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Pension Funds Investment and Human Capital Development in Nigeria

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Abstract

The growth of an economy is limited by the quality of life of its inhabitants. This analogy applies to pension funds whose growth is also affected by the quality of life of the owners of such funds. This paper investigates the impact of the investment of pension funds on human capital development in Nigeria and by extension the attainment of the United Nations' SDGs. Granger Causality and Ordinary Least Squares techniques were used to analyse data on the Human Development Index (HDI), annual pension savings (PEN_S), annual pension investment (PEN_I), growth of Real GDP per worker (GDPGR), Financial Development Index (FIN_DI), consumer price index (CPI), as well as access to renewable energy (Renewable), from 2003 to 2023. Findings indicate that the investment of pension funds though diversified, has no significant impact on human capital development. It was concluded that the current investment template of pension funds does not support the attainment of the SDGs towards attaining the Agenda 2030 of the United Nations. It therefore recommended a retirement postponement besides wage increases, and most importantly the tagging of a percentage of the investment of pension funds to education and healthcare to ensure a developed human capital for a decent retirement living and the attainment of the SDGs.

Keywords: *Pension, Investment, Human Capital, Intermediate Ends, Education, Health, SDGs, Clean Energy.*

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1. Introduction

The Agenda 2030 of the United Nations in 2015 birthed the 17 Sustainable Development Goals (SDGs). The agenda provides a blueprint for peaceful and prosperous people and the planet both present and future generations (UN, 2024). In general, the framework requires coordinated action by both developed and developing countries to ensure improved health and education, reduced inequality, and economic growth and ultimately ending poverty and other deprivations as reported in the Multidimensional Poverty Index of the National Bureau of Statistics (NBS, 2022). Specifically, some of the SDGs have the following targets 1 – No poverty; 2 – Zero hunger; 3- Good health and well-being; 4-Quality education; 7- Affordable and clean energy; 8- Decent Work and economic growth; 12- Responsible consumption and production; and 13- Climate action. Most of these targets could be achieved in part by pension design. How has the Nigerian pension industry supported the attainment of these SDGs in Nigeria?

The growth of an economy without a corresponding impact on the lives of its inhabitants is unarguably limited. Such an economy prioritises the expansion of intermediate means at the expense of intermediate ends (Daly, 2022). The author referred to intermediate ends as the benefits of wealth, including a good diet, quality education, and good health. In contrast, intermediate means are products such as industrial goods, education, healthcare etc. whereas the former are unlimited, the latter are limited. An economy that expands her intermediate means is a growing economy while that which improves the intermediate ends is a developing one. The economy cannot grow without developing its human capital through adequate feeding, high-quality education, and qualitative and affordable healthcare, among others (Wanger & Akanegbu, 2023) (Jacobius, 2020).

Part XII of the Pension Reform Act 2014 provides for the investment of Pension funds by Pension Fund Administrators with the objectives of safety and maintenance of fair returns. Pension Funds often neglect human capital – the owners of the very funds they are managing (Hoekstra, 2022). Pension Fund investment should consider the predictability or otherwise of the future income of fund owners. This is however not obtainable in the Nigerian context. The total pension registration in Nigeria increased from 2,797,529 Retirement Savings

Accounts (RSA) at the end of quarter four of 2007 to 10,280,956 RSAs at the end of quarter one of 2024. At the end of the first quarter of 2024, the total pension contributions grew from ₦15.60 billion in 2004 to ₦10,254.20 trillion with the public sector saving ₦5,336.66 billion (52.04%) while the private sector saved ₦4,917.54billion (47.96%), as summarised in Table 1 below:

On the investment of pension savings, the industry's net asset value (NAV) increased by over 968.72% to ₦19.66 trillion in quarter one 2024 from ₦2.03 trillion in quarter four of 2010. On the general growth of the pension industry, the total membership expanded by 367.50% from inception; total contributions increased by 657.32%, and the NAV grew by a whopping 968.72%, indicating a boom in investment returns.

Despite reported growth in the industry, it has not been able to provide the intermediate ends to its clients in the form of a decent retirement life. What then is the problem? Is it inadequate membership, low contributions or low returns? Is it corruption in the management of the total pension assets? The very owners of pension funds are often neglected when they need their savings. This is obvious given the indefinite waiting time between retirement and payment of gratuity and/or monthly pension.

It is therefore imperative for individuals to source appropriate information to make informed financial decisions; for financial institutions to adequately enlighten their clients/customers, and most importantly the government/employers to create adequate public awareness by expanding financial/retirement education. This can only be guaranteed if adequate provisions are made and incorporated into the pension design and regularly monitored and reviewed in line with changing realities within the economic and financial environments including the demographics of participants. Such provisions should be appropriate for tackling behavioural biases by encouraging savings and optimal investment decisions through the evaluation of the probabilities of defaults of financial instruments while also reducing market imperfections by applying certain restrictions (Perets & Yashiv, 2015). These could boost savings, spur investments and stimulate economic growth and development for possible positive returns thus guaranteeing post-service benefits. Unfortunately, available evidence has proven to the contrary (see Collard, 2009; Byrne et al, 2009; Bovernberg et al, 2007).

In view of the above, this issue is worth investigating because, despite the series of reforms being implemented in the global pension industry; from parametric changes to the Traditional PAYG, to the new pension formulae such as notional funding, to the development of funded schemes, the pension quagmire persists. Even with the accumulated pension contributions, employers still cannot adequately meet their retirement obligations to the elderly nor have the national economies felt the impact of such accumulated funds lying waste or better still being embezzled and/or diverted. The bulk of the pension savings in the past may have been channelled to the black economy since the full impact is not being felt by the mainstream economies. Furthermore, Pension Reforms globally should have gone beyond guaranteeing the welfare of retirees, to accelerating the development of the financial sector if not the entire economy by way of financing critical infrastructural development. It is however worrisome to note that more than a decade into the global pension reforms, employers are still struggling to meet even the basic purpose – guaranteed retirement benefits. National economics are still heavily blotted with external debts while leaving accumulated domestic pension savings fallow and inaccessible to even fund owners. For instance, the Chilean pension system, which became operational in the 1980s is still battling with the fears that retirees would be forced into poverty due largely to the oligopolistic structure of the industry and the low employer contribution (The Economist Intelligence Unit, 2019). The Nigerian pension system has undergone two reforms. The 2004 introduced the funded system known as the Contributory Pension Scheme while the 2014 fine-tuned the policy. These reforms cut across the rate of contribution, to benefits, key players, fund investment, and regulation as well as the issuance of e-statements to contributors among other items. What is however not clear is the sustainability of these reforms as there appear to be no meaningful impact on the post-service lives of employees more than a decade after full implementation.

Against this background, this research idea has been fashioned to investigate the general impact of Pension Reforms on the development of the economy of the country. Specifically, how much has the reform affected the quality of living of public sector employees towards guaranteeing their access to quality living after retirement?

This research is therefore tailored towards assessing the role of the DC pension scheme in promoting financial awareness and discipline among the government, fund managers, and employees that would enhance the quality of human capital of the country.

2.0 Review of relevant literature

2.1. Pension Savings

The total pension registration in Nigeria increased from 2,797,529 Retirement Savings Accounts (RSA) at the end of quarter four of 2007 to 10,280,956 RSAs at the end of quarter one of 2024 as shown in Table 1 below.

Table 1 Total RSA Registrations

SN	PFA	Inception to 31st March 2024	No. of Contributors registered in Q1, 2024	Percentage (%) of Total New Registrations	Total RSAs registered from Inception to 31st March 2024
1	S/IBTC Pension Managers Ltd	2,075,094	21,288	23.9%	2,096,382
2	Access Pensions Ltd	1,105,500	20,042	22.5%	1,125,542
3	ARM Pension Managers Ltd	918,548	7,438	8.4%	925,986
4	Trustfund Pensions Ltd	812,464	3,267	3.7%	815,731
5	Premium Pension Ltd	794,946	6,204	7.0%	801,150
6	FCMB Pensions Ltd	749,922	4,273	4.8%	754,195
7	Leadway Pensure PFA Ltd	714,989	6,327	7.1%	721,316
8	Pension Alliance Ltd	611,428	2,663	3.0%	614,091
9	Crusader Sterling Pensions Ltd	383,775	3,634	4.1%	387,409
10	NLPC PFA Ltd	360,541	1,820	2.0%	362,361
11	Fidelity Pension Managers Ltd	331,124	2,165	2.4%	333,289
12	NPF Pensions Ltd	323,815	34	0.0%	323,849
13	Tangerine Apt Pensions Ltd	272,092	1,385	1.6%	273,477
14	OAK Pensions Ltd	238,773	2,879	3.2%	241,652
15	Norrenberger Pensions Ltd	165,347	1,127	1.3%	166,474
16	Veritas Glanvills Pensions Ltd	161,955	1,226	1.4%	163,181
17	Guaranty Trust Pension Managers Ltd	94,049	1,873	2.1%	95,922
18	Radix Pension Managers Ltd	49,382	864	1.0%	50,246
19	Nigerian Uni Pension Management Coy	28,151	552	0.6%	28,703
	Total	**10,191,895**	**89,061**	**100%**	**10,280,956**

Source: PenCom(2024)

At the end of the first quarter of 2024, the total pension contributions grew from ₦15.60 billion in 2004 to ₦10,254.20 trillion with the public sector saving ₦5,336.66 billion (52.04%) while the private sector saved ₦4,917.54billion (47.96%), as summarised in Table 1 above.

Table 2: Total Pension Contribution from inception

Year/Quarter	Public Sector		Private Sector	
	Amount (N billion)	% of Total	Amount (N billion)	% of
2004	15.60	0.29	0	0
2005	34.68	0.65	0	0
2006	37.38	0.70	23.03	0.4
2007	80.63	1.51	68.34	1.3
2008	99.28	1.86	80.81	1.6
2009	137.10	2.57	91.21	1.8
2010	162.46	3.04	103.03	2.1
2011	228.92	4.29	119.53	2.4
2012	302.24	5.66	159.52	3.2
2013	278.50	5.22	225.42	4.5
2014	237.76	4.46	343.97	6.9
2015	200.05	3.75	358.91	7.3
2016	225.86	4.23	262.33	5.3
2017	257.11	4.82	353.73	7.1

Source: PenCom (2024).

2.2. Pension Fund Investment

Part XII of the Pension Reform Act 2014 provides for the investment of Pension funds by Pension Fund Administrators with the objectives of safety and maintenance of fair returns. Pension Funds often neglect human capital – the owners of the very funds they are managing (Hoekstra, 2022). Pension Fund investment should consider the predictability or otherwise of the future income of fund owners. On the investment of pension savings, the industry's Net Asset Value (NAV) increased by over 968.72% to ₦19.66 trillion in quarter one 2024 from ₦2.03 trillion in quarter four of 2010. On the general growth of the pension industry, the total membership expanded by 367.50% from inception; total contributions increased by 657.32%, and the NAV grew by a whopping 968.72% indicating a boom in the investment returns.

Pensions are a form of post-service remuneration. They are compensations made by employers to their erstwhile employees. The Nigerian Pension Reform Act of 2014 replaced that of 2004 and increased the ceiling for the investment of pension funds from 25% to 35% in domestic equities (Kwairanga, 2013; Ekpulu & Bingilar, 2016). The initial Act (2004) introduced the Contributory Pension Scheme (CPS) in which both the employer and the employee made commitments towards ensuring a smooth retirement life for the employees. These were adjusted upwards in the 2014 amendment. The CPS, however, does not give room for individual financial decision-making apart from the choice of fund manager and has instead vested such powers in institutions- Pension Fund Administrators (PFAs) with guidelines from the Central Bank of Nigeria (CBN) through the National Pension Commission (PenCom). Pensions could be Funded, Unfunded or overfunded. Defined Benefit schemes are unfunded pension systems whereas Defined Contributions are a form of funded pensions. The former refers to a design where the pension liability is solely borne by the employer, while the latter connotes adequate preparations by way of worktime savings by employees to cater for their retirement needs. The discount rate if varied could render a funded pension scheme overfunded, which implies a surplus of pension assets over pension liabilities at a point in time; or underfunded. The Nigerian pension industry has been largely underfunded, giving rise to its inability to meet pension obligations. This has compelled many agencies such as the Nigerian Customs Services (Popoola, 2023), Nigeria Police Force, etc. to demand exemptions from the DC scheme being operated in the country.

Table 3 RSA Active Funds

ASSET CLASS	RSA ACTIVE FUND			
	Dec-23		Mar-2	
	₦'Billion	Weight %	₦'Billion	
Domestic Ordinary Shares	1,355.87	10.51%	1,806.91	
FGN Securities:	**8,712.58**	**67.52%**	**8,962.35**	
FGN Bonds	8,508.44	65.94%	8,717.83	
Treasury Bills	94.17	0.73%	133.80	
Agency Bonds (NMRC)	7.38	0.06%	6.51	
Sukuk	101.23	0.78%	102.87	
Green	1.37	0.01%	1.34	
State Govt. Securities	202.47	1.57%	200.85	
Corporate Debt Securities	1,140.51	8.84%	1,136.96	
Supra-National Bonds	7.57	0.06%	7.82	
Money Market Securities	1,189.36	9.22%	1,247.65	
Foreign Money Market Securiti	-	0.00%	2.04	

Source: PenCom (2024).

Table 4 RSA Retiree Fund

ASSET CLASS	Dec-23		Mar-2	
	₦'Billion	Weight %	₦'Billion	W
Domestic Ordinary Shares	26.86	1.97%	39.79	
FGN Securities:	**975.45**	**71.40%**	**998.07**	
FGN Bonds	945.71	69.22%	960.59	
Treasury Bills	17.46	1.28%	27.12	
Agency Bonds (NMRC & FMBN)	0.40	0.03%	0.36	
Sukuk	11.72	0.86%	9.84	
Green Bonds	0.16	0.01%	0.16	
State Govt. Securities	23.10	1.69%	23.04	
Corporate Debt Securities	151.95	11.12%	151.29	

Source: PenCom (2024).

2.3. The NSE Pension 40 Index

The trend in the growth of the pension fund portfolio is represented by the Pension Index published by the Nigerian Stock Exchange (NSE). The Nigerian Pension Index tracks the performance of all pension-compliant stocks quoted on the Nigerian Stock Exchange (NGX, 2024). Also known as NSE Pension 40 Index, it is made up of the top 40 companies by market capitalisation sector liquidity, and free Float Factor. By PenCom investment reform guidelines, no individual listed equity can have a weighting exceeding 4.5% while no single sector can have a weighting below 2% or above 4.5% of the total index. Companies to be included must have a free Float of at least 5%

Figure 1 Trend of the NGX Pension Index

Pension fund investment strives to balance growth, risk, and liquidity using MPT, factor-based investing, and environmental, social, and governance (ESG) strategies in the face of challenges such as market risks and changes in regulation and demographics (Tampli, 2024). These challenges are surmounted through proper asset allocation, investment guidelines and investment management. The investment choices are no doubt guided by the risk-return trade-off appropriate among the multi-fund structure of the pension fund portfolio, especially between the RSA active and retiree funds. Figure 3 below illustrates the trend in annual return on investments of the RSA fund portfolio.

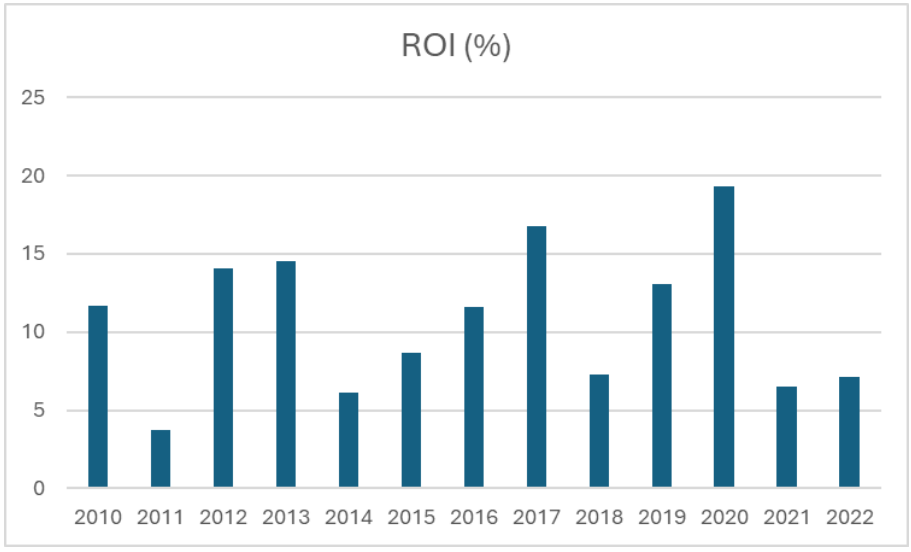


Figure 2 Trend of RSA Funds Return on Investment (Source NGX, 2017)

The trend indicates wide fluctuations in the ROI reflecting the conditions within the macroeconomic environment with recessions in 2014, 2018 and the covid-19 pandemic of the 2020s. Besides these downsides of the business cycle, the average ROI has generally been increasing, indicating an expansion of the industry. The growth of the industry could boost retirement consumption and development the owners of the funds if properly

harnessed,

2.4. Pension Funds and Human Capital Development

Despite reported growth in the industry, it has not been able to provide the intermediate ends to its clients in the form of a decent retirement life. What then is the problem? Is it inadequate membership, low contributions or low returns? Is it corruption in the management of the total pension assets (Wanger, 2024)? The very owners of pension funds are often neglected when they need their savings.

The growth of an economy without a corresponding impact on the lives of its inhabitants is unarguably limited. Such an economy prioritises the expansion of intermediate means at the expense of intermediate ends (Daly, 2022). The author referred to intermediate ends as the benefits of wealth, including a good diet, quality education, and good health. In contrast, intermediate means are products such as industrial goods, education, healthcare etc. whereas the former are unlimited, the latter are limited. An economy that expands its intermediate means is a growing economy while that which improves the intermediate ends is a developing one. The economy cannot grow without developing its human capital through adequate feeding, quality education, and quality healthcare, among others.

2.5. The Rationality Theory

Also known as the self-interested or rationality assumption of neoclassical economics provides that individuals base their decisions on rational calculations to achieve outcomes that align with personal objectives. Economists believe that people forego alternatives that are not relatively valuable and compelling to them in favour of those with the greatest personal benefit. This also applies to DC pension participants. However, their degrees of rationality are often constrained by both demographic and market realities. The level of financial education, or the amount of information at the disposal of contributors, often makes a mockery of this rationality assumption. However, the multi-fund structure of the Nigerian pension industry does not seem to support the development of fund owners including adequate consumption since third parties handle the investment of the funds. This is because the funds do not invest in the education of their owners and their general welfare is often neglected.

2.6. Framing

Sometimes the framing effect or framing bias proposes that individuals make decisions based on how the issues are presented to them or framed (Dolan, 2023). People without adequate knowledge of basic financial theories are often impacted by the different situations in which scenarios are presented (framed) to them (Ackert & Deaves, 2016). As such, they are faced with uncertainty – the risk of inadequate pension at retirement. To get around this, practitioners often apply the Expected Utility Theory to define the preferences based on the market environment. The ambiguity in defining individual rational behaviours has however questioned the robustness of the Expected Utility Theory in accommodating the risk-averse, risk-seeking and risk-neutral investors. Neurofinance has also introduced another aspect to the rationale behind individual financial decision-making. This emerging field is focused on unravelling the mystery behind the think box that propels some investors to be risk-averse, risk-seeking or risk-neutral. These inconsistencies in choices have been attributed to Framing which has also provided the background for Prospect theory to examine the variations in individual choices (Ackert & Deaves, 2016). Since pension savings have been channelled to the markets, their sustainability largely depends on the markets' efficiencies. Pension fund investment should prioritise the welfare of owners of the funds by investing in the education and healthcare to develop the human capital of the country.

2.6.1 The Modern Portfolio Theory (MPT)

The MPT strives to maximise returns while minimising risk through diversification of investment across different asset classes (Tamplin, 2024). The financial framework was developed in the 1950s by Harry Markowitz to guide investors in their financial decisions.

2.7. The Efficient Market Hypothesis (EMH)

The Efficient Market Hypothesis (EMH) by its postulations underlies the desire for fairness in pension payments and their linkage to economies where pension funds have been invested. The EMH no doubt underscores information as a major constraint in financial decision-making especially to financially illiterate investors. The efficacy of any pension design, especially DC scheme can be measured by its ability to match goals with constraints. This also depends on the efficiency in asset pricing by fund managers through the application of asset pricing models that consider the risk-return trade-off since the risk inherent in those markets directly impacts the health of the pension systems. For instance, Markowitz's Modern Portfolio Theory founded on the Mean-Variance Portfolio assumes investors to be risk averse. In making their investment choices, investors tend to be more favourable to portfolios with lower risks providing their profits are the same (Shen, Wang, & Ma,

2014) (Chen & Peng, 2019). The MVT requires investors to take more risk if they must earn higher profit. Using the variance of Asset returns and Expected Asset Returns as proxies for Risk and profit respectively, the MVT(MPT) recommends that investors should select the portfolios that are mean-variance-efficient - the feasibility towards poverty reduction and payment of adequate retirement benefits on one hand and the risk of inadequate contributions and default behaviour on the other (Ackert & Deaves, 2016). The authors enumerated several parameters for assessing a DC pension design including Automatic Enrolment – Fighting Procrastination; Regular Dynamic Asset Allocation Adjustment until retirement; Higher Replacement Ratio; Workplace Financial Education; Midian Numbers of Asset-allocation changes; different saving rates for males and females; and Lifecycle (Target-Date) funds. Does the Nigerian Public sector pension design meet these criteria? The study also identified certain defects of the DC scheme to include its voluntary outlook, inherent default behaviour, endorsement effect (herding), and inertia. It further recommended that there should be Scheduled Deferral Increase Programmes (SDIPs) to induce voluntary contributions and encourage enough savings for retirement. To downplay loss aversion and money illusion, it also recommended regular pay Review/Rise during which the SDIPs should take effect.

Pension designs should account for the demographics of plan participants such as their risk attitudes and age. Collard (2009) reported that countries in Central and Eastern Europe and Hong Kong have a higher number of participants making active financial decisions since they offer limited investment choices. Conversely, countries like the US, Sweden and Australia that offer a wider choice of pension investment instruments tend to have low active participation because of the confusion thus encouraging default behaviour. It has been reported that information provision alone does not ensure constant investment rebalancing and most plan participants in the UK that were desirous of making investment decisions themselves are aimed a risk control. Appropriate investment behaviour should be the one that matches risk with return rather than the risk minimization inclination of employees since this may also be responsible for the pension crisis occasioned by inappropriate saving and investment behaviour.

2.8 The Human Capital Theory

The neo-classical school of economics is the source of human capital theory. The human capital theory stresses a match between investments in both physical and human capital. Health Economics is an important branch of the economy given the pivotal role of human capital in economic growth. It highlights the role of good health in determining the quality of human capital and the growth of an economy. Adams Smith (1776) in his Inquiry into the Nature and Causes of the Wealth of Nations stressed that improving human capital through training and education benefits the enterprises and the society at large. The Human capital theory of 1960 by Gary Becker and Theodore Schultz posits that investments in education and training are key to increased productivity, however, it is portable (Robinson & Pope, 2023) (Ross, 2021) (Samoszuk, 2022). The theory stresses the importance of knowledge and skills acquisition to economic growth while also emphasising the fact that labour if not adequately remunerated, can migrate across borders to areas of superior reward in the form of better working conditions. The authors foretold the present spate of brain drain facing emerging economies, Nigeria inclusive. The theory also links productivity to the level of income and stresses the need for increased investment in training and commensurate remuneration of workers (Wanger & Akanegbu, Impact of Disaggregated Government Expenditure on Human Capital Development in Nigeria 1970 - 2022, 2023).

2.9 The Human Capital Model

The Human Capital Model of the demand for Health derived from the Human capital theory explains variations in the amount of health demanded with increases in the age of the people. It was developed to determine the optimal amount of investment in human capital at any age. The models show that the derived demand for health varies with the individual and age (Grossman, 2000). The model considers health as a durable product that depreciates with age and hence requires regular investments in it. The author employed the household production function of consumer behaviour by using health as the dependent variable and medical care as input and found that the shadow price of health depends on many other factors like age (where deterioration in health occurs with growth in age) besides the cost of medical care. The model also surveyed the relationship between education and health and found that the shadow price of health rises over the lifecycle and falls with education and that more educated people are more efficient producers of good health. Increased Government expenditure on education could boost health at a reduced shadow price in the long run and increase productivity. The model provides a framework for adequate retirement planning to guarantee accessible healthcare for retirees and their families.
This economic theory postulated that 'human capital development plays a significant role in economic growth'. A trained labour force has an enlarged economic opportunity that has a direct impact on the income of the individual (Wanger & Aras, 2022). A developed human capital contributes to the economic growth of the country.

Therefore, for an economy to experience economic growth and increase income distribution, a large size of its population needs to be educated and stay healthy, because of the monetary and non-monetary impact this has on the social, and economic well-being of the citizens, and what it is contribution also has on the productive sector of the economy.

2.10 Empirical Review

On the relationship between pensions and the economy, Miguel Rodriguez Gonzalez and Christoph Schwarzbach (2016) analysed the long-run relationship between growth and old-age welfare. They argued that, increased economic growth increases employment which also determines labour incomes to build up pension benefits. They employed the Cointegration Analysis using the Vector Error Correction Model (VECM) in studying the relationship. There is a causality between growth and old-age welfare underpinned by appropriate savings and investment behaviour. Pension savings are not a leakage from the economy since they accumulate capital and if optimally invested could take employees out of retirement poverty and also stimulate economic growth.

There is also the risk of inadequate retirement income under the DC schemes given that the burden is entirely borne by the plan participants whose savings decisions are full of flaws (Forsyth & Vetzal, 2019). They recommended a behavioural change regarding the required contributions, expectations and the optimal asset allocation mechanisms. Individual savings behaviours have been found to be influenced directly by their attitudes towards savings and levels of income, and indirectly by their views of longevity, replacement rate, age as well as their feelings as savers (Garcia, Barros, & Sylvestre, 2011) (Kitces, 2017). Using a structural equation model, the authors analysed the determinants of savings behaviours in Portugal and concluded that family size does not affect the saving behaviour of individuals. Individual employees should hold themselves accountable for their retirement living by demanding from their employers through their unions the appropriate pension designs that would offer them affordable post-service lives. Pension designs could be evaluated based on their target returns, asset allocations, cash flows, fund manager selection as well as the cost involved. The cost implies the opportunities to be forgone and the risk composition of a design vis-a-vis alternatives.

In applying the Lifecycle Hypothesis (LCH), it was discovered that some employees have adequate knowledge of financial theories regarding adequate savings rates and investment strategies and can also apply them while a few don't (Byrne, Blake, & Mannion, 2009). They recommended strategic policy designs to guard against the mistakes of the latter set of employees. The LCH developed by Franco Modigliani in 1957 provides that to smoothen consumption over their lifetime, individuals tend to borrow when their incomes are low and save with high incomes.

Past literature on the relationship between pension funds and financial markets focused on volatility, employing secondary research, a few conducted primary research on savings and investment decisions with the argument that pension savings rate should be a positive function of both age and income (Byrne, Blake, & Mannion, 2009). A few of these studies used ordinary least squares (OLS) methods for analysis of data and hypotheses tests and a few used advanced econometric techniques such as the Autoregressive Distributed Lag (ARDL) Test including Unit Root and Cointegration tests, the VECM, the LCH, among others (See Jappelli, 2005; Bodie et al, 2007; Bovenberg et al, 2007; Byrne et al, 2009).

Many other techniques of portfolio management including MPT, APT, Asset-Liability Management, CAPM, Present Value Model or Efficiency Model, and Prospect Theory among others also strive to maximise the expected return given the constraints identified within their domains (Alwohaibi & Roman, 2018). While certain investors have a Hyperbolic Absolute Risk Aversion (HARA) utility function, some have a Symmetric Asymptotic Hyperbolic Absolute Risk Aversion (SAHARA) utility function. Ideally, Pension designs involving the first class of investors should adopt the Constant Proportion Portfolio Insurance (CPPI) strategy whereas the LCH should be adopted for the later in the management of their pension savings. A sustainable pension system should incorporate both (Bernard & Kwak, 2016). Unfortunately, most of these are normative and would not be appropriate in managing financial behaviour. However, all the research above on pension funds has supported their investment to generate higher returns and guarantee old-age pensions for investors while also developing the markets and their economy in general. Moreover, some of the studies recommended attitudinal change among plan participants to be supported by pension designs.

Menoncin & Vigna (2017) adopted the mean-variance approach to prove that fund managers could place the probability of ruin under control by choosing the desired payback ratio. They minimised quadratic function for a diligent implementation of guidelines towards receiving the target insurance claims. Some studies proved that the attainment of the desired payback also depends on the risk parameters chosen to qualify the risk exposures of

the plan participants (Chi & Liu, 2017). The authors used Value-at-Risk, Tail Value-at-Risk or Expectile to measure the risk exposures of the insured with insurance schemes. This implies that an optimal pension is possible if the designs are properly followed while adopting time rebalancing with due regard to the risk characteristics of plan participants.

3.0 Methodology

3.1 Sample and Data Collection

Data for this research was obtained from data repositories like the WDI, National Pension Commission, and the Global Economy, among others. The research covers the period from 2004 to 2024. For the secondary investigation, data was obtained on annual pension savings (PEN_S), annual pension investment (PEN_I), HDI, growth of Real GDP per worker (GDPGR), Financial Development Index (FIN_DI), consumer price index (CPI), and access to renewable energy.

3.2 Tools of Data Analysis

Eviews application was used alongside spreadsheets, tables bar chats etc to analyse the data on pension savings, their investment, the HDI, as well as the macroeconomic conditions such as the financial institutions, the price levels etc.

3.2 Model Specification

On the relationship between pension savings, their investment, and human capital development, the OLS was used alongside other econometric techniques to test the impact of annual pension assets on the Human Development Index (HDI), Financial Development Index (FinDI), % Annual growth rate of real GDP per employed person (GDPR).

$$HDI = \beta 1 PEN\_S + \beta 2 PEN\_I + \beta 3 RENEW + \beta 4 FIN\_DI + \beta 5 GDPGR + \beta 6 CPI + \mu$$

Where: -

$HDI - human\ development\ index\ (a\ proxy\ for\ human\ capital\ development)$

$PEN\_S - pension\ savings$

$PEN\_I - pension\ investment$

$RENEW - access\ to\ renewable\ energy$

$FIN\_DI - financial\ development\ index\ (representing\ the\ development\ of\ the\ financial\ sector)$

$GDPGR - per\ worker\ growth\ in\ real\ GDP$

$CPI - consumer\ price\ index$

$\mu - the\ error\ term$

Whereas Pension savings and investment represent the growth of the pension industry, HDI and access to Renewable and clean energy are indicators of the industry on human lives, while GDPGR, CPI and FIN_DI are control variables.

3.3. A Priori Expectation

From the model:

$$0 > \beta 1, \beta 2, \beta 3, \beta 4, \beta 5 < 1$$

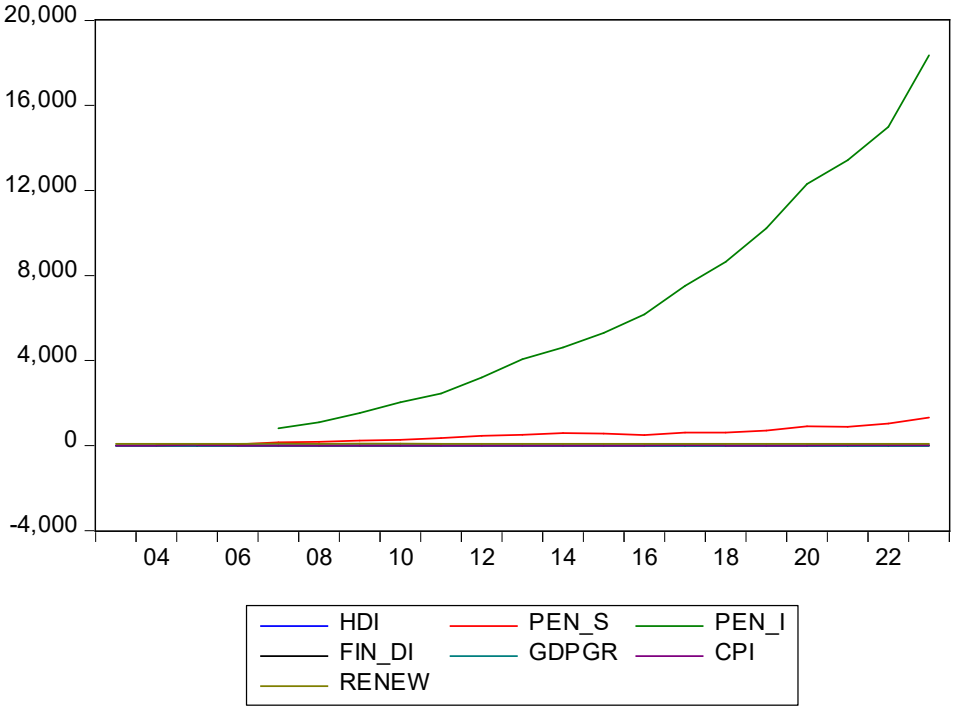
$$\beta 6 < 0$$

4.0 Results

4.1 Descriptives of the Series

The Human Development Index (HDI) emphasises the people and their capabilities as the ultimate criteria for evaluating the development of a country, not just growth. It summarises the average achievement in key dimensions of human development including a long and healthy living, a quality education, and a decent living standard (UNDP, 2024). The health aspect is measured by the life expectancy at birth; education is measured by

the mean of years of schooling for adults aged 25 years or more and expected years of schooling for children of school entering age, while the standard of living is measured by the gross national income per capita. It is used to evaluate national policies concerning their expected impacts on people's livelihoods. A pension scheme should ensure adequate enlightenment, feeding, and good health for the participants including their dependents.



(Source: Authors' computation)

Figure 3 The Pension Industry and Human Development

As shown in Figure 22 above, pension investment in the Nigerian pension industry have increased without a corresponding increase in HDI the proxy for human capital development. This confirms the low investment of pension funds in the health and education sectors as shown by the pension index. This could mean that the injection of pension funds into the economy is fuelling consumption rather than production, which also confirms the level of mismanagement reported in the industry.

Table 5 Descriptive Statistics

	HDI	PEN_S	PEN_I	GDPGR
Mean	0.521100	578.1965	6864.886	1.439664
Median	0.527000	558.9600	5302.890	0.674286
Maximum	0.564294	1319.160	18355.65	8.680000
Minimum	0.479000	148.9700	815.1800	-4.940000
Std. Dev.	0.027485	318.2012	5338.898	3.718909
Skewness	-0.100312	0.677117	0.715376	0.164255
Kurtosis	1.798030	2.934731	2.380024	2.130800
Jarque-Bera	1.051861	1.302065	1.722257	0.611595

Source: Author's Computation

The descriptives in Table 7 confirm the series graphs in Figure 22 where Pension Savings, Pension Investment,

GDPGR and CPI have high standard deviation values implying a deteriorating welfare amidst the expanding pension industry.

4.2 Unit Root Test

Table 6 Group Unit Root Test Result

	LLC	Breitung	IPS	ADF-Fisher	PP-Fisher	Hadri
	t-statistic (p-value)	**t-statistic** (p-value)	**W-statistic** (p-value)	**Chi-Square** (p-value)	**Chi-Square** (p-value)	**t-statistic** (p-value)
Levels	3.646 (1.000)	6.668 (1.000)	0.330 (0.629)	7.272 (0.924)	6.505 (0.952)	6.466 (0.000)
1st Difference	-1.572 (0.058)	-0.549 (0.291)	-4.224 (0.000)	83.42 (0.000)	81.94 (0.000)	8.343 (0.000)

Source: Authors' Computation

To test the null that the series are non-stationary, we used four individual tests out of which four have proven that the series are all non-stationary at levels but are stationary at the first difference. We therefore reject the null of unit root processes at first difference. However, since most of the focal variables are already in their standardised forms, we proceeded to estimate the data using the OLS technique. The result is presented in Table 9 below.

4.3. Estimation Result and Interpretation

Table 71 Summary of Results of OLS Estimation

Variable	Coefficient	Std Error	t-Statistic	p-Value
PEN_S	0.0002	5.6583	2.8689	0.0153
PEN_I	-1.6579	3.9281	-0.7148	0.4896
FIN_DI	0.1133	0.2269	0.4995	0.6272
GDPGR	-0.0030	0.0013	-2.3933	0.0357
CPI	0.0018	0.0013	-1.3794	0.1952
RENEW	0.0054	0.0007	7.7986	0.0000
R-Squared	0.8078			
Adj R-Squared	0.7204			
S.E. Regression	0.0145			
Log-likelihood	51.5118			
DW Statistic	1.7527			

Source: Author's Computation

The estimated equation is hereunder presented

$$HDI = 0.0002PEN\_S - 1.6579PEN\_I + 0.1122FIN\_DI - 0.0030GDPGR + 0.0018CPI + 0.0054RENEW$$
$$(0.0153)\ (0.4896)\qquad (0.6272)\ (0.0357)\qquad (0.1952)\qquad (0.000)$$

From the estimated equation above, pension savings, GDPGR and renewable energy have a significant impact on human capital development. While pension savings and renewable energy support the development of human capital, GDPGR inhibits human capital development. The latter implies the exploitation of labour through less than commensurate compensation for labour as a factor of production including pension payments. Furthermore, pension investments have no significant impact on human capital development within the period under review. Generally, the percentage impact of the variables on Human Capital Development is very negligible.

On the overall fit of the model, the Adjusted R-squared indicates that about 72% variation in the human capital is explained by the regressors. The regressors are also jointly significant as indicated by the Log-likelihood. The Standard Error of the model is very low while the Durbin Watson statistic of 1.7527 indicates that past levels of development in human capital affect the current state of the same.

4.4. Granger Causality Test Result

Table 82 Granger Causality Test Result

Null Hypothesis:	Obs	F-Statistic	Prob.
CPI does not Granger Cause HDI	19	0.05275	0.9488
HDI does not Granger Cause CPI		2.15865	0.1524
FIN_DI does not Granger Cause HDI	19	2.76188	0.0975
HDI does not Granger Cause FIN_DI		0.67014	0.5273
PEN_I does not Granger Cause HDI	15	0.86189	0.4515
HDI does not Granger Cause PEN_I		0.50620	0.6174
PEN_S does not Granger Cause HDI	18	3.46596	0.0622
HDI does not Granger Cause PEN_S		0.97105	0.4045
RENEW does not Granger Cause HDI	19	1.40550	0.2778
HDI does not Granger Cause RENEW		2.32209	0.1346
FIN_DI does not Granger Cause CPI	19	0.90448	0.4271
CPI does not Granger Cause FIN_DI		3.57875	0.0555
PEN_I does not Granger Cause CPI	15	4.74830	0.0355
CPI does not Granger Cause PEN_I		0.65158	0.5420
PEN_S does not Granger Cause CPI	18	5.95429	0.0146
CPI does not Granger Cause PEN_S		1.63656	0.2323
RENEW does not Granger Cause CPI	19	1.60877	0.2350
CPI does not Granger Cause RENEW		0.11989	0.8879
PEN_I does not Granger Cause FIN_DI	15	5.24476	0.0277
FIN_DI does not Granger Cause PEN_I		0.14034	0.8707
PEN_S does not Granger Cause FIN_DI	18	0.08194	0.9218
FIN_DI does not Granger Cause PEN_S		0.07686	0.9264
RENEW does not Granger Cause FIN_DI	19	1.03005	0.3825
FIN_DI does not Granger Cause RENEW		0.23759	0.7916
PEN_S does not Granger Cause PEN_I	15	0.52694	0.6059
PEN_I does not Granger Cause PEN_S		3.36019	0.0765
RENEW does not Granger Cause PEN_I	15	0.03322	0.9674
PEN_I does not Granger Cause RENEW		0.37777	0.6948
RENEW does not Granger Cause PEN_S	18	1.15921	0.3441
PEN_S does not Granger Cause RENEW		2.66716	0.1070

Source: Author's Computation

From Table 10 above, it is confirmed that pension investments have no significant impact on human capital development in Nigeria. Instead, for the control variables, pension investments have rather caused inflation in the economy. This also confirms the corruption in the management of the industry.

4.5. Residual Diagnostics

Table 93 Breusch-Godfrey Serial Correlation LM Test

Test statistic	Test Value	P-Value
F-statistic	0.1716	0.8450
Ch-Square	0.6246	0.7318

LM Test p-value>0.05 means no serial correlation. Therefore, we cannot reject the null hypothesis of no serial correlation.

Table 40 Test of Heteroskedasticity

Test statistic	Test Value	P-Value
F-statistic	0.5873	0.7341
Obs*R-Square	4.4301	0.6187
Scaled Explained SS	1.3517	0.9687

From Table 12 above, we cannot reject the null hypothesis of homoskedasticity, since the Obs*R-square p-value (0.6187) >0.05

5.0 Conclusion

From the analysis, the investment of pension funds has no significant impact on the owners of the funds (human capital) as there is a lack of investment in workplace financial literacy schemes or healthcare. Employers do not take the enlightenment or awareness creation about retirement seriously. Also, many employees do not even contemplate retirement, and as such, they do not plan for it. This is due to poor retirement welfare. There are tendencies that if given the opportunity some employees could elongate their services due to retirement phobia. The findings collaborate position of Nikolov & Adelman (2020) who found that pensions hurts cognitive functioning at old age. It is responsible for the prevalence of dementia and partial stroke among retirees. In essence, the pension industry has deprecated rather than developing the human capital of nations.

6.0 Recommendation

From the findings of this research, it is recommended that employers step up their financial awareness schemes to enlighten their employees on the benefits of savings and investment for a decent retirement life. This will instill rationality in financial decisions generally and pension decisions, particularly among employees.
It is also recommended that financial literacy be included as a core subject of study in the education curriculum from secondary to tertiary schools.
Finally, it is recommended that a certain percentage of pension investments be tagged to human capital development in the form of education and healthcare delivery endowments for employees and their families.

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References

Ackert, L., & Deaves, R. (2016). Understanding Retirement Saving Behaviour and Improving Pensions. In L. Ackert, & R. Deaves, *BEHAVIOURAL FINANCE: Psychology, Decision-Making, and Markets.* (Vol. 05, pp. 295-318). Mason, Ohio, USA: South-Western Cengage Learning.

Addo, P. M., Guegan, D., & Hassani, B. (2018, April 16). Credit Risk Analysis Using Machine and Deep Learning Models. *Risks, 6*(28), 20. doi:doi:10.3390/risks6020038

Adelakun, O. (2015, Dedember). An Investigation of the Determinants of Savings and Investment in Nigeria. *International Economics and Business, 1*(2). Retrieved January 13, 2020, from

https://www.researchgate.net/publication/286402539

Alonso-García, J. (2017). Adequacy, fairness and sustainability of pay-as-you-go-pension systems: defined benefit versus defined contribution. *The European Journal of Finance*. doi:http://dx.doi.org/10.1080/1351847X.2017.1399429

Alwohaibi, M., & Roman, D. (2018, March 8). ALM models based on second order stochastic. *Computational Management Science, 15*, 187-211. doi:https://doi.org/10.1007/s10287-018-0299-8

Apilado, V. P. (1972). Pension Funds, Personal Savings, and Economic Growth. *The Journal of Risk and Insurance, 39*(3), 397-404. Retrieved July 25, 2018, from https://www.jstor.org/stable/251830

Ashok, T., & Spataro, L. (2016). THE EFFECTS OF PENSION FUNDS ON MARKETS PERFORMANCE: A REVIEW. *Journal of Economic Surveys*, 1.

Bernard, C., & Kwak, M. (2016). Dynamic preferences for popular investment strategies in pension funds. *Scandinavian Actuarial Journal, 2016*(5), 398-419. doi:https://doi.org/10.1080/03461238.2014.954606

Biondi, Y., & Marzo, G. (2013). Decision Making Using Behavioral Finance for Capital Budgeting. In H. K. Baker, & P. English. John Wiley and Sons. doi:DOI: 10.1002/9781118258422.ch22

Boado-Penas, M. d., Godinez-Olivares, H., & Serrano, S. H. (2020). Automatic balancing mechanisms for mixed pension systems under different investment strategies. *European Journal of Finance, 26*(2-3), 277-294. doi:https://doi.org/10.1080/1351847X.2019.1647260

Browning, M., & Crossley, T. F. (2001). The Life-Cycle Model of Consumption and Savings. *Journal of Economic Perspectives, 15*(3), 3-22. Retrieved June 4, 2020, from https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.15.3.3

Byrne, A., Blake, D., & Mannion, G. (2009, December 08). Financial Sophistication and Pension Plan Decisions. *Review of Behavioural Finance, 2*(1), 19 - 36. doi:https://doi.org/10.1002/rbf.7

CBN. (2014). *Pension gaps and solutions.* Abuja: CBN. Retrieved 1 23, 2024, from https://www.cbn.gov.ng/FinInc/regulators.asp

Chan-Lau. (2017). Lasso Regressions and Forecasting Models in Applied Stress Testing. *IMF Working Paper - Institutute for capacity Building, 17*(108). Retrieved May 5, 2020, from https://ideas.repec.org/p/imf/imfwpa/17-108.html

Chan-Lau, J. A. (2005). Pension Funds and Emerging Markets. *Financial Markets, Institutions & Instruments*, 2.

Chen, F., & Peng, X. (2019, October 31). Optimal deterministic reinsurance and investment for an insurer under mean–variance criterion. *Communications in Statistics: Theory and Methods*. doi:https://doi.org/10.1080/03610926.2019.1682165

Chi, Y., & Liu, F. (2017, September). Optimal insurance design in the presence of exclusion clauses. *Insurance: mathematics and Economics, 76*, 185-195. doi:https://doi.org/10.1016/j.insmatheco.2017.07.003

Chow, G. C. (1990, November). Capital Formation and Economic Growth in China. *Econometric Research Program*. Princeton, China: Princeton University. Retrieved July 25, 2018, from https://www.jstor.org/stable/2118409

Christiansen, M. C., & Steffensen, M. (2018, April 25). Around the Life Cycle: Deterministic Consumption-Investment Strategies. *North American Actuarial Journal, 22*(3), 491-507. doi:https://doi.org/10.1080/10920277.2018.1450156

Daly, H. (2022). *This Pioneering Economist Says Our Obsession With Growth Must End.* New York: The New York Times Magazine. Retrieved July 1, 2024, from https://www.nytimes.com/interactive/2022/07/18/magazine/herman-daly-interview.html

Dolan, B. (2023, May 11). *Framing Effect: What It Is and Examples*. Retrieved April 19, 2024, from Investopedia: https://www.investopedia.com/framing-effect-7371439

Ekpulu, G. A., & Bingilar, F. (2016). Pension Fund in Nigeria: An Appraisal. *Quarterly Journal of Contemporary Research, Federal University Otuoke*, 196-209.

Ekpulu, G. A., & Bingilar, F. (2016). Pension Fund in Nigeria: An Appraisal. *Quarterly Journal of Contemporary Research, Federal University Otuoke*, 196-209.

Ennis, F. (2017, April 7). *Pursuing Justice over Pension Scheme Deficits*. Retrieved from Scottish Legal Issues: http://www.scottishlegal.com/2017/04/07/blog-pursuing-justice-over-pension-scheme-deficits/

Folger, J. (2023, April 18). *Best Countries for Pensions and Retirement*. Retrieved November 12, 2023, from Investopedia: https://www.investopedia.com/articles/personal-finance/042914/top-pension-systems-world.asp

Forsyth, P., & Vetzal, K. (2019, April 24). Defined Contribution Pension Plans: Who Has Seen the Risk? *Journal of Risk and Financial management, 12*(70). doi:doi:10.3390/jrfm12020070

Franco, D., Marino, M. R., & Tommasino, P. (2010). Introduction. *Pension Reform, Fiscal Policy and Economic*

Performance (pp. 13-14). Perugia: Banca d'Italia Eurosistema.

Garcia, M. T., Barros, C., & Sylvestre, A. (2011, May 09). Saving Behaviour: Evidence from Portugal. *International review of Applied Economics, 25*(2). doi:https://doi.org/10.1080/02692171.2010.483467

Gellert, A. (2019, January 28). *How to Calculate Net Present Value of a Future Pension*. (R. Cockerham, Editor, C. C. Finance, Producer, & CISI) Retrieved June 4, 2020, from Zacks: https://finance.zacks.com/calculate-net-present-value-future-pension-9929.html

Godinez-Olivares, H., Boado-Penas, M. d., & Habemen, S. (2016, July). Optimal strategies for pay-as-you-go pension finance: A sustainability framework. *Insurance: Mathematics and Economics, 26*, 117-126. doi:https://doi.org/10.1016/j.insmatheco.2016.05.001

Grossman, M. (2000). The Human Capital Model. *Handbook of Health Economics, 1*(Part A), 347-408. doi:https://doi.org/10.1016/S1574-0064(00)80166-3

Hastings, J., & Mitchell, O. S. (2020). How Financial Literacy and Impatience shape retirement wealth and Investment behaviours. *Journal pension Economics and Finance, 19*(1), 1-20. doi:10.1017/S1474747218000227

Hayes, A. (2023, December 11). *The Influence of Temporal Discounting on Decision-Making and Self-Control*. Retrieved December 28, 2023, from Investopedia: https://www.investopedia.com/temporal-discounting-7972594

Hoekstra, T. (2022, February 2). *Pension funds neglect human capital when setting investment policy, say experts*. Retrieved July 5, 2024, from IPE: https://www.ipe.com/pension-funds-neglect-human-capital-when-setting-investment-policy-say-experts/10057788.article

Honea, Z., & Marisennayya, S. (2019). Determinants of Household Consumption Expenditure in Debremarkos Town, Amhara Region, Ethiopia. *AmericanScientific Research Journal for Engineering, Technology, and Sciences*, 124-144. Retrieved December 28, 2023, from https://core.ac.uk/download/276539534.pdf

Jacobius, A. (2020, July 27). *Considerations over 'human capital' growing*. Retrieved September 10, 2024, from Pension Funds: https://www.pionline.com/pension-funds/considerations-over-human-capital-growing

Japelli, T., & Pistaferri, L. (2017). The Economics of Consumption: Theory and Evidence. Retrieved June 4, 2020, from RePEc:oxp:obooks:9780199383153

Jappelli, T. (2005, September). The life-cycle hypothesis, fiscal policy and social security. *PSL Quarterly Review, 63*(233-234), 173-186. Retrieved January 15, 2020, from https://statusquaestionis.uniroma1.it/index.php/PSLQuarterlyReview/article/view/9853/9735

Kassambara, A. (2018, March 11). *Penalized Regression Essentials: Ridge, Lasso & Elastic Net.* Retrieved June 3, 2020, from Statistical tools for high-throughput data analysis: http://www.sthda.com/english/articles/37-model-selection-essentials-in-r/153-penalized-regression-essentials-ridge-lasso-elastic-net/

Kitces, M. (2017, July 19). *Choosing An Appropriate Discount Rate For Retirement Planning Strategies.* Retrieved January 25, 2020, from Kitces: https://www.kitces.com/blog/net-present-value-discount-rate-formula-retirement-plan-pension-lump-sum-or-social-security-breakeven/

Kolsru, J., C. L., Reck, D., & Spinnewijn, J. (2019, October 18). Retirement Consumption and Pension Design. *Pension Design*. London School of Economics. Retrieved June 4, 2020, from http://econ.lse.ac.uk/staff/clandais/cgi-bin/Articles/Retirement_Sweden.pdf

Kumo, W. L. (2012, February 23). *Investment Efficiency, Savings and Economic Growth in Sub Saharan Africa.* Retrieved July 25, 2018, from U.S.A. Economic News: http://usaeconomynews.blogspot.co.uk/2012/02/investment-efficiency-savings-and.html

Kwairanga, S. (2013). IMPACT OF PENSION REFORM ON NIGERIA'S CAPITAL MARKET FROM 2004 - 2008. *International Journal of Accounting and Financial Management Research Vol.3 Issue 4*, 11-20.

Lijian Wang, D. B. (2013). Pension fairness in China. *China Economic Review*, 1. Retrieved July 25, 2018, from https://doi.org/10.1016/j.chieco.2013.11.003

Michael Millar, D. D. (2009). Attitudes, savings choices, level of knowledge and investment preferences of employees towards pensions and retirement planning: survey evidence from Barbados. *Pensions*, 1. Retrieved July 25, 2018

Morina, F., & Grima, S. (2022). The impact of pension fund assets on economic growth in transition countries, emerging economies, and developed countries. *Quantitative Finance and Economics, 6*(3), 459-504. doi:https://doi.org/10.3934/QFE.2022020

NBS. (2022). *2021 Nigeria's Multidimensional Poverty Index (MPI).* Abuja: National Bureau of Statistics. Retrieved August 9, 2024, from file:///C:/Users/hp/Documents/PSL/Research/2024/Pension/Data/ANNUAL/2022%20Nigeria%20Multi

dimensional%20Poverty%20Index_%20Statistical%20Snapshots.pdf

NGX. (2024, August 8). *The Nigerian Stock Exchange Pension Index (NGX-PENSION)*. (Nigerian Stock Exchange) Retrieved August 9, 2024, from African Financial: https://africanfinancials.com/pt-index/ng-xngpen/#:~:text=Index%20Value3%2C637.75%20Today%27s%20Change-8.32%20%2F%20-0.23%25%201%20Year,pension-compliant%20stocks%20listed%20on%20the%20Nigerian%20Stock%20Exchange

NPF Penions Ltd. (2024). *AUDITED ACCOUNTS.* Abuja: NPFPL. Retrieved June 26, 2024, from https://npfpensions.com.ng/audited-accounts/

O'Dea, C. (2018). Insurance, Efficiency and the Design of Public Pensions. *Society for Economic Dynamics.* Retrieved June 4, 2020, from https://economicdynamics.org/meetpapers/2018/paper_1037.pdf

OECD. (2013). Pension at a Glance 2013: OECD and G20 Indicators.

Peijnenburg, K. (2018, October). Life-Cycle Asset Allocation with Ambiguity Aversion and Learning. *Journal of Financial and Quantitative Analysis, 53*(5), 1963-1994. doi:https://doi.org/10.1017/S0022109017001144

PenCom. (2004). *https://www.pencom.gov.ng/pension-fund-administrators/#*. Retrieved 1 26, 2024, from https://www.pencom.gov.ng/pension-fund-administrators/

PenCom. (2023, Septmber 20). *Frequesntly asked questions on the CPS - 2023 Edition.* Retrieved 2 26, 2024, from National Pension Commission: https://www.pencom.gov.ng/category/publications/general-publications/

Pension Talk. (2022). Major Players in the Nigerian Pension Industry and what they do. *Pension Talk*. Retrieved 1 26, 2024, from https://pensiontalk.com.ng/major-players-in-the-nigerian-pension-industry-and-what-they-do/#:~:text=There%20are%20presently%204%20PFCs,UBA%20Pensions%20Custodian%20Limited

PensionNigeria. (2021). *PenCom vs PensionNigeria Report on Return on Investment for all PFAs in Nigeria.* Abuja: PensionNigeria. Retrieved June 26, 2024, from https://www.pensionnigeria.com/pension-news/pencom-vs-pensionnigeria-report-on-return-on-investment-for-all-pfas-in-nigeria/

Perets, G. S., & Yashiv, E. (2015). The Fundamental Nature of HARA Utility. *Discussion Papers 1522.* Centre for Macroeconomics. Retrieved May 23, 2020, from https://ideas.repec.org/p/cfm/wpaper/1522.html

Pettinger, T. (2019, September 15). *Investment and the Rate of Interest*. Retrieved from Economics Help: https://www.economicshelp.org/blog/425/interest-rates/investment-and-the-rate-of-interest/

Popoola, N. (2023). *10 things to know about Contributory Pension Scheme.* Abuja: The Punch Newspaper. Retrieved 1 23, 2024, from https://punchng.com/10-things-to-know-about-contributory-pension-scheme/#:~:text=Nigeria's%20Contributory%20Pension%20Scheme%20introduced,emolument%20for%20the%20employee's%20retirement.

Robinson, C., & Pope, R. (2023). Human Capital Theory. *International Encyclopeida on Education 4th Edition*. Retrieved 6 27, 2023, from https://www.sciencedirect.com/topics/social-sciences/human-capital-theory

Ross, S. (2021, 3 24). *What Is the Human Capital Theory and How Is It Used?* Retrieved from Investopedia: https://www.investopedia.com/ask/answers/032715/what-human-capital-and-how-it-used.asp

Samoszuk, S. (2022, 7 7). *Human Capital Theory Overview & Use.* Retrieved 6 29, 2023, from Study.Com: https://study.com/learn/lesson/human-capital-theory-overview-use.html

Shen, W., Wang, J., & Ma, S. (2014). Doubly Regularized Portfolio with Risk Minimization. *twenty-Eight AAAI Conference on Artificial Intelligence.* Association for the Advancement of Artificial Intelligence. Retrieved from aaai.org/ocs/index.php/aaai/aaai14/paper/view/8286/8570

Singh, A. (1996, April). Pension Reform, the Stock Market, Capital Formation and Economic. *Globalization, Labor Markets, and Social Policy*, p. 1. Retrieved July 25, 2018, from https://www.jstor.org/stable/251830

Skagerlunda, K., Lind, T., Strömbäck, C., Tinghög, G., & Västfjäll, D. (2018). Financial literacy and the role of numeracy–How individuals' attitude and affinity with numbers influence financial literacy. *Journal of Behavioural and Experimental Economics*, 18-25. doi:https://doi.org/10.1016/j.socec.2018.03.004

Tampli, T. (2024, March 06). *Pension Fund Investment Strategy*. Retrieved August 03, 2024, from Finance Strategists: https://www.financestrategists.com/retirement-planning/qualified-retirement-plans/defined-benefit-plan/pension-fund-investment-strategy/

Tamplin, T. (2024, Janiuary 25). *Modern Portfolio Theory (MPT)*. Retrieved August 03, 2024, from Finance Strategists: https://www.financestrategists.com/wealth-management/risk-profile/diversification/modern-portfolio-theory-mpt/

The Economist Intelligence Unit. (2019). *Chile's pension reform makes progress.* The Economist Group.

Thomas, A., Spataro, L., & Matthew., N. (2014). Pension Funds and Stock Market Volatility: An empirical analysis of OECD countries. *Journal of Financial Stability*, 1. Retrieved July 25, 2018, from https://doi.org/10.1016/j.jfs.2014.01.001

UN. (2024). *The 17 SDGs*. Retrieved August 9, 2024, from United Nations: https://sdgs.un.org/goals

UNDP. (2024). *Human Development Index*. Retrieved from UNDP Human Development Report: https://hdr.undp.org/data-center/human-development-index#/indicies/HDI

Wanger, B. (2024). Public Sector Defined Contribution Pension Scheme and Consumption Smoothening in Nigeria. *Economics and Finance, 12*(3), 4-20. Retrieved September 10, 2024, from https://economics-and-finance.com/archive/EF_2024_3(4-20).pdf

Wanger, B., & Akanegbu, B. N. (2023). Impact of Disaggregated Government Expenditure on Human Capital Development in Nigeria 1970 - 2022. *Journal of Economics and Sustainable Development, 14*(14), 45-59. Retrieved from https://www.iiste.org/Journals/index.php/JEDS/article/view/61395/63380

Wanger, B., & Aras, O. N. (2022). Human Capital Development in Nigeria: The Role of Diaspora Remittances. *Journal of Sustainable Business Economics and Finance*. Retrieved September 10, 2024

Zhang, X., & Guo, J. (2020, February). Optimal Defined Contribution Pension Management with Salary and Risky Assets Following Jump Diffusion Processes. *East Asian Journal on Applied Mathematics, 10*(1), 22-39. doi:doi: 10.4208/eajam.301218.170419

Zou, H., & Hastie, T. (2005). Regularization and variable selection via the Elastic Net. *Journal of the Royal Statistical Society, Series B (Statistical Methodology), 67*(Part 2), 301–320. Retrieved June 4, 2020, from https://web.stanford.edu/~hastie/Papers/B67.2%20(2005)%20301-320%20Zou%20&%20Hastie.pdf