



Effect of Behavioural Biases on Investments at the Rwanda Stock Exchange

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Abstract: The main objective of this study was to establish the effect of behavioural biases on investment in the Rwanda Stock Exchange. The specific objectives were to establish the effects of self-serving bias, over-optimism bias, loss aversion, self-attribution bias and confirmatory bias on investment in the Rwanda stock exchange. The prospect theory, heuristics theory and herding theory formed the foundation of this study. The underlying epistemology of this research was positivist; focusing on examining earlier established theories under the assumption that reality is objectively given and can be described by measurable properties independent of the observer and the instruments. The study used cross-sectional descriptive survey research design to ascertain and establish the effect of behavioural biases on investment in the Rwanda stock exchange. The target population comprised of 13,543 individual, group investors at the Rwanda Stock Exchange. Random sampling was used where the targeted population was individual investors to finally yield a sample size of 374 respondents. A questionnaire was used to collect the primary data. Data analysis involved the use of descriptive and inferential statistics. A linear regression model was used to predict the probability of different possibility outcomes of dependent variables, helping to predict the probability of an investor to invest in Rwanda Stock Exchange. The results confirmed that there was a significant positive linear relationship between self-serving bias, over-optimism bias, loss aversion bias, self-attribution bias, confirmatory bias and Investment in Rwanda stock market. The study also concluded that most investors suffered from behavioural biases in investment in stock markets. The study further recommends that the individual investors to seek the advice of stock brokers/fund managers to advise them accordingly in terms of performance of a specific security in which an investor would wish to invest in.

Keywords: Self-Serving Bias, Over-Optimism Bias, Loss Aversion, Self-Attribution Bias, Confirmatory Bias, Investment, Rwanda Stock Exchange

1. Introduction

Behavioural finance is the new field that seeks to combine behavioural (aspirations, cognition, emotions) and cognitive psychological theory. It explains why investors makes a rational financial decisions on the stock market [22]. It describes the outcomes of interactions between investors and managers in financial and capital markets; and it prescribes more effective behaviour for investors and managers. The investment is mostly influenced in a large proportion by psychological and emotional factors [40]. Behavioural

finance attempt to better understand and explain how emotional and cognitive errors influence investment on the stock markets [39]. The stock markets are able to positively influence the economic growth through encouraging savings amongst individuals and providing avenues for firm financing. Liquid stock markets may improve the allocation of capital and enhance prospects for long-term growth [44].

The traditional theory of finance assumes that people are guided by reason and logic and therefore view investment

through the transparent and objective lens of risk and return. It argues that markets are efficient and therefore security prices are an unbiased estimate of their intrinsic value. Behavioural finance recognizes that emotions, herd instincts and social influences play an important role in influencing investment leading to discrepancies between market price and fundamental value. Investor behaviour looks at how behaviour impacts the investment performance [28].

These biases play their part in shaping individual's choices, financial decisions in corporations and financial markets. Unreasonable choices hamper the investor's wealth and the execution of companies and additionally the productivity of business sector. Scholars have identified so many biases [16]. [17] wrote a paper in which they stated different states of mental biases that may impact the investment process; they are risk aversion, regret aversion and self-attribution and the locus of control [4]. The Rwanda Stock Exchange (RSE) started in January 2011, replacing Over the Counter Exchange in existence from 2008, with only Bralirwa stock, a brewery manufacturing firm trading [27]. As at 31/12/2014, seven firms were listed at RSE with three government and one corporate fixed income securities [33].

Rwanda is one of the youngest stock market in East Africa with a small number of listed companies and low market capitalization, an indicator of low Stock Market development [6]. The Rwanda Stock Exchange Limited (RSE) was incorporated in 2005 and launched officially in 2008. It is the principal stock exchange operating under the jurisdiction of Rwanda's Capital Market Authority (CMA), previously known as Capital Markets Advisory Council (CMAC), which in turn reports to the (MINECOFIN) Ministry of Finance and Economic Planning [1]. Rwanda's Stocks Exchange is young compared to the other markets in EAC, like Nairobi Security Exchange (NSE) which was established in 1954, Dares Salaam Security Exchange in 1996 and Uganda Stock Exchange in 1997. Currently RSE has only three Initial Public Offering (IPO), Bralirwa, Bank of Kigali and Crystal Ventures as primarily listed in Rwanda and four IPO as secondarily listed in Rwanda includes: Kenya Commercial Bank Group and Nation Media Group, which are primarily listed in Nairobi Stock Exchange and cross listed on the Rwanda Stock Exchange [18]. Uchumi Supermarkets and Equity are primarily listed on the Nairobi Stock Exchange and are cross listed on the Rwanda Stock Exchange starting from 2014.

However, the Rwanda stocks exchange has largely attracted the large investors (group or organizations), institutional investors and a few individual investors [20]. The influence of behavioural biases especially emotional ones will be analysed in an attempt to decipher their effect on investment in the Rwanda stock exchange in terms of whether they affect the investment. The government has ensured that investors in the Rwanda Stocks Exchange are protected, by advising and guiding companies seeking investment through provision of important infrastructures and conducive environment for business development [25]. Despite these efforts, investment in the Rwanda stock

exchange is low and the Rwanda Stocks Exchange is not growing at the pace expected. Currently there are approximately 13,543 registered investors, all these investors are composed by the individual investors, group investors and institutional investors. The market capitalization of Rwanda Stocks Exchange is USD 3.7 billion with 7 listed companies [33]. In comparison with Nairobi Securities Exchange, there are approximately 66 listed companies with a total market capitalization of approximately USD 23 billion [27].

2. Literature Review

2.1. Theoretical Background

The proponents of the herding behaviour theory were [5] & [3], where herding was defined as a switch in traders' opinion into the direction of the crowd Raafat, Chater and Frith proposed an integrated approach to the theory, describing two key issues; the mechanisms of transmission of thoughts and or behaviour between individuals and the patterns of connection between them [31]. [12] added that herding effect in financial market is identified as the tendency of investors to follow the others' actions. Practitioners of the herding behaviour theory usually consider carefully the existence of herding, due to the fact that investors rely on collective information more than private information which can result to the price deviation of the securities from fundamental value; therefore impacting on the many good chances for investment. Herding behaviour impacts on property price changes and may influence the attributes of risk and return models and this has impacts on the viewpoints of asset pricing [41].

Daniel Kahneman and Amos Tversky are the proponents of prospect theory. They came up with this theory in 1992 as a description of investment among individuals. According to Kahneman & Tversky, prospect theory states that individuals make decisions based on the potential value of losses and gains rather than the final outcome [42]. According to [7] prospect theory is a psychological theory of choice under uncertainty. This theory is about how people make choices between different options or prospects and is designed to better describe, explain, and predict the choices that the typical person makes, especially in a world of uncertainty. Choices are based on the strong preference for certainty and people are willing to sacrifice income to achieve more certainty.

Amos Tversky and Daniel Kahneman are the proponents of heuristics theory. According to Tversky & Kahneman, heuristics are defined as the rules of thumb, which makes decision making easier, especially in complex and uncertain environments by reducing the complexity of assessing probabilities and predicting values to simpler judgments [32, 42]. In general, these heuristics are quite useful, particularly when time is limited [45], but sometimes they lead to biases [42, 32]. In addition, [24] states that heuristics stands for the tendency that individuals make judgments quickly. Heuristics

are strategies used to access complex problems and limit the explaining information. Investors tend to make rules of thumb in order to process the information so that they can make investment. In stock market, when investors seek to buy “hot” stocks instead of poorly performed ones, this means that representativeness is applied. This behaviour is an explanation for investor overreaction [11]. Relative to the small size of the companies trading in the Rwanda Stock Exchange, investors may judge the performance as either good or bad in ignorance of the ‘sample size neglect’.

2.2. Empirical Literature Review

[37] concluded that people with negative self-views find themselves caught in a cognitive–affective crossfire in that they have difficulty accepting what they want to believe about themselves. [14] results showed that four biases including self-serving bias, confidence, and sense of remorse and regret and snake bites influence the investment decision-making. [36] findings on the other hand showed that people in general are exposed to the studied behavioral biases but the degree and impact are affected by experience and other characteristics.

[16] findings on self-serving bias showed that it negatively affected the rational decision making of investors. Similarly, [21] concluded that cognitive biases play a significant role in individual investment decisions. On their part [23] found that the optimistic CEOs are 65 percent more likely to complete mergers, are more likely to overpay for those target companies, and are more likely to undertake value-destroying mergers. [19] further established that a unit increase in Certain return bias is associated with - 0.468 decreases in stock investment, loss aversion 0.445, fear of regret 0.278 and random walk framing 0.340 increase while the coefficient of determination was found to be 26.5% meaning the above factors accounted for this percent while other factors accounted for 73.5% of the NSE investors financial and investment decisions.

According to [38] people are believed to realize gains too quickly in the fear that they may make a loss. The sentiments were further supported by [34] who emphasized on the impact of loss aversion and mental accounting on investment decision of retail investors. [15] established that while individual returns relate to more agreement, market returns have no such effect. [29] results hold important implications about commonly occurring biases in the psychodiagnostic assessment process. Finally, [43] concluded the economic decisions of a human being are more emotionally based than rationally based.

3. Research Methodology

The study used cross-sectional descriptive survey research design to assess and establish the effect of behavioural biases on investment at the Rwanda stock exchange. The target population of this study comprised of individual, group and institutional investors at the Rwanda Stock Exchange which are approximately 13,543 [33]. Stratified random sampling

was first be used where the targeted population was stratified into three distinct strata Rwandese investors, EAC and foreign investors. According to [33] there are 13,543 investors registered at the RSE, 10,662 Rwandese investors, 2,474 EAC and 407 foreign investors at the Rwanda Stock Exchange that means 79% of domestic, 18% EAC and 3% foreign investors [33].

To determine the sample size for this study in consideration of the population of 13,543 investors the study used the normal approximation to the hyper-geometric distribution. The sample size is 374, were selected using the simple random sampling. The study collected primary data. A semi-structured questionnaire was used to collect the primary data. The semi-structured questionnaire was designed to contain both closed and open-ended questions and a five-point Likert scale. The researcher then administered the questionnaire with the help of four (4) trained research assistants. The respondents gave a time frame within which they were expected to responds to the instruments. Data analysis involved the use of descriptive and inferential statistics in order to help the researcher to establish the relationship between emotional bias and investment. In relation to inferential statistics, the linear and multi linear regression models were utilized to further give inferences to the data obtained using the Statistical Package for Social Sciences (SPSS). Following the study, the linear regression models were used to test the significance of the overall model at 95% level of significance. The model used to test the relationship between independent variables and dependent variables was as shown below;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where:

Y = Investment in Rwanda stock Exchange

β_0 = Constant

$\beta_1 \dots \beta_4$ = Represents the regression coefficients

X_1 = Self-serving bias

X_2 = Over-optimism bias

X_3 = Loss aversion

X_4 = Self-attribution bias

X_5 = Confirmatory bias

ε = Represents the error term

4. Analysis, Findings and Discussions

The study administered a total of 374 to selected individual investors in Rwanda stock market. A total of 350 questionnaires were dully filled and returned. This represented a response rate of 93.6%.

4.1. Respondents Background Information

Table 1 presents the demographic characteristics of the respondents. This was aimed at describing the sample that was used in this study. The study sought to establish the age bracket of the respondents, genders of the respondents and there highest education qualifications.

Table 1. Respondents Background Information.

Bio Data	Response	Percent
Age	21-30 years	48.3
	31-40 years	41.4
	41-50 years	3.4
	51-60 years	6.9
Gender	Male	68.9
	Female	31.1
highest level of education attained	Undergraduate	20.9
	Graduate	65.1
	Post Graduate	14
Total		100

4.2. Correlation Tests

The researcher investigated the association between the dependent variable and the independent variables as well as between the independent variables themselves using the correlation coefficient matrix as recommended by [9] as shown in table 2.

Table 2. Correlation Matrix.

		Self-Serving Bias	Over Optimism Bias	Loss Aversion Bias	Self-Attribution Bias	Confirmatory Bias
Self-Serving Bias	Pearson Correlation	1				
	Sig. (2-tailed)					
Over Optimism Bias	Pearson Correlation	0.324				
	Sig. (2-tailed)	0.000				
Loss Aversion Bias	Pearson Correlation	0.414	0.457			
	Sig. (2-tailed)	0.000	0.000			
Self-Attribution Bias	Pearson Correlation	0.436	0.43	0.646		
	Sig. (2-tailed)	0.000	0.000	0.000		
Confirmatory Bias	Pearson Correlation	0.41	0.405	0.61	0.611	
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
Investment in RSM	Pearson Correlation	0.421	0.413	0.508	0.55	0.487
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
	N	350	350	350	350	350

The finding in Table 2 indicates that the correlation between Investment in Rwanda Stock Market by individual investors at the Rwanda stock market and Self-Serving Bias was 0.421 with a corresponding p value of 0.000. The correlation coefficient was therefore significant and positive implying that if self-serving bias increases the investment in Rwanda Stock Market also increases. The findings of this study concurs with those of [26] whose findings were that individuals engage in self-enhancing attributions under conditions of success, but minimal evidence was found that individuals engage in self-protective attributions under conditions of failure.

The finding further indicates that the correlation between Investment in Rwanda Stock Market by individual investors at the Rwanda stock market and Over Optimism Bias was 0.413 with a corresponding p value of 0.000. The correlation coefficient was therefore significant and positive implying that as Over Optimism Bias increases the investment in Rwanda Stock Market also increases. These finding supports those of [30] whose study found that over-optimism has direct applications in investment. [8] also found that over-optimism bias causes investors to trade excessively and causes them to believe that they are less at risk of experiencing a negative event compared to others. However, the findings contradicts those of [2], whose study found that

68 percent of start-up entrepreneurs believe their company is more likely to succeed than similar companies, while in reality only 50 percent of start-up companies survive beyond three years of activity. Similarly, the finding contradicts those of [23] in a study on CEO over-confidence and the market reactions found that CEOs who are optimistic regarding their organizations future performance have a greater sensitivity to investment, leading to distortions in investments.

The correlations results further showed the correlation between Investment in Rwanda Stock Market by individual investors at the Rwanda stock market and loss aversion bias was 0.508 with a corresponding p value of 0.000. The correlation coefficient was therefore significant and positive implying that as loss aversion bias increases the investment in Rwanda Stock Market also increases. Similarly, [20] who found that investors avoid regret by refusing to sell decreasing shares and willing to sell increasing ones.

The findings also established that the correlation between Investment in Rwanda Stock Market by individual investors at the Rwanda stock market and Self-Attribution Bias was 0.550 with a corresponding p value of 0.000. These findings implied that there existed a positive and significant association between Self-Attribution Bias and Investment in Rwanda Stock Market by individual investors at the Rwanda

stock market. The findings further implied that if Self-Attribution Bias increases individuals Investment in Rwanda Stock Market also increases. [35] found that self-attribution bias builds up an individual's overconfidence Individual exposed to self-attribution bias think that they have more abilities than average, known as "Batter then average effect. Self-attribution enhances overconfidence, so the subjects who suffer from this bias will be overconfident in their decisions and judgments. [13] also found that people suffering from self-attribution bias become more overconfident after a success and it affects the conception about own capabilities as it hinders the evaluation of past performance, this leads to overconfidence.

The findings also established that the correlation between Investment in Rwanda Stock Market by individual investors at the Rwanda stock market and Confirmatory Bias was 0.487 with a corresponding p value of 0.000. These findings implied that there existed a positive and significant association between Confirmatory Bias and Investment in Rwanda Stock Market by individual investors at the Rwanda stock market. Similarly, [10] study showed that an investor exhibiting confirmatory bias may come to believe with near certainty in a false hypothesis despite receiving an infinite amount of information which may lead them to over invest.

4.3. Multivariate Regression Analysis

In order to establish the statistical significance of the hypothesized relationships, multiple linear regression was conducted at 95 percent confidence level ($\alpha=0.05$). The results are presented in Tables 3-5.

Table 3. Model Results for Multivariate Regression Analysis.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.632	0.595	0.586	0.38430

The findings revealed a relationship $R=0.628$, indicating a strong positive association between self-serving bias, over optimism bias, loss aversion bias, self-attribution bias, confirmatory bias and investment in Rwanda stock market. R -squared= 0.595 indicated that 59.5% of variation in the investment in Rwanda stock market can be explained by self-serving bias, over optimism bias, loss aversion bias, self-attribution bias and confirmatory bias.

Table 4. ANOVA Results for Multivariate Regression Analysis.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33.624	6	5.604	37.947	0.000
	Residual	50.655	343	0.148		
	Total	84.280	349			

The results of ANOVA test show that the F value is 37.947 with a significance of p value = 0.000 which was less than 0.05, meaning that there is a significant relationship between self-serving bias, over optimism bias, loss aversion bias, self-attribution bias, confirmatory bias and investment in Rwanda stock market.

Table 5. Multivariate Regression Analysis Results.

	B	Std. Error	t	Sig.
(Constant)	2.573	0.086	29.842	0.000
Self-Attribution Bias	0.116	0.027	4.256	0.000
Self-Serving Bias	0.084	0.026	3.216	0.001
Over Optimism Bias	0.06	0.021	2.832	0.005
Loss Aversion Bias	0.059	0.026	2.282	0.023
Confirmatory Bias	0.058	0.026	2.188	0.029

The coefficient of Self-serving bias was ($\beta=0.084$, $p=0.001$, <0.05) shows a statistically significant relationship between Self-serving bias and investment in the Rwandan Stock Exchange. The regression coefficient of 0.084 obtained in this case implies that a unit increase of the Self-serving bias variable would lead to 0.084 increases in investment in the Rwandan Stock Exchange. The coefficient of over-optimism bias was ($\beta=0.06$, $p=0.005$, <0.05) shows a statistically significant relationship between over-optimism bias and investment in the Rwandan Stock Exchange. The regression coefficient of 0.06 obtained in this case implies that a unit increase of the over-optimism bias variable would lead to 0.06 increases in investment in the Rwandan Stock Exchange.

The coefficient of Loss aversion bias was ($\beta=0.059$, $p=0.023$, <0.05) shows a statistically significant relationship between Loss aversion bias and investment in the Rwandan Stock Exchange. The regression coefficient of 0.059 obtained in this case implies that a unit increase of the Loss aversion bias variable would lead to 0.059 increases in investment in the Rwandan Stock Exchange. The coefficient of Loss aversion bias was ($\beta=0.116$, $p=0.000$, <0.05) shows a statistically significant relationship between Self-attribution bias and investment in the Rwandan Stock Exchange. The regression coefficient of 0.116 obtained in this case implies that a unit increase of the Self-attribution bias variable would lead to 0.116 increases in investment in the Rwandan Stock Exchange. The coefficient of confirmatory bias was ($\beta=0.058$, $p=0.029$, <0.05) shows a statistically significant relationship between Loss aversion bias and investment in the Rwandan Stock Exchange. The regression coefficient of 0.058 obtained in this case implies that a unit increase of the confirmatory bias variable would lead to 0.058 increases in investment in the Rwandan Stock Exchange.

The findings of this study concurs with those of [26] whose findings were that individuals engage in self-enhancing attributions under conditions of success, but minimal evidence was found that individuals engage in self-protective attributions under conditions of failure. These finding supports those of [30] whose study found that over-optimism has direct applications in investment. [8] also found that over-optimism bias causes investors to trade excessively and causes them to believe that they are less at risk of experiencing a negative event compared to others.

Similarly, the finding contradicts those of [23] in a study on CEO over-confidence and the market reactions found that CEOs who are optimistic regarding their organizations future performance have a greater sensitivity to investment, leading to distortions in investments. [13] also found that people suffering from self-attribution bias become more

overconfident after a success and it affects the conception about own capabilities as it hinders the evaluation of past performance, this leads to overconfidence. Similarly, [10] study showed that an investor exhibiting confirmatory bias may come to believe with near certainty in a false hypothesis despite receiving an infinite amount of information which may lead them to over invest.

5. Conclusion

This study established that self-serving bias, over optimism bias, loss aversion bias, self-attribution bias, confirmatory bias significantly affected investment in Rwanda stock market. Based on the findings the study concluded that investors at Rwanda stock exchange engaged in self-serving bias whenever they were successful in their investments. Self-serving bias however could lead to investors increasing their stock trading with the notion that they are in control of their investments and could not makes losses which sometimes lead to massive losses.

Based on the findings, the study also concluded that over optimism bias affects the financial decision making of many investors at the stock markets. Over-optimism bias occurs majorly when investors place too much weight on past information. Based on the findings, the study further concluded that investors at the stock market tend to be more regretful about holding losing stocks too long than selling winning ones too soon. This is because to many stock market investors failure depresses them. The study also concluded that most investors suffer from self-attribution bias. Most of the investors judge their skills by assessing their past accomplishments and failures. Stock market investors mostly take too much credit for their own achievements which affect their abilities and divert them from learning from past successes.

The study finally concluded that confirmatory bias play a positive and significant role in frequency of trading in stock market. Confirmatory bias limits investors from making sound decisions based on the reality which may sometimes results to over trading or reduced trading. Investors therefore should take note of these biases and consult widely before making investment decisions.

Recommendations

This study find out that self-serving bias, over optimism bias, loss aversion bias, self-attribution bias, confirmatory bias significantly affected investment in Rwanda stock market. Based on these findings the following recommendations were made; The study recommended that stock market investors should be smart enough to capture the essence of self-serving bias which could guide them in taking the right investment decision and also behave rationally when making investment decisions. The study recommended that in order to manage the excesses of over optimism bias influences to stock market investment frequency, training programs that create investor awareness and ability to

identify and guard against such biases that lead to bad investment choices should be offered to both potential and existing individual investors. The study further recommends that the individual investors to seek the advice of stock brokers/fund managers to advise them accordingly in terms of performance of a specific security in which an investor would wish to invest in. The implication is that such brokers/fund managers have the information of the market and are aware of the movers and shakers of securities and therefore provide their advice at a fee. The study finding established that self-attribution bias is a significant channel that hinders people to link their successes with their internal forces and their non-successes with external forces. The study recommends that investors should be keen to identify such bias to increase their rationality in stock trading.

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