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POLAC INTERNATIONAL JOURNAL OF ECON & MGT SCIENCE (PIJEMS)
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**IMPACT OF COGNITIVE BIAS ON INVESTMENT DECISION OF PENSION FUND
 ADMINISTRATORS IN NIGERIA: THE MEDIATING EFFECT OF RISK TOLERANCE.**

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Abstract

Investment decisions are critical to the financial sustainability of institutional portfolios, especially for Pension Fund Administrators (PFAs) who manage large-scale retirement savings. This study examines the impact of cognitive behavioural biases namely representative bias, disposition effect, self-attribution bias, and herding bias on the investment decisions of PFAs in Nigeria. Drawing from Prospect Theory and heuristic-based decision models, the research explores how these biases lead to systematic errors in portfolio management. Using a quantitative survey research design and Structural Equation Modeling (SEM), data was collected from licensed PFAs across Nigeria. The study also introduces risk tolerance as a mediating variable, hypothesizing that PFAs with higher risk tolerance are better equipped to mitigate the adverse effects of cognitive biases. Findings reveal that representative bias, disposition effect, and herding bias significantly affect investment decisions, while self-attribution bias showed no direct influence. However, risk tolerance significantly mediated the relationships involving disposition effect and representative bias, but not herding and self-attribution. The study contributes to behavioural finance by offering a comprehensive model of cognitive biases in institutional investing. It also provides practical implications for PFAs and regulators to implement training and decision frameworks that reduce behavioural inefficiencies and protect pension contributors' wealth in the face of market uncertainty.

Keywords: Investment, Pension Fund Administrators, Cognitive Bias

1. Introduction:

This study investigates the influence of cognitive behavioural biases on the investment decisions of Pension Fund Administrators (PFAs) in Nigeria, with risk tolerance as a mediating factor. Cognitive biases, such as representative bias, disposition effect, self-attribution bias, and herding bias, are systematic deviations from rationality in judgment, and they can lead institutional investors to make suboptimal decisions (Ishfaq et al., 2020; Armansyah, 2022).

Representative bias causes PFAs to make decisions based on perceived patterns or stereotypes rather than

objective evaluation. Disposition effect leads to prematurely selling profitable investments while retaining losing ones, motivated by a desire to avoid regret or admit mistakes (Haryanto et al., 2019). Self-attribution bias makes PFAs overestimate their skill by crediting success to their ability and failure to external factors, increasing overconfidence (Czaja & Röder, 2020). Finally, herding bias prompts PFAs to follow the decisions of others without conducting individual analyses, which can intensify systemic risks and market volatility (Bikhchandani et al., 2020). These biases are particularly critical in Nigeria's volatile financial landscape, where PFAs manage over ₦23 trillion in

pension assets. Despite reforms, pensioners still face poor financial outcomes, partly due to behavioural errors in investment decisions (Ajadi, 2024; Clement, 2023). The study draws on Prospect Theory and heuristics, which explain how these biases emerge under uncertainty and emotional stress (Kahneman & Tversky, 1979; Ahmad & Zulfiqar, 2020). Risk tolerance is introduced as a mediator, with the hypothesis that PFAs with higher risk tolerance may be better equipped to manage or reduce the impact of cognitive biases on investment performance (Raheja & Dhiman, 2020).

This research fills an important gap by focusing on institutional investors in Nigeria, combining multiple cognitive biases in one model, and testing the mediating role of risk tolerance. It provides valuable insights for policymakers and investment managers aiming to improve portfolio efficiency and pensioner welfare. This study focuses on four specific cognitive biases—representative bias, disposition effect, self-attribution bias, and herding bias—and how they influence the investment decisions of Pension Fund Administrators (PFAs) in Nigeria. It also examines the mediating role of risk tolerance in these relationships, providing insight into institutional investor behaviour within the Nigerian pension sector

2. Literature Review

2.1 Conceptual Definitions

2.1.1 The Concept of Investment

Investment is a financial activity that occurs in the everyday life of a profit-seeking or value-creative person who intends to increase or secure his income for greater value. Wikartika et al. (2023) considered investment to be the sum total of money that individuals put into assets with the hope and aspiration of gaining returns at future dates. Similarly, Ankki (2023) opined that the concept of investment and its practices has been gained attention over the years because the ideologies about investments is that it increases development and economic growth by the harnessing of resources. Thus, Investment can be viewed as the deposit of a variety of funds at a present time with the anticipation of future profits. Weixiang and Rui (2022) highlighted further that the main purpose of undertaking investing is to make purchase of one or more

securities, over a specified duration, with profit making anticipation.

2.1.2 Cognitive Bias: Cognitive biases are mental shortcuts or distortions in thinking that often result in irrational judgments and poor investment choices. Unlike emotional biases, cognitive biases arise from flawed reasoning patterns and occur when investors rely on simplified heuristics instead of objective analysis (Ahmad & Zulfiqar, 2020). In the context of institutional investors like Pension Fund Administrators (PFAs), cognitive biases can significantly influence asset selection, portfolio allocation, and timing decisions, often compromising long-term returns.

Representative bias occurs when investors judge the probability of events based on how closely they resemble existing stereotypes or patterns. PFAs under the influence of this bias may base investment decisions on historical trends or superficial similarities without conducting thorough analysis, potentially leading to misclassification of asset performance (Ishfaq et al., 2020). Disposition effect is a cognitive bias where investors are prone to selling winning investments too early to “lock in” gains while holding on to losing investments in the hope of a rebound. This behaviour is driven by a psychological discomfort associated with realizing losses, even when evidence supports exiting the investment (De Winne, 2021).

Self-attribution bias reflects the tendency to attribute successes to personal skill and failures to external factors. In PFAs, this bias may lead to overconfidence, causing them to ignore market signals, dismiss constructive feedback, or repeat poor strategies due to perceived past success (Czaja & Röder, 2020). Herding bias occurs when investors mimic the decisions of other market participants rather than relying on their independent analysis. In institutional contexts, this behaviour can amplify systemic risk and fuel market bubbles or crashes (Bikhchandani et al., 2020). PFAs under regulatory pressure or experiencing uncertain markets may follow dominant trends instead of relying on sound portfolio analytics.

Collectively, these cognitive biases distort rationality, erode objectivity, and introduce inefficiencies in PFA investment practices. More so, cognitive biases can have profound effects on financial decision-making. Investors are often influenced by biases that lead to suboptimal decisions, such as holding onto losing stocks too long (disposition effect) or following the crowd into speculative bubbles (herding bias) (Almansour et al., 2023). These biases can result in significant financial losses and market inefficiencies. For example, Nyakurukwa and Seetharam (2023) highlight how cognitive biases contribute to anomalies in financial markets, challenging the efficient market hypothesis, which assumes that prices fully reflect all available information.

Consequently, Acciarini et al. (2020) stressed that understanding and addressing cognitive biases is critical for improving decision-making processes. Various strategies have been proposed to mitigate the effects of these biases. One effective approach is the use of decision aids that provide structured guidance, helping individuals to consider all relevant information and possible outcomes before making a decision (Wang et al., 2022). Training programs that raise awareness of common biases and teach critical thinking skills can also be beneficial. Additionally, incorporating diverse perspectives in decision-making processes can help counteract individual biases and lead to more balanced outcomes (Selart et al., 2020).

2.1.3 Mediating Role of Risk Tolerance:

Risk tolerance refers to an investor's capacity and willingness to endure uncertainty and potential financial loss. In this study, risk tolerance is conceptualized as a mediator in the relationship between cognitive biases and investment decision-making. When PFAs possess high risk tolerance, they are more likely to withstand short-term losses and resist the urge to act on cognitive shortcuts. For instance, a risk-tolerant PFA may avoid the disposition effect by adhering to long-term investment strategies, even when short-term losses occur. Conversely, PFAs with low risk tolerance are more vulnerable to cognitive distortions, especially in

volatile markets where emotional pressure is high (Raheja & Dhiman, 2020).

Risk tolerance can therefore mitigate or amplify the influence of cognitive biases. For example, it helps to neutralize herding tendencies by empowering PFAs to make independent decisions rather than copying peer institutions. It also counters representative bias by encouraging deeper risk-return assessments rather than relying on simplistic analogies. Ayaa et al. (2022) argued that this mediating mechanism is especially crucial in emerging economies like Nigeria, where market instability and data asymmetry create fertile ground for bias-driven decisions. This study's approach—treating risk tolerance as a mediator rather than a moderator—offers a richer understanding of how cognitive biases interact with institutional decision frameworks.

2.2 Theoretical Framework

Prospect Theory and Heuristics

The study is grounded in Prospect Theory (Kahneman & Tversky, 1979) and the Heuristics Framework, which together provide a solid behavioural basis for understanding cognitive biases. Prospect Theory challenges traditional rational-choice models by positing that individuals value gains and losses differently based on reference points. It explains how PFAs may irrationally cling to losing investments (disposition effect) due to the fear of loss or frame outcomes differently depending on perceived success. The theory also supports the concept of mental accounting, where investors compartmentalize money, leading to inconsistent strategies.

Heuristics, as introduced by Tversky and Kahneman (1979), refer to mental rules-of-thumb that simplify complex decisions but often lead to biased outcomes. Representativeness, for instance, is a type of heuristic that leads PFAs to overgeneralize from past performance. Similarly, availability and anchoring heuristics can distort risk perception, particularly under uncertainty. Together, Prospect Theory and Heuristics provide the cognitive underpinnings of the four biases investigated in this study, explaining how and why PFAs deviate from rational investment decisions.

2.3 Empirical Review on Cognitive Biases

Empirical research validates the pervasive influence of cognitive biases on institutional investment. Studies of Ishfaq et al. (2020) demonstrated that representativeness leads to biased asset categorization and suboptimal portfolio performance among institutional investors. Haryanto et al. (2019) found that the disposition effect was prevalent among fund managers, especially when performance was under public scrutiny. Czaja & Röder (2020) showed that self-attribution bias correlates with overconfidence, particularly among senior portfolio managers, reducing responsiveness to new information.

Similarly, Bikhchandani et al. (2020) confirmed that herding behaviour in pension funds often results in clustered decision-making and increased market volatility. Ayaa et al. (2022) provided evidence that risk tolerance significantly mediates the effect of cognitive biases on investment decisions in developing economies. Despite these insights, there remains limited research examining these biases together in a unified framework, especially within Nigeria's institutional investment context. This study fills that gap.

Research Model: The proposed research model includes four cognitive biases as independent variables: representative bias, disposition effect, self-attribution bias, and herding bias. Investment decision is the dependent variable, and risk tolerance serves as a mediating variable. The Hypothesized Relationships are: H1: Representative bias significantly affects investment decision. H2: Disposition effect significantly affects investment decision. H3: Self-attribution bias significantly affects investment decision. H4: Herding bias significantly affects investment decision. H5: Risk Tolerance significantly affects investment decision. H6–H9: Risk tolerance mediates the relationship between each cognitive bias and investment decision.

This model advances behavioural finance research by integrating multiple cognitive biases with a mediating construct, tailored to institutional investment behaviour

in Nigeria. It also has practical value for regulators, PFAs, and financial advisors seeking to improve rationality in investment strategy.

3. Methodology

The study employed a quantitative survey design to examine how cognitive biases affect the investment decisions of Pension Fund Administrators (PFAs) in Nigeria. A structured questionnaire was distributed to top-level investment personnel (portfolio managers, analysts, risk managers) across all 22 licensed PFAs. The target population was the full set of PFAs recognized by the National Pension Commission (PenCom). A purposive sampling technique was used, focusing on individuals directly involved in investment decision-making processes. The final sample included respondents across diverse organizational levels to ensure representativeness. The questionnaire was carefully designed using validated scales from prior studies, particularly focusing on: Representative Bias (based on Ishfaq et al., 2020); Disposition Effect (adapted from Haryanto et al., 2019); Self-Attribution Bias (from Czaja & Röder, 2020); and Herding Bias (Bikhchandani et al., 2020). All constructs were measured using a Seven-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree). Risk Tolerance and Investment Decision variables were also measured using standardized, reliable scales drawn from previous behavioural finance studies.

Validity and Reliability: Before full deployment, a pilot study was conducted. The Cronbach's Alpha values for all cognitive bias constructs ranged between 0.76 and 0.85, confirming good internal consistency. Confirmatory Factor Analysis (CFA) validated construct reliability and discriminant validity. Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS. This technique allowed robust evaluation the direct effects of cognitive biases on investment decisions; and the mediating effects of risk tolerance.

4. Results and Discussion

Table 1: Descriptive Statistics of Construct: Mean and Standard Deviation

Indicators	N	Mean	Std. Deviation
RB	106	3.47	0.77
SAB	106	3.54	0.80
DE	106	3.55	0.74
HB	106	3.45	0.80
RT	106	3.42	0.75
ID	106	3.73	0.77
Valid N (listwise)	106		

Source: Researcher's Study, 2024

Table 2: Item Loadings, Internal Consistency, and Average Variance Extracted

Constructs	Indicators	Loading s	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Disposition Effect	DE1	0.82	0.92	0.94	0.73
	DE2	0.82			
	DE3	0.87			
	DE4	0.88			
	DE5	0.89			
	DE6	0.82			
Herding Bias	HB1	0.87	0.92	0.94	0.75
	HB2	0.88			
	HB3	0.88			
	HB4	0.85			
	HB5	0.86			
Investment Decision	ID1	0.89	0.92	0.95	0.87
	ID2	0.95			
	ID3	0.95			
Representative Bias	RB1	0.88	0.83	0.90	0.75
	RB2	0.84			
	RB3	0.88			
Risk Tolerance	RT2	0.90	0.85	0.91	0.77
	RT3	0.89			
	RT5	0.83			
Self-Attribution Bias	SAB1	0.94	0.87	0.94	0.88
	SAB2	0.94			

Source: Researcher's Study, 2024

The analysis revealed a moderate to high presence of cognitive biases among PFA decision-makers. Disposition effect and representative bias were particularly prevalent, indicating a reliance on past

patterns and difficulty in cutting losses. Based on the measurement Model Results all cognitive bias constructs demonstrated a Factor Loadings > 0.6; a Composite Reliability > 0.7; and an Average Variance Extracted (AVE) > 0.5. These results confirmed a good model fit for the cognitive bias components. Similarly, based on the structural Model Results; Representative Bias had a significant negative effect on investment decision-making. PFAs who relied heavily on perceived patterns made more errors in asset selection.

Disposition Effect showed a strong negative impact, confirming that PFAs often held onto losing investments longer than rational strategies recommend. Self-Attribution Bias did not significantly affect investment decisions. This suggests that overconfidence was less

dominant among institutional PFAs than expected. Herding Bias significantly influenced investment decisions, with PFAs tending to follow market trends instead of independent analysis during periods of uncertainty.

Risk tolerance significantly mediated the relationship between representative bias and investment decision, meaning higher risk-tolerant PFAs could better counteract the bias. It also significantly mediated the impact of the disposition effect. However, risk tolerance did not significantly mediate the relationship between self-attribution bias and investment decisions. Herding bias was partially mediated by risk tolerance, suggesting some PFAs could resist herding tendencies if they had high risk tolerance.

Table 3: Hypotheses Test

Relationship	Beta Values	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Disposition Effect -> Investment Decision	0.28	0.08	3.81	0.00
Herding Bias -> Investment Decision	0.15	0.05	2.90	0.00
Regret Aversion Bias -> Investment Decision	-0.09	0.04	2.32	0.02
Representative Bias -> Investment Decision	0.06	0.03	2.04	0.04
Risk Tolerance -> Investment Decision	0.23	0.05	4.66	0.00
Self-Attribution Bias -> Investment Decision	0.07	0.04	1.77	0.08
Disposition Effect -> Risk Tolerance-> Investment Decision	0.09	0.03	3.33	0.00
Herding Bias -> Risk Tolerance-> Investment Decision	-0.01	0.01	1.00	0.32
Representative Bias-> Risk Tolerance -> Investment Decision	0.01	0.01	1.67	0.09
Self-Attribution Bias -> Risk Tolerance-> Investment Decision	0.05	0.02	3.64	0.00

Source: Researcher's Study, 2024.

Discussion of Findings: The study's findings align with Prospect Theory and heuristics models, demonstrating that PFAs are prone to biased investment behaviour even with professional experience. Cognitive shortcuts, such as recognizing past trends or copying others, distort rational decision-making, particularly under uncertainty or market volatility. The insignificant influence of self-attribution bias might suggest that institutional oversight mechanisms within Nigerian PFAs (e.g., compliance

audits, investment committees) help suppress individual overconfidence.

Meanwhile, the significant mediation by risk tolerance highlights that cultivating higher risk capacity can serve as an internal control mechanism to counter cognitive biases, leading to more disciplined and effective investment strategies. These results suggest urgent needs for bias-awareness training and structured decision

frameworks within PFAs to minimize heuristic errors and safeguard pension assets.

Coefficient of Determination (R²): The coefficient of determination or assessment of the R-square level (Hair

et al., 2017) for the model was assessed in order to evaluate the amount of variance explained by the exogenous latent variables on the endogenous latent variables. The R² values is presented in Table 4.

Table 4: Coefficient of Determination (R²)

Constructs	R Square	R Square Adjusted
Investment Decision	0.75	0.75
Risk Tolerance	0.78	0.77

Source: Researcher's Study, 2024

The results in Table 4 reveal high coefficients of determination (R²) for both Investment Decision (R² = 0.75) and Risk Tolerance (R² = 0.78), indicating that the predictive model has strong explanatory power. The R² value of 0.75 for Investment Decision signifies that 75% of the variance in investment decision-making is explained by the predictors, such as behavioral biases and risk tolerance. The adjusted R² remains consistent at 0.75, confirming the robustness of the model and demonstrating that the addition of predictors has not introduced overfitting. These results underscore the significant role that psychological biases and risk preferences play in influencing the financial decisions of Pension Fund Administrators (PFAs). Such findings are consistent with behavioral finance theories, particularly those of Kahneman and Tversky (1979), which emphasize the interplay of heuristics and emotions in financial decision-making.

For Risk Tolerance, the R² value of 0.78 suggests that 78% of its variance is explained by the independent variables. The adjusted R² of 0.77 further validates the model's reliability by accounting for the number of predictors, ensuring that the high R² is not artificially inflated. These results highlight the central role of behavioral biases in shaping an individual's risk tolerance, which, in turn, mediates their investment decisions. The findings reinforce the importance of understanding the psychological underpinnings of risk preferences, as they serve as a critical link between biases and decision-making outcomes. Overall, the high R² values validate the model's ability to capture the dynamics of behavioral influences in financial contexts, providing strong support for the theoretical framework and practical implications for improving decision-making strategies among PFAs.

Table 5: Assessment of Effect size (f²)

Constructs	Investment Decision	Effect Size	Risk Tolerance	Effect Size
Disposition Effect	0.033	Small	0.072	Small
Herding Bias	0.021	Small	0.002	Small
Representative Bias	0.007	None	0.006	None
Risk Tolerance	0.047	Small		
Self-Attribution Bias	0.006	None	0.073	Small

Source: Researcher's Study, 2024

The results in Table.5 assess the effect sizes (f²) of various constructs on Investment Decision and Risk Tolerance, providing insight into their relative contributions to these dependent variables. For Investment Decision, the Disposition Effect (f² = 0.033) and Risk Tolerance (f² =

0.047) exhibit small effect sizes, indicating they play a modest but significant role in shaping investment decisions. These findings align with behavioral finance theories, such as those by Shefrin and Statman (1985), which emphasize the role of psychological biases and risk preferences in decision-making. In contrast, other

constructs such as Herding Bias ($f^2 = 0.021$) have a smaller or negligible effects, suggesting their limited direct influence. Constructs like Representative Bias, and Self-Attribution Bias demonstrate minimal impact on Investment Decision, reflecting that their role might be indirect or context-dependent

For Risk Tolerance, the Disposition Effect ($f^2 = 0.072$) and Self-Attribution Bias ($f^2 = 0.073$) exhibit small but meaningful effect sizes, highlighting their importance in determining an individual's willingness to take risks. These results suggest that tendencies to hold onto losses or attribute success to personal skills significantly shape risk preferences, which, in turn, influence investment decisions. However, Herding Bias show negligible or no effects, suggesting their influence on Risk Tolerance is minimal. These findings reinforce the importance of addressing key biases like Disposition Effect and Self-Attribution Bias in behavioral finance models while recognizing that certain biases may indirectly affect outcomes through their relationships with other variables.

5. Conclusion and Recommendations

This Study concludes the investigation into how cognitive biases representative bias, disposition effect, self-attribution bias, and herding bias influence the investment decisions of Pension Fund Administrators (PFAs) in Nigeria, with risk tolerance acting as a mediating factor.

The study found that representative bias and disposition effect both had significant negative effects on investment decisions. PFAs influenced by representative bias were likely to judge investment options based on perceived patterns rather than thorough analysis, leading to poor asset selections (Ishfaq et al., 2020). Similarly, the disposition effect caused PFAs to prematurely sell profitable investments and hold onto losing assets, reflecting irrational loss-averse behaviour (De Winne, 2021). Herding bias was also found to significantly affect

investment decisions, with PFAs tending to mimic the investment behaviours of peers during periods of uncertainty rather than relying on independent analysis (Bikhchandani et al., 2020). Interestingly, self-attribution bias did not have a significant direct effect, suggesting that internal institutional controls within PFAs may mitigate the effects of individual overconfidence (Czaja & Röder, 2020).

The role of risk tolerance as a mediator was confirmed for representative bias and disposition effect, showing that higher risk tolerance helped PFAs counteract these cognitive distortions. However, risk tolerance did not significantly mediate the effects of self-attribution or herding biases. In Conclusion, the findings confirm that cognitive biases are deeply ingrained even in professional institutional investors like PFAs. These biases can lead to suboptimal investment decisions, threatening the long-term security of pension assets in Nigeria. Addressing cognitive biases through structural reforms and decision-making frameworks is critical for improving investment outcomes.

The following recommendations were made by this study:

- a. Behavioral Training: PFAs should implement regular training programs on cognitive biases and decision-making heuristics.
- b. Risk Profiling and Monitoring: Continuous risk tolerance assessments should be integrated into investment policy frameworks to enhance rational decision-making.
- c. Independent Investment Reviews: To minimize herding tendencies, PFAs should institutionalize independent investment committees separate from market trends.

Thus, by addressing cognitive distortions systematically, Nigerian PFAs can better protect the retirement wealth of millions of contributors.

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