about 100% in 2006-2007 and - 200% between 2007 and 2009. Precisely, the experience of both variables in the past two decades portends financial instability hence, difficult environment for investment planning.

Figure 4: Nigerian Bond Market Interest Rate Structure

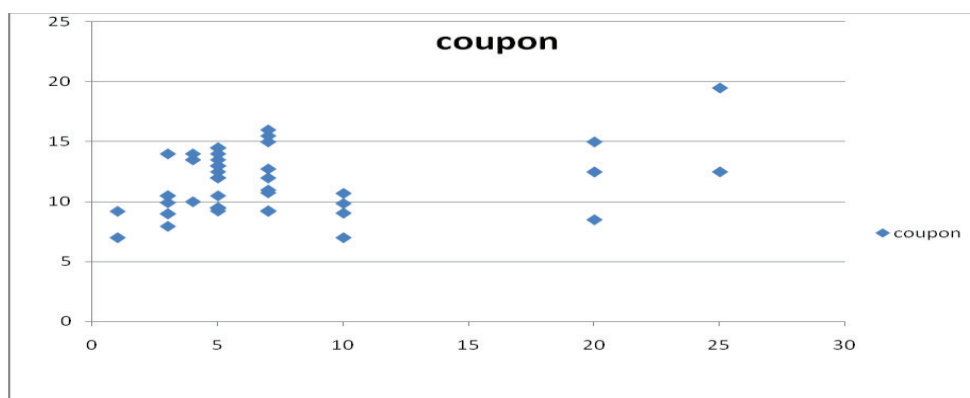


Table 4 in appendix 6 presents the interest rate structure relationship with years to maturity. Figure 4 plots the relationship between interest rates of different issued bonds by the Federal government of Nigeria and years to maturity. The outcome shows scattered points without any correlation which clearly negates the theoretical basis of linear relationship between interest rate and years to maturity. The implication is that Nigerian bond market does not offer opportunities to manage pension asset with interest rate risks through portfolio diversification of bond.

The Nigerian bond market does not currently experience active secondary market trading (no market price) hence, studies to compute the respective yields have being difficult. The coupon rate does act as proxy for yield to maturity (Malkiel Burton, 1962). The duration approximates the yield to maturity of respective bonds issued to date. To this extent, it will be difficult for investors, and investment or pension managers to employ duration-base immunization strategies. The 'cointegrated' factors of duration, coupon rate, time to maturity and price volatility are important to building duration-base immunization strategies. These strategies would match the durations of assets and liabilities within a portfolio for the purpose of minimising the impact of interest and inflation rate on the portfolio's net worth.

4.0. Analysis

4.1. Simulation of Retirement Benefit

Let us assume the following simulated data for pension assets as follows;

Assumptions

- An average Nigerian begins active work life at age 30, and puts in 30 years service, retiring at age 60

- It is expected that the retiree lives for the next 10 years and dies at age 70

- Most Nigerians in the formal sector earn an annual salary of Nigerian Naira, N1, 200,000.00 15% thereof or N180, 000.00 is contributed to a Retirement Savings Account (RSA), hypothetically.

- A salary increment of 20% every 5years, subject to maximum four times in work life. By the pension administration rule (PENCOM), a management fee of 3% is paid to both PFA and PFC

Net investible pension asset = N144, 000.00 (12% of N180, 000.00)

- 50% allocation to bond market @ 13% per annum (Stock exchange daily official list)

- 30% allocation to bank deposit @ 10% per annum

- 10% allocation to Treasury bill @ 5% per annum

- 10% to equity market @ 35% annualized return (Author computation)

If average inflation rate estimated from table 2 is 21.45% .

We apply Fisher's Law on interest rate,
 $real\ interest\ rate = nominal\ rate - inflation\ rate$

Or

$Nominal\ interest\ rate = real\ interest\ rate - inflation\ rate$

Accumulation period of 30 years.

The simulated accumulated fund is as computed in table 5 in appendix 6.

4.2. Analysis of Simulation Result

From the table 5 in appendix 6, the future values of the individual DCS pension asset gives a positive value of over N800million. However in real term, considering the average inflation rate of 21.45% the present value equivalent of the future sum is N2.4million.

It should be noted that the average inflation rate in Nigeria for 20 years is used as a proxy for the discount rate used in deriving the present value.

Generally, the Nigerian economy as an emerging market is unpredictable and largely subject to immense systematic risks, hence the average inflation rate used as proxy factor is rather superficial. Thus, while the simulated present value of the bond, money market and cash asset are not likely to yield favourable real returns, returns of the equity investments however stands out as the only reliable investment option. The Nigerian financial market may not be able to offer the needed environment for hedging pension risk management.

5.0. Discussion

The framework for managing a DCS slightly differs from that of a DBS, because a DBS is an employer or public sponsored program, sometimes described as a collective savings scheme while a DCS is an individual retirement programme. The pension risk ownership transfers from the sponsor to the retiree respectively in a transition from DBS to DCS. The transition to DCS worldwide on the recommendations of the World Bank (1994) was based on the failures of DBS to guarantee minimum pension. Though, the DCS is driven by joint contributions from employee and employer; but its management is the responsibility of the worker guided by government regulations.

In Nigeria, management of pension is delegated to PFAs and PFCs. The cruxes of pension risk management under DCS are investment risks and actuarial risks controlled by pension managers. The incentives

for fiducially responsible management, aside from regulatory oversight are more or less non obvious in the Act and investment regulations.

A developing economy such as Nigeria depicted by tables 1a and 1b in appendix 6 has low volume and turnover due to few listed securities in the equity market and pension risks are further impacted by high volatility. Pension fund being long term in nature require vibrant deep markets for effective investment in portfolio of assets where risks can be minimised while achieving benchmark returns. Table 2 and 3 in appendix 6 shows Nigerian capital market is suspect to high volatility from the percentage change in all-share index and market capitalization. The bond market does not trail the theoretical interest rate structure relationship with years to maturity, indeed no correlation is observed at all in figure 4. The simulated invested pension assets under minimal inflation rate of 21.45% obviously portend danger for sustainable old age living.

6.0. Conclusion and recommendations

A DCS transfers pension risks to the worker without the government and pension administrators sharing any part. Thus, no incentive is created to optimise risk/return possibilities for pension assets by the regulators and administrators. In Nigeria, pension risk control is limited to effective diversification of pension assets by applying Markowitz's portfolio theory. Nigerian financial market is not well developed in investment instruments (Ologunde, Elumiade and Asalu, 2006); and has no financial risk management (derivatives) market.

Risk management processes commonly deployed in funds management are

regulatory oversight, investment policy of fund managers (Mitchell and Hsin 1997) and contracting investment objective into the policy. Obviously, this is the road map for a successful DBS in shallow financial markets where:

- The degree of expertise required to cumulate savings at a risk adjusted return that insure a minimum future value of pension is lacking- it takes average of 50 years to develop required expertise
- The financial market is not yet developed and having no financial risk market such as derivatives
- Regulatory risks on asset valuation techniques may prevail
- The pension system more or less is not multi-pillar in nature
- Penalties for mismanagement of pension assets should more stringent as a risk management tool. In the light of all this study, it is recommended that the future outlook should consider the following;
- The discount rate for annuities should be disclosed by either the PFA or Insurance company
- A minimum guaranteed nominal return with an assumed inflation rate may be considered as risk allocation mechanism for PFAs and contracted out with retirement

account holders

- Allowing increase in contributions by employee without tax limitations
- More awareness on annuity functions, risk appetite or tolerance relationships with age, inflation trends are required.
- PENCOM must be invited to join the council of the Nigerian Stock Exchange so as to provide input in market regulation.
- The Nigerian Capital Market should review urgently its conditions for listing and quotation in order to attract more listings.
- That Nigerian pension fund manager should be allowed to increase the percentage asset allocation to foreign investment market.
- To evolve an effective interest rate structure for planning.
- The Bond market should be activated to allow for vibrant secondary market, attractive coupons, government patronage across all tiers, effective rating agencies.
- The Bond market should be re-vitalized to take up infrastructural investment desperately needed in the economy.
- The technical proficiency and investment skill of the PFA and PFC managers need to be improved towards complementing pension fund management with the hope of achieving a benchmark.

REFERENCES:

1. **Ackley, G.** (1978). *Macroeconomics: Theory and Practice*. New York: Macmillian Publishing.
2. **Banerjee, B.** (2009). *Fundamentals of Financial Management*. New Delhi: PHI Learning Private Limited.
3. CIA World Fact book, (2009).
4. **Crabb, P. R.** (2003). *Finance and Investment using the Wall Street Journal*. New York: McGraw-Hill Irwin.
5. **Fabozzi, F. J.** And **Modigliani, F.** (2009). *Capital Markets: Institution and Instruments*. (3rd) New Jersey; Prentice Hall.
6. **Fisher, D. E.** And **Jordan, R. J.** (1995). *Security Analysis and Portfolio Management*. New Delhi: Prentice-Hall of India private Limited.

7. **Friedmann, M.** (1957). *A theory of the Consumption Function*. Princeton: University Press.
8. **Kevin, S.** (2009). *Security Analysis and Portfolio Management*. New Delhi: PHI Learning Private Limited.
9. **Kellison, S. G.** (1970). *The Theory of Interest*. Illinois; Richard Irwin Inc.
10. **Harrington, S. E. And Niehaus, G. R.** (2004). *Risk Management and Insurance* (2nd ed.). New Delhi: Tata McGraw-Hill Publishing company Limited.
11. **Henshaw, E. T.** (2008). *Challenges of Investments of Pension Fund*. www.pencom.gov.ng
12. **Mangiero, S. M.** (2005). *Risk Management for Pensions, Endowments and Foundations*. John Wiley and Sons.
13. **Mehr, R. I.** (1970). *Life Insurance: Theory and Practice*. Dallas: Business Publications Inc.
14. **Mishra, M. N.** (2007). *Insurance: Principles and Practice*. New Delhi: S. Chand & Company.
15. **Mitchell, O. S. And Hsin, P.** (1997). *Public Pension Governance and Performance*. In S. Valdes-Prieto (ed.), *The Economics of Pensions*. Cambridge University Press, pp. 92-126.
16. **Modigliani, F. and Muralidhar, A.** (2004). *Rethinking Pension Reform*. New York: Cambridge University Press.
17. **Modigliani, F. and Ando, A.** (1963). *The life-cycle Hypothesis of Saving: Aggregate Implications and Tests*, *American Economic Review*. 53, pp55-84.
18. **Muralidhar, A.** (2001). *Innovations in Pension Fund Management*. Stanford: Stanford University Press.
19. **Ogunsola, A. O.** (1984). *Insurance and Pension Practice in Nigeria: Relections of a Nigerian Actuary*. Ibadan: Board Publications.
20. **Ologunde, A. O., Elumilade, D. O., and Asalu, T. O.** (2006). *Stock market capitalization and Interest Rate in Nigeria: A Time Series Analysis*. *International Research Journal of Finance and Economics*. 4
21. **Olowe, R. A.** (1997). *Financial Management: Concepts, Analysis and Capital Investments*. Lagos: Brierly Jones Nigeria Limited.
22. **World Bank**, (1994). *Averting the old Age Crisis: Policies the Old and promote Growth World Bank Policy Research Report*. New York: Oxford University Press.