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Heuristic Bias And Risk Tolerance On Individual Investment Performance In Nigeria: Moderating Role Of Financial Literacy

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ABSTRACT
Investment decisions are viewed as a deliberate and rational investment process based on information availability. Heuristics factors are simple rules of thumb that explain how individuals make investment decisions, make judgments, and solve problems when confronted with complex situations which include incomplete information. This study looked into the effects of heuristic factor (HF) and risk tolerance (RT) on investment performance.: the role of financial literacy (FL) as a moderator. This study's population consists of 460 active individual investors in Kaduna city in the first quarter of the year 2023. A total of 460 questionnaires were distributed, with 349 valid. A census method of sampling was used, and primary data was collected using a self-administered questionnaire and an online Google form. A 7-point Likert scale that ranged from '1' "Extremely Agree" to '7' "Extremely Disagree" was used. Smart-PLS version 4 was used to analyze the data. The study found that the heuristic factor has a positive and significant effect on investment performance (IP), whereas financial risk tolerance has an insignificant negative impact on investment performance (IP). Financial literacy has a positive but significant impact on investment performance. Furthermore, the moderating effect of financial literacy demonstrates that the heuristic factor has a significant and positive impact on investment performance. Risk tolerance hurts investment performance. Results emanating from the study show that HF helps investors make better investment decisions, the study recommends that investors should reduce their risk tolerance levels while maintaining the heuristic behavioral bias factors.

Keywords: *Heuristic Bias, Risk Tolerance, Investment performance, Financial Literacy, Nigeria*

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I. Introduction

The capital market is referred to as the different markets where publicly traded company shares or stocks can be bought and sold. These kinds of financial transactions occur within formal exchanges and also over-the-counter markets that adhere to a set of standards. The capital market brings traders of securities together to communicate and transact on securities matters. The stock market help in the discovery of corporate share prices and serves as an index in a country economy. Behavioral finance is concerned with the psychological decision-making processes of market participants who may engage in irrational behavior. There are numerous behavioral factors that can influence investor decision-making, which include heuristic theory and financial risk tolerance.

Heuristic is a mental bias that determines the likelihood of future outcomes within a short time (Sarin & Chowdhury, 2017). More so, it is widely acknowledged that individual investors frequently have insufficient information to make broad investment decisions, but they consistently make the correct choice (Adeleke et al, 2020). Financial risk tolerance is the maximum level of uncertainty that can be tolerated while making an investment decision (Bayar et al., 2020). The financial literacy is a personal feature of an individual with certain financial skills, knowledge and ability that allow sound financial decision.

The motivation for this study is as a result of the importance of heuristic bias attributed to investors when making investment decision which plays a vital role in determining investment performance. Thus, heuristic bias involves the purchasing of high priced stocks due to the tendency of investors overconfidence, anchoring, and availability bias toward investment decision. The investors biasness of always wanting to sell winning stock quickly and holding on to losing stock for too long, which may have an adverse effect on investment performance because of market uncertainty. In April 2023, an indigenous conglomerate corporation in Nigeria, Transcorp Plc,

disclosed that an investor bought 6.2 percent stake of the corporation stocks. This disclosure came amidst reports that the company's shares have been witnessing continuous purchase bargain in the capital market. Thus, after 15 days of acquiring the shares, the investor sold his shares to the chairman of Transcorp Plc and to be paid on instalments. Thereafter, the Transcorp plc recorded a 9.9% drop from its previously closing price of ₦3.12 Naria to ₦2.81 per share on Friday April 28, 2023. Thus, this heuristic behavior of the investor has affected the company; market value. Therefore, heuristic biases could have effect on investor gains, losses, and the firms. For example, the overconfidence bias has cost investors a lot of money and this made them more vulnerable to high risk due to high level of trading as a result of investors overconfidence and misinformation from business associates, families and friends which could lead to poor investment performance in the long run.

This study is important for emerging markets like Nigeria because heuristic biases have influence on investor gains or loss. For example, the overconfidence bias can cause investors to incur high brokerage fees and make investors vulnerable to large losses because investors trade frequently without sufficient knowledge in financial skills (Parveen et al., 2020). Prior studies have gathered evidence of the influence of heuristic biases on investor performance. However, most researchers concentrated on the direct effect on heuristic biases on investment performance (Rasool & Ullah, 2019). Therefore, this study considered financial literacy as a moderator. Understanding the moderating structures of financial literacy allows for better decision regarding investment (Peloza, 2009). In this regard, this study investigated the financial literacy as moderating mechanisms as they relate to heuristic biases, risk tolerance, and investment performance.

Furthermore, the findings of this study could assist various Nigerian investors in understanding the impact of investment decisions based on heuristic biases, in addition, this study may guide investors on the right attitude toward risk attitudes, and financial literacy. This study's findings will also help policy makers develop operational guidelines. For regulating the effect of heuristic biases on investment decision based on the previous thorough review of relevant empirical studies, It is clear that few studies on heuristic factors, risk tolerance, and investment performance have been conducted in Nigeria. Thus, the aim of this research is to look into how financial literacy affects the heuristic factor and risk tolerance on investment performance. To this end, the following questions were answered; Does heuristic factor affect investment performance? Does risk tolerance affect investment performance? how does financial literacy influence the heuristic factors and risk tolerance on investment performance? The objectives of the study examine the effects of heuristic factor and risk tolerance on investment performance: moderating role of financial literacy.

In line with this research study objectives, the following hypotheses were developed in null form,

H_{01}: Heuristic factor has no significant influence on investment performance

H_{02}: Riks tolerance has no significant impact on investment performance

H_{03}: Financial literacy has no significant impact on investment performance

H_{04}: Financial literacy has no significant moderating effect on the influence of heuristic factor and risk tolerance on investment performance

II. Literature Review

Investment performance is an individual self-analysis on the return on shares invested in a company (Hassan et al., 2017). Accordingly, individual investors who make a higher amount of transactions might lead to greater returns on investment than individuals with fewer transactions (Hamidon & Kehelwalatenna, 2020). Hence, Investment performance is determined by the rate of the return of stocks in terms of volume and price, as well as the satisfaction on the investment. According to Rajeshwaran (2020) the calculation of the rate of return demonstrated that investment performance can be evaluated objectively or subjectively.

Heuristic theory argues that the heuristic bias are cognitive shortcuts learned through experience that clarify how decisions are made and problems are solved by investors, particularly when confronted with complex problems with incomplete information (Kasoga, 2021). Hence, Anchoring, availability, and representativeness, gamble fallacy and overconfidence are the five heuristics factors that could help investors make decisions.

According to Mikołajek (2021) representative heuristic takes place when a person chooses a thing based on its recognizability, thereby requiring the least amount of effort or information to make a decision. The availability bias occurs when a decision is made because the information available is easily retrieved. The anchoring heuristic is used in decision making when an estimated value is required. Overconfidence bias refers to an investor's tendency to overestimate their expertise or abilities (Shabarisha, 2015). Gamblers the fallacy bias occurs when investors incorrectly predict that the trend will reverse (Waweru et al., 2008).

Empirical Literature

Zain ul Abdin et al. (2022) evaluated the impact of overconfidence bias on investment performance of investors in the Pakistan Stock Exchange. The study used mixed-method approach, that is both qualitative and quantitative research techniques were applied. The study used 1000 questionnaires which were administered to individual investors and 400 individuals participated in the study. The total number of samples duly filled and

returned were 378. The study employed purposive sampling method. The findings revealed that overconfidence bias was positive with a significant impact on investment performance.

Naveed and Taib (2021) assessed the impact of behavioral biases like overconfidence bias and self-attribution bias and information acquisition on individual investors' decisions. The population of the study is the individual investors trading in Pakistan Stock Exchange (PSX) online and on the floor of the exchange, which is located in Lahore, Islamabad, and Karachi. PSX's. The CEO, Richard Morin gave an interview that as of 2018 the population of individual investors in Pakistan was around 250,000 and the valid sample size was 390. A cluster sampling technique was employed for the study. Five-point Likert scale and Statistical Package for Social Sciences (SPSS), was employed for data analysis; and the Smart-PLS software was used for Partial Least Square Structural Equation Modelling (PLS-SEM). The findings of this study confirmed that behavioral biases (overconfidence bias and self-attribution bias) have a significant and negative influence on individual investors' decisions.

Oyaro and Nasution (2021) investigated the effect of heuristic factor on investment performance in the Securities Exchange of Nairobi. The study employed a survey research design and targeted 1,196,995 individual investors. 400-sample size was arrived at with the support of Slovin's formula. The study used primary data and a convenient sampling method. The study used the simple linear regression model and the hierarchical linear regression model. According to the findings, the heuristic factor has a positive and significant impact on investment performance. Furthermore, Cao et al. (2021) assessed the effect of heuristic factor on individual investors' investment decisions and investment performance in the Vietnam stock exchange market. The study sample size was 250 investors that participated in the survey. The study processed and analyzed the collected data through the support of SPSS and AMOS statistical instrument. the findings of the study revealed that heuristics have a positive and significant influence on investment performance.

Tuffour et al. (2020) investigated the impact of financial literacy on the performance of small-scale businesses in Ghana's La Nkwantanang Madina Municipality. The study collected primary data from 200 small-scale managers through structured questionnaire. The study employed a cross-sectional survey design. The PLS-SEM method was used to estimate the study's structural model. The study's findings indicated that financial literacy has a significant effect on firm performance. Furthermore, financial literacy has a significant positive effect on investment performance.

Jiang et al. (2020) investigated the effect of financial literacy on the investment outcomes of retail mutual fund investors. In the study, the ordered logit model was used. The sample size was 30,051 individual Chinese investors in open-end mutual funds. The research stated that investors with a higher level of education and more investment experience have greater financial literacy. The study found that having a high literacy level has a significant influence on investment performance. In addition, Ahmad etal. (2021) investigated the effect of heuristic factor on investment performance of investors trading on the Pakistan stock market. The study used primary sources of data collection and 500 questionnaires were administered to the respondents through the brokerage firms out of which 400 returned and 352 were valid for use for the study. Hayes Process tool and the AMOS software were used to analysis the collected data. The study adopted a convenience sampling technique. The findings showed that heuristic factor has a significant and positive effect on investment performance.

Siraji (2019) investigated the impact of heuristic biases on individual investment performance on the Colombo Stock Exchange. From a population of 520 questionnaires distributed at random from November 2018 to February 2019, 448 questionnaires were received, for a total of 425 valid questionnaires. Multivariate analyses were used for the study. Findings from the study revealed that heuristics biases such as anchoring, availability bias, overconfidence and representativeness bias have statistically significant effect on investment performance, but not significantly for gamblers' fallacy. Furthermore, Kusumaningrum et al. (2019) examined the influence of financial literacy, risk tolerance, and investment experience on investment decisions. The study used a quantitative approach with the aim to quantify collected data, and the questionnaire were sourced through the primary data. The population of the study was novice investors in the Economic faculty, at Universitas Negeri Surabaya. The study used a random sampling technique. The data of the study were analyzed using partial least square analysis. Findings from the study revealed that financial literacy has a negative and insignificant influence on investment decisions.

Siraji (2019) investigated the effect of heuristic bias on investment performance from individual investors in the Colombo Stock Exchange. The study considered heuristics biases which include anchoring, availability bias, gamblers fallacy, overconfidence and representativeness. The study used a standard questionnaire and was divided into three sections. The quantitative approach survey was adopted on the registered individual investors at CSE. From the population, 520 questionnaires were distributed randomly and only 448 questionnaires were received and a total of 425 valid questionnaires were considered for analysis after filling out the incomplete questionnaires. Multivariate analyses and Structure Equation Modelling (SEM) were used for the study. Findings from the study revealed that overconfidence has a negative and statistically significant effect on investment performance based on the empirical study reviewed.

Marwa and Meryem (2018) assessed the impact of heuristic bias (overconfidence) on the performance of Tunisian UCITS. The study used mixed methods; qualitative and quantitative methods. The sample of the study consisted of 22 mixed UCITS and 18 bond UCITS that have been operating from February 2005 until December 2015. This formed a total of 40 UCITS. The population of the study represented 40 UCITS surveyed, and the sample was 34 UCITS who agreed to answer the questionnaire, this represented an 85 percent acceptable answers rate. The study used the SPSS software 13.0 to analyze the data and the regression model was used for the study. The result showed that overconfidence has a negative and insignificant impact on investment performance.

In conclusion, Onosumu et al. (2017) examined the effect of risk tolerance on portfolio returns. Their study sample comprising of 279 investors who traded at the Nairobi Securities Exchange. The study employed secondary data to measure risk tolerance levels for equity portfolios held by individual investors. The study used primary data collected using questionnaires and secondary data (share prices). The data were re-analyzed using ANOVA and regression analysis. The findings of the regression results indicated that risk tolerance has a significant positive effect on portfolio returns.

III. Methodology

The study employed survey research design, with 460 active investors in Kaduna city obtained from the Central Securities Clearing System Plc data base in the first quarter of 2023. A census sampling technique was used. The study used a primary data and the data was administered through self-administered questionnaire and online google form. Out of the 460 respondents, 33 copies of the questionnaires were invalid due to missing information, 78 copies were not re turned, and 349 were validly returned. Thus, the retuned 349 questionnaires are sufficient for the analysis and generalization of the result findings. 7-point Likert scale, ranging from '1' "Extremely Agree" to '7' "Extremely Disagree" was employed. SPSS version 20 was employed to analysie the demographic characteristics and PLS-SEM technique were used for data analysis.

Presented below are the models used to test the hypotheses;

$$\mathbf{IPit = \beta 0 + \beta_1 HFit + \beta_2 FRTit + \varepsilon \text{ ----------i}}$$

$$\mathbf{IPit = \beta 0 + \beta_1 HF*FLit + \beta_2 FRT*FLit + \varepsilon \text{ ----------ii}}$$

Where: IP = Investment Performance, HF= Heuristic Factor, FRT= Financial Risk Tolerance, FL= Financial Literacy, i= number of investors, observation, 1- - 4, t= time periods, β_0= Intercept of the model "Constant", Є =is the error component, β= 1, 2, are the estimate parameters

Table 1

Variables and its Components, Measurement and Sources

Variables	Components	Measurement	Sources
Dependent			
Investment Performance	i) Dividend yield ii) Stock appreciation	7-Likert Scale	(Siraji, 2019)
Independent			
Heuristic Factor	i) Availability factor ii) Overconfidence iii) Anchoring	7-Likert Scale	(Kasoga, 2021)
Financial Risk Tolerance	i) low risk tolerance ii) Average risk tolerance iii) High risk tolerance	7- Likert Scale	(Bayar etal. 2020)
Moderator			
Financial Literacy	i) Financial knowledge ii) Financial planning	7- Likert Scale	(Rasool & Ullah, 2020)

Source: Research Work (2023)

IV. Result and Discussion

The study used SPSS and Smart PLS tool of analysis data and result were presented. SPSS was used to demonstrate the demographic attributes of the respondents in Kaduna city. Also, Smart-PLS 4 was used to investigate the moderating role of financial literacy on the effect of heuristic factor and financial risk tolerance on investment performance. In accordance with the findings, 58.5% consisted of males and 41.5% were females. In addition, the analysis revealed that 4.9% were within the ages of 18–30. And 36.7% were within the ages of 31–40. 32.1% were within the range of 41 – 50 and the aged 51 and above were 26.4%t. Furthermore, the respondents with Basic and Secondary levels of education represent 1.7% of the total. 30.7% have a Tertiary

Education (B.Sc and HND) while Postgraduate educational qualifications such as Master and PhD comprised 67.6%.

Table 2
Demographic Characteristics

Variables	Frequency	Percentage
Gender		
Male gender	204	58.5
Female gender	145	41.5
Educational Qualification		
Secondary	6	1.7
BSc & HND	107	30.7
Master & PhD	236	67.6
Total Respondents	**349**	**100**

Source: SPSS 20 Result Output

Descriptive statistics

The descriptive statistics as shown in table 3, has 349 is the observation of the study and no missing data. The minimum and maximum value assigned is 1 to 7 representing extremely agree to extremely disagree in the study respectively. From the study, the heuristic factor, financial literacy and risk tolerance show a min to max value from 1 to 5 respectively while the investment performance revealed the min and max value of 1 to 7, with a high standard deviation.

Table 3
Descriptive statistics

Constructs	Observations	Mean	Median	Min	Max	Std dev	kurtosis	Skewness
FL2	349.000	2.768	3.000	1.000	5.000	0.973	0.315	0.067
FL3	349.000	2.716	3.000	1.000	5.000	1.077	-0.265	0.169
FRT1	349.000	2.576	3.000	1.000	5.000	0.965	-0.140	0.129
FRT2	349.000	2.218	2.000	1.000	6.000	0.986	1.583	0.974
FRT3	349.000	2.768	3.000	1.000	5.000	0.973	0.315	0.067
HF1	349.000	2.768	3.000	1.000	5.000	0.973	0.315	0.067
HF2	349.000	2.716	3.000	1.000	5.000	1.077	-0.265	0.169
HF3	349.000	2.507	3.000	1.000	5.000	0.929	0.167	0.291
IP1	349.000	3.275	3.000	1.000	7.000	1.048	2.061	0.690
IP2	349.000	3.352	3.000	1.000	7.000	1.379	0.203	0.547

Source: Smart-PLS.4

Evaluation of the Measurement Model

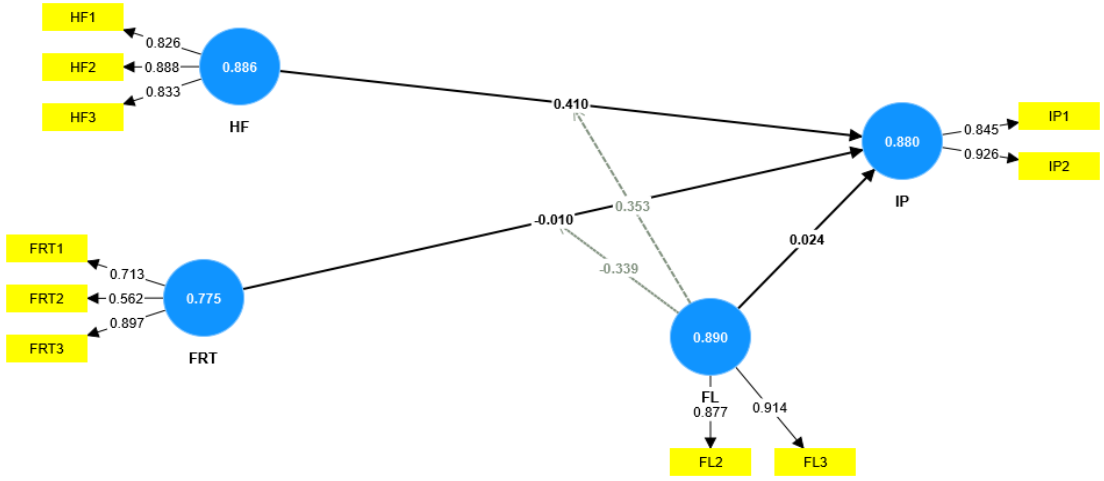

Figure I
Source: Smart-PLS.4

Reliability and Validity of Constructed Model

Cronbach's Alpha (CA) was used to assess the research's reliability; financial literacy was 0.756, financial risk tolerance was 0.602, heuristic factor was 0.806, and investment performance was 0.735. This implies a good internal consistency of reliability of the study and it is accepted. According to Kanagasabai and Aggarwal (2020) reliability values of 0.60 is acceptable. The Composite reliability (CR) for each construct was computed and in all cases the CR was above the minimum threshold of 0.70, this showed that variables have acknowledged and acceptable values. AVE of all latent constructs were in the range between 0.50 (financial risk tolerance) and 0.80 (financial literacy) which were above the recommended threshold of 0.50, which is an indicator of strong convergent validity. Therefore, the table 3 result shows that the constructs are all reliable and valid for the study. The result of the pilot test indicated that composite reliability (CR) for all the reflective constructs were greater than 0.7 except for Skills and ability to communicate financial concept (FL1) which was below 0.7 and was deleted.

Table 3

Assessment of Measurement Models

Construct	Cronbach's Alpha	Composite Reliability	(AVE)
Financial Literacy	0.756	0.890	0.803
Financial Risk Tolerance	0.602	0.775`	0.543
Heuristic Factor	0.806	0.886	0.721
Investors Performance	0.735	0.880	0.786

Source: Smart-PLS.4 Result Output

Quality Criteria

Table 4 shows the quality criteria which was determined by the value of R^2 of dependent variable, the acceptable level of R^2 is 0.25, 0.50 and 0.75, which is indicated as weak, moderate and significant respectively. The results represent that there is 23.4% variance in investment performance and the rest of 76.6% is determined by variables not considered in the model. The weak predictive accuracy is because only two independent variables were used, and this can be concluded that the model is sufficient predictive accuracy as the values exceed the threshold level of 0.1.

Table 4

Predictive Accuracy of the Model

Construct	R^2	Adjusted R^2
Investors Performance	0.234	0.223

Source: Smart-PLS.4 Result Output

Structural Equation Model

In order to find the effect of the exogenous variables (heuristic factors and financial risk tolerance) on the endogenous (investment performance), and moderator (financial literacy), the SMART-PLS version 4, was used to analyse the structural equation model.

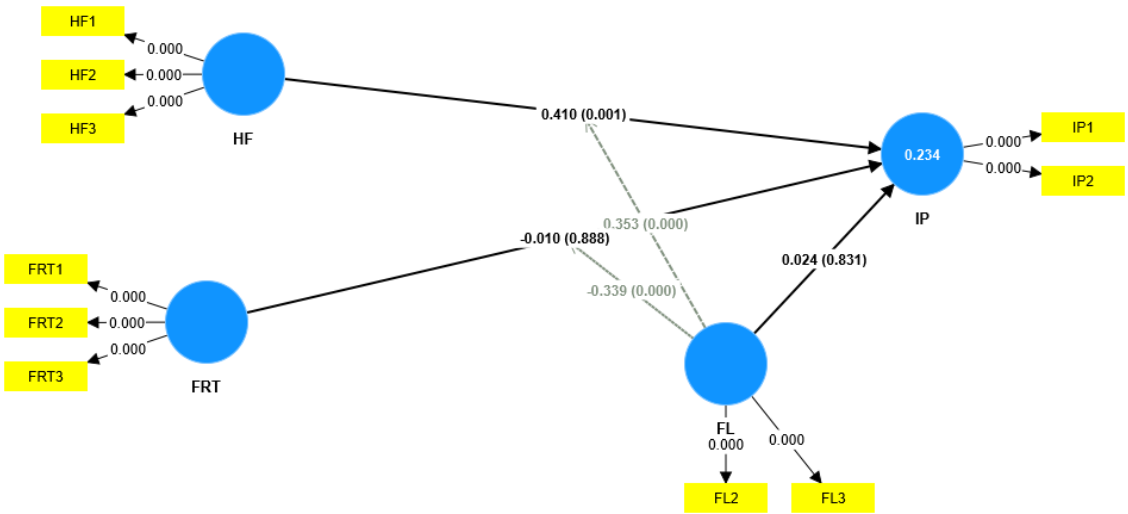

Figure 2: Structural Equation Model

Table 5
Structural Equation Model

Construct		Coefficients	Standard Deviation	t-Statistics	P-Values
H →IP		0.410	0.128	3.194	0.001
FRT →IP		-0.010	0.073	0.141	0.888
FL →IP		0.024	0.114	0.213	0.831
FL X HF →IP		0.363	0.093	3.804	0.000
FL X FRT →IP		-0.39	0.078	4.356	0.000

Source: Smart-PLS.4 Result Output

Heuristic factor has no significant effect on investment performance: Heuristic factors significantly influence investment performance. The coefficient value is 0.410 with a t-value of 3.194 and a corresponding p-value of 0.001, showed that heuristic factor, has a significant and positive effect on investment performance. The result indicated that if heuristic factors change by 1%, the investment performance will increase by 41%. This study revealed that the heuristic behaviors positively affect investment performance. Indicating that investors are less concerned with risk associated with investment but highly concerned with appreciation of wealth and gain. The findings are supported by work of Edeh et al., (2023) and contradict the study of Pratheepan and Rathiranee (2020).

Financial Risk Tolerance has no significant effect on investment performance: Financial risk tolerance and the investment performance showed a coefficient value of -0.010 with a t-value of 0.141 and a corresponding p-value of 0.888. This indicated that financial risk tolerance has in significant, negative impact on investment performance. This further indicated that a 1% change in financial risk tolerance, will drop or decrease investment performance by 1%, with all other predictors remaining constant. The findings from the study is supported by research of Kanagasabai and Aggarwal (2020). However, contradict the study of Onsomu et al. (2017) which shows that risk had a positive and significant relationship with portfolio returns.

Financial literacy influence investment performance with a coefficient value of 0.024, the t-value of 0.213 and a corresponding p-value of 0.813, This showed that financial literacy has a positive and insignificant effect on investment performance. This also indicated that a 1% change in financial literacy of individual investor, will result to 2% increase in investment performance. The findings of the study revealed that the financial literacy level of individual's investor does not have significant effect on investor decision and not much returns is achieved from investment. The findings of this study is supported by research of Tuffour et al. (2020). but contradict the study of Ahmad et al. (2021).

Ho_4: Financial literacy has no significant moderating effect on heuristic factor and risk tolerance on investment performance: The role of financial literacy in moderating the effect of heuristic factor and financial risk tolerance on investment performance shows a coefficient value of 0.353 and -0.339 and t-value of 3.804 and 4.356 with a corresponding p-value of 0.000 and 0.000 respectively, which showed that the interaction of financial literacy and heuristic factor is discovered to have a significant effect on investment performance. The β value of 0.353 indicates that the level of financial literacy of individual affects the psychological behavior and heuristic factor by 1%, and this increases the individual investment performance by 35%. On the other hand, the β value of -0.339 revealed that the level of financial literacy of individual affects the psychological behavior and financial risk tolerance by 1%, decreases the individual investment performance by 33%.

V. Conclusion and Recommendations

This study examined the effect of heuristic factor and financial risk tolerance on individual investment performance in Kaduna city, Nigeria. The study concludes that heuristic factor has positive and significant effect on individual investment performance. This shows that investors heuristic disposition play a pivotal role in determining investment performance. According to the findings from this study, investors believe that their dividend yields and stock booms can be attributed to investment decisions based on heuristic reactions. Furthermore, financial risk tolerance shows a negative and insignificant effect on investment performance, which revealed that individual investors risk tolerance level does not really influence the individual investment performance.

This study shows that financial literacy has a significant and positive moderating effect on the effect of heuristic factor on investment performance of individuals. This study therefore concludes that financial literacy level of individual investor influence heuristic biases of individuals investors because FL has been found to increase individual investment performance. On the other hand, financial literacy has a negative and significant moderating role on the effect of financial risk tolerance on individual investment performance. This study further concludes that the high financial literacy level of individual significantly reduce investment performance which may be as result of overconfidence of the investors.

Based on the conclusions of this study, it is therefore recommended that individual investors should recognize that heuristic bias is a behavioral trait of the individual, and that investment decision is an important cognitive factor that influences investment performance rather than focusing on only fundamental analysis in taking investment decision. Secondly, individual investors should lower their financial risk tolerance because it has been established to reduce investment performance regardless of financial literacy level.

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