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The relationship between Behavioral biases and Portfolio Performance among Individual Investors at the Nairobi Securities Exchange

Sharon Lovega
Dominic Murage Njeru

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By: Sharon Lovega[1] & Dominic Murage Njeru (PhD,CPA)[2]

Abstract

Behavioral finance, unlike traditional finance, holds the view that investors do not always act rationally in their investment decisions in the stock markets as they are influenced by behavioral predispositions, raising the question of how behavioural biases influenced individual investors' portfolio performance in the securities exchange. This study's broad objective was to assess how individual investors' behavioural biases related to their portfolio-performance at the NSE. Specifically, the study evaluated how herding, loss aversion, overconfidence and anchoring biases related to the individual investors' portfolio performance at the NSE. A descriptive cross-sectional research design was adopted. A sample of 384 individual investors at NSE was used. Primary data was collected using researcher-administered questionnaires. Study data was analyzed using descriptive statistics that included frequencies, mean scores and percentages while multiple regression analysis was utilized to analyze how the predictor variables related with the outcome variable at 5% significance level. The analytical software was SPSS Version 24. Findings were depicted in figures and tables. Key findings of the study were that a statistically significant positive relationship was established between the individual investors' portfolio performance and several behavioral biases including herding, overconfidence and anchoring. However, the relationship with loss aversion bias was negative and significant. The study concluded that behavioral biases had a significant influence on portfolio performance among individual investors at the NSE. It is recommended that NSE in collaboration with CMA should initiate investor education programs or workshops with a view of enriching potential and existing individual investors' understanding of how the stock market operates hence aiding them in making judicious investments. Individual investors should consider seeking guidance and necessary information from existing stock brokers and fund managers so they are able to make informed investment decisions at the NSE.

Keywords: *Behavioural Biases, Portfolio Performance, Securities, Exchange*

Introduction

Traditional models of finance operate on the basis of investors behaving rationally in their investing decisions on the basis of expected gains vis-à-vis risks (Maditinos, Sevic & Theriou, 2007). The models assume investors always hold well-diversified portfolios, are operating in efficient markets, trade rationally and fear losing in their trades (Sayim & Rahman, 2015). Practically, however, investors regularly rely on own intuition, attitudes, emotions and knowhow to make investing decisions, an aspect called behavioral finance (Muriithi, 2016). Behavioral finance, thus, seeks to explain investors' behaviours especially when they clearly depart from the expected rational behaviour espoused under the traditional models of finance (Pompian, 2011).

[1] *Department of Finance and Accounting, Faculty of Business and Management Sciences, University of Nairobi*
[2] *Lecturer, Department of Finance and Accounting, Faculty of Business and Management Sciences, University of Nairobi*

Several finance theories informed this study including the modern portfolio theory (MPT), which argues that, for every asset return level, investors acting rationally will choose investing opportunities with low risks rather than those with elevated risks. Similarly, the Efficient Market Hypothesis (EMH) and Capital Asset Pricing Model (CAPM) assume that individual investors act rationally and participate in markets that are efficient as reflected in stock prices (Ross et al., 2013). However, the current study was anchored on the prospect theory, reason being, the theory acknowledged that investors do not always behave rationally, hence tries to elaborate role of various investors' biases in their stocks performance (Marchand, 2012).

The Nairobi Securities Exchange (NSE) is Kenya's principal securities market under regulation of the Capital Markets Authority (CMA). It provides an avenue for individual and institutional investors to trade in quoted securities, and hence improve their portfolios' returns (Kung'u, 2016). Though, investors have traditionally applied the concepts of rationality and efficient markets while trading in capital markets, these concepts are increasingly becoming untenable as markets become more dynamic and volatile (Kimani, 2018). Hence, there's growing focus on behavioral finance and its efforts to explain irrationality observed in individual investors' behaviors at NSE, particularly on how behavioral biases affected individual investors decisions and their portfolios, sentiments also shared by Ratemo (2016) and Kigen (2020).

Behavioral Biases

Behavioural biases depict the inclination of making illogical or ill-considered choices/decisions occasioned by defective mental and/or emotional propositions (Pompian, 2011). Shefrin and Statman (1985) defined behavioral biases as acts of investors making unsound decisions regarding their portfolios due to erroneous inherent mental or emotional beliefs. Similarly, Sattar et al. (2020) averred that behavioral biases, in finance, denote unreasonable/illogical leanings in financial or investment decision making instead of applying concrete facts. Behavioral biases are either emotional - those stemming from intuition or one's feelings or cognitive - those stemming from mental information processing errors (Marchand, 2012).

Behavioral finance strives to enrich traditional models of finance by offering due consideration to the notable and regular variance from rationality by investors attributable to their misguided beliefs (Sattar

et al., 2020). It thus seeks to offer insights as to the different biases, their influence on decisions of investors and consequently on investors' portfolio performance (Madaan & Singh, 2019). Investors, like any other persons, when confronted by difficult/uncertain scenarios that require significant effort and time, may not act/decide rationally. Often, instead, they tend to make decisions by following a more instinctive, imperfect reasoning guided by personal preferences and biases (Chhapra et al., 2018).

Herding, loss aversion, overconfidence and anchoring constituted this study's independent variables. Herding - basing one's investment decisions by emulating other investors' decisions (Pompian, 2011), and loss aversion - investors' tendency to avoid losses over achieving equivalent gains (Marchand, 2012) were assessed using a likert scale model, unlike the yes or no response questions approach used in studies by Ojwang (2015), Verma (2016), Kung'u (2016) and Kigen (2020). Both overconfidence - investors' propensity to overrate/overestimate the accuracy of their stock choices and forecasts (Sattar et al., 2020), and anchoring - investors' inclination of ignoring present information by making stocks prices approximations based on their original values or past prices (Madaan& Singh, 2019) were assessed using a likert scale approach, as was in studies by Chaudhary (2013), Ratemo (2016), Muriithi (2016) and Kimani (2018).

Portfolio Performance

A portfolio is a collective/aggregate group of assets from different sectors held by investors (Chaudhary, 2013). According to Bacon (2008) portfolio performance therefore is the gain or loss an individual gets after investing in several stocks over a certain time period. It is the capacity of held assets to produce premeditated outcomes with regards to set objectives (Blasco, Corredor & Ferreruela, 2012). Portfolio performance indicates the returns to the investors from the group of assets over a given time period and at certain risk levels (Ross et al., 2013). It is reflected in investor's preferences on what, when, why and how much to invest as well as when and how much to sell/divest with the sole goal of maximizing returns (Kumar & Goyal, 2015).

Often, different assets in a portfolio will have different expected returns and performance of the portfolio will be influenced by volatility of the individual assets, though other variables like market inefficiency, political instability, human biases and global dynamics such as the prevailing Covid-19 pandemic may also affect (Yoshino et al., 2021). Acquiring, funding and managing assets constitute the

essence of portfolio performance with value maximization as overriding goal. Investors' desire is choosing a mix of assets that yields optimal gain as per their risk (Bacon, 2008). As a consequence, assessment of portfolio performance is critical to point out whether this goal is being realized (Eklund, 2013).

Portfolio performance measures applied in various studies included the Treynor's index which calculates portfolio performance using excess returns on the fund scaled by the funds' beta, and is used when the only important risk is beta and all diversifiable risk is eliminated (Chen & Knez, 1996). The Jensen's Alpha method of 1968 assumes that diversifiable risk is dealt with by diversification and therefore only market risk or systemic risk is important. The Sharpe ratio is established by taking average portfolio returns less risk free rate and divides the outcome with the standard deviations of returns (Baddeley, 2017). The Miller and Modigliani risk adjusted measure of returns is a product of Sharpe ratio with chosen benchmark's annualized standard deviation plus the risk free rate (Bacon, 2008). For this study, portfolio performance was measured using the Sharpe ratio. The Sharpe ratio was appropriate as it did not assume that a portfolio should be well diversified, since investors were assumed to suffer from behavioral biases and hence it utilized the standard deviation as a measure of risk.

Empirical studies exist relating to the research subject. Globally, studies by Maditinos et al. (2007), Sayim and Rahman (2015) and Madaan and Singh (2019) in Greece, Turkey and India respectively focused on influence of behavioral biases on individual investors' investment decision-making. They revealed that behavioral biases often led to sub-optimal investment choices. Similarly, local studies by Aduda et al. (2012), Muriithi (2016), Ratemo (2016) and Kimani (2018) reported that individual investors' choices and actions at NSE were influenced by various behavioural biases. The studies noted gaps in local understanding of how behavioral biases affected investors' portfolio performance - an area they suggested required further investigation.

The current study explored the relationship between behavioral biases and portfolio performance among individual investors at the NSE, in light of existing conflicting empirical findings, the different methodological approaches, the narrow approach to study variables and the different economies studied in respect of this study subject.

Literature Review

Modern Portfolio Theory

The modern portfolio theory was advanced by Markowitz in 952. It holds that, for every risk level, a portfolio's expected return can be optimized via diversification. Markowitz hypothesized that efficient portfolios are those assets or securities that give highest returns with the lowest possible risk or acceptable risk. The theory presumes that an efficient portfolio is one with the highest return at the lowest possible risk. This theory assumes that investors consider anticipated return a good thing and risk a bad thing (Elton & Gruber, 1997).

The theory is premised on two major propositions that risk and return are directly connected denoting that higher risks relate to higher expected returns and vice-versa; and that diversification allows investors to hold portfolios that optimize returns while lowering risks. The theory is however critiqued as based on unrealistic assumptions such as markets always being efficient and investors always being rational (Elton & Gruber, 1997). The theory provides a basis for analyzing what happens when risk-return rules in investing decisions are disregarded as is with behavioural biases.

Capital Asset Pricing Model

Treynor, Sharpe, Lintner and Mossin independently developed the Capital Asset Pricing Model (CAPM) between 1196 and 1964. It provides an outline of the relationship between return and risk for risky assets. The model illustrates gains made on high risk securities proportionately vary in line with their risk levels. Its assumptions include; investors are risk averse and rational, existence of a risk free asset, homogenous expectations and frictionless markets, information is available freely and no market inadequacies like taxes (Ross et al., 2013).

The oversimplified assumptions are critiqued by scholars such as Black, Jensen and Scholes who hold that CAPM does not require a pure riskless asset instead beta can be used as a measure of risk (Yen & Lee, 2008). Despite the criticisms, it is still a good measure for analyzing risky assets. It was important in this study as it guided investment and consequently portfolio performance based on current correct pricing.

Determinants of Portfolio Performance

Investor Investment Style

An investor's style of investment may be active or passive. With passive style, investors only make occasional reviews and re-alignments of their portfolio after some period of time while active investment style involves daily/regular portfolio management and interaction with the market. Often, passivity is associated with better portfolio performance compared to the active investment style (Nyamute et al., 2015).

Diversification

Diversification involves an investor undertaking investment in more than one investment vehicle or asset. Often, overall portfolio performance is mitigated against returns and risk fluctuations through diversification as a decline in one asset's returns may be compensated by an increase in returns from another asset and vice versa (Kumar & Goyal, 2015). The risk and return balance afforded by diversification thus influences portfolio performance (Muriithi, 2016).

Portfolio Size

Portfolio size also affects returns from the portfolio. A bigger portfolio in terms of the nature, size and value of assets held is likely to provide higher returns relative to smaller portfolios (Aragon & Ferson, 2007). Portfolio size largely depends on individual investors of making new investments or adding new units on existing investments (Chen et al., 2011).

Portfolio Composition

Portfolio composition is the different individual investments within a portfolio, classified in terms of asset classes, industry invested in or maturity period, either short term or long term (Madaan & Singh, 2019). Portfolio composition effectively aligned with one's investing goals and objectives is likely to enhance portfolio performance.

Empirical Review

Sayim and Rahman (2015) investigated how individual investor sentiments related to stock returns in Turkey. The study context was the Istanbul Stock Exchange (ISE) and the duration covered was 2004 - 2010. Study participants were individual investors who traded in the ISE. Descriptive measures and vector auto-

regressions were used in analyzing data. Direct association was established between positive investor sentiments and stock returns at ISE. The study however did not indicate the sample size used.

Blasco et al. (2012) undertook a study that aimed to ascertain whether there was herding bias among investors in Spain. The study context was the Spanish Stock Exchange and its duration was 1997-2003. Secondary data on 35 indexed stocks was utilized. Granger causality test was applied in analysis. The findings revealed presence of herding among the investors. The study did not however explore the link of the behavioral bias with portfolio performance, which was current study's focus.

Chen et al. (2010) evaluated traits of irrationality/bias among 66 Taiwanese investors through reviewing their asset and investment preferences. Taiwan's stock market was the study's context. Study period was 2007 to 2008. Data were analyzed using the analytical hierarchy process method. Risk tolerance was cited as the most important factor in creation of asset portfolios. Irrationality and risk- seeking behavior were evident among the investors. The study did not however explore the link between behavioral biases and portfolio performance, a gap the current study has addressed.

Ratemo (2016) explored how individual investors' investing decisions were influenced by their behavioral biases. Kisumu County NSE trading investors were the study units. Correlational research design was adopted. Data was gathered from 60 participants via questionnaires and evaluated descriptively as well using linear regression-analysis. Findings revealed that the investors' choices were modified by behavioral biases with representativeness, mental accounting and loss aversion being the most influential. The study however never explored how the investors' behavioral biases impacted their assets' returns, a gap the current study sought to address.

Kung'u (2016) assessed cognitive biases' effects on investing choices among individuals investing at NSE. Design for the study was descriptive. A total of 69 individual investors was used. Data were collected using self-administered questionnaires and analyzed descriptively and via multiple regression analysis using SPSS v.22. It was established that individual investors' investment decisions were significantly correlated with anchoring, overconfidence, mental accounting and random walk. Current study extended the scope of this study by exploring the link between these biases and performance of portfolios held by the investors.

Research Methodology

This study adopted a descriptive cross-sectional research design. Mugenda and Mugenda (2009) averred that this research design entails assessing a set of variables as they exist naturally at a particular point in time. Kothari (2004) opined that this design offers the researcher a framework to describe relevant aspects of the phenomena under study and can help identify relationships between variables. This research design was considered appropriate for the current study as it helped the researcher evaluate the relationship between the study's predictor variables and the dependent variable. The population of the study was individual investors at the NSE, Nairobi. According to CMA's quarterly statistical bulletin (Q2 - 202) there were about ,207,690 individual investors trading in NSE as at June 202 (CMA, 202). These individual investors constituted the study population. Using the formula developed by Fisher and others (998) and recommended by Mugenda and Mugenda (2003), the appropriate number of sampled participants was determined as here below;

$n = [z^2pq/d^2]$

Where;

n = Appropriate size of sample (for population $\geq$ 0,000).

Z = Normal standard deviation for the set significance level of 0.05 which was .96

p = Estimated population part with required features, set at 50%.

q = (-p) = - 0.5 = 0.5

d = Significance level = 0.05.

Hence, $n = (.96^2$ x 0.5 x 0.5$) / 0.05^2$

$n = 384$

Hence, number of participants that constituted the study sample was 384 individual investors at NSE. Data for the study was obtained via a researcher-administered questionnaire. The questionnaire contained closed ended questions designed to elicit specific responses required to answer the research question.

Analysis of study data was performed using descriptive statistics including percentages, mean, frequencies and standard deviation. Multiple regression analysis was utilized to analyze how the predictor variables related with the study's outcome variable using the F and t statistics at 5% significance level. The regression model in use was specified here below;

The objective of the study was to evaluate how select behavioral biases related to portfolio performance of individual investors at the NSE. Results of the study are presented herein. Descriptive statistics and regression analysis were used to summarize the findings.

Findings

Portfolio Performance

The study also evaluated the respondents' portfolio performance for the period 209 to 202 using Sharpe ratio. The summarized findings were as shown in Table 4.8.

Table: Respondents' portfolio performance for the period 209 - 202

Sharpe ratio				
N	Min	Max	Mean	Std. Dev.
36	-2.04	.69	0.26	0.857

Results in table indicate that Sharpe ratio (a risk adjusted measure of investor portfolio performance) had a minimum of -2.04 and a maximum of .69; a mean of 0.26 and standard deviation of 0.857.

This indicated that, over the study period (209 - 202), the worst investor registered negative 204% portfolio performance while the best registered a portfolio performance of 69%, though on average the investors made 26% gains to their portfolios. This implied that, on average, the individual investors' portfolio performance was positive over the study period.

Regression Analysis

To determine the relationship between the study variables, the researcher performed a regression analysis whose results were as follows;

Model Summary

Table 4.9 contains the model summary findings.

Table 2: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.744[a]	0.554	0.548	.422

Predictors: (Constant), herding, loss aversion, overconfidence and anchoring

Coefficient of determination (R square) explains the percentage of variation in the dependent variable that is influenced by the independent variables. From the findings shown in Table 2, the four independent variables

evaluated (that is, herding, loss aversion, overconfidence and anchoring), explained 55.4% of variance in the individual investors' portfolio performance as represented by the R^2. Thus other factors not part of this study contributed 44.6% of variance in the study's dependent variable.

Analysis of Variance
Table 3 presents the analysis of variance findings.

Table 3: ANOVA (Analysis of Variance)

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	65.923	4	6.48075	96.53	.0000[a]
	Residual	53.098	3	0.7073		
	Total	9.02	35			

a. Predictors: (Constant), herding, loss aversion, overconfidence and anchoring

b. Dependent Variable: Portfolio performance

Analysis of Variance (ANOVA) consists of calculations that provide information about levels of variability within a regression model and form a basis for tests of significance. From the findings in Table 4.0, the significance value is .0000 which is less than 0.05, indicating that the overall regression model was statistically significant in predicting how herding, loss aversion, overconfidence and anchoring influenced portfolio performance among individual investors at the Nairobi Securities Exchange. Further, the F calculated value of 96.53 was greater than the F critical value at 5% level of significance of 2.40. This affirmed that the overall regression model had a good fit.

Model Coefficients
Table 4: *Regression model coefficients*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.04	.324		6.26	.000
Herding	0.439	.0	.58	4.347	.000
Loss aversion	-0.248	-.6	.686	2.38	.036
Overconfidence	0.367	.9	.624	3.084	.003
Anchoring	0.52	.3	.52	4.53	.000

Based on results shown in Table 4., the regression model becomes;

$$Y = 2.04 + 0.439\,X + -0.248\,X_2 + 0.367\,X_3 + 0.52\,X_4 + \varepsilon$$

The above analytical equation shows that portfolio performance among individual investors at the NSE would be 2.04 in the absence of behavioral biases.

The study established a significant positive relationship between herding bias and the individual investors' portfolio performance (β=0.439 and p value < 0.05); meaning that a raise in herding bias leads to an increase in individual investors' portfolio performance by 0.439. It further established a significant negative relationship between loss aversion bias and the individual investors' portfolio performance (β=-0.248 and p value < 0.05); meaning that a unit raise in loss aversion bias leads to a decrease in individual investors' portfolio performance by 0.248.

The study also established a significant positive relationship between overconfidence bias and the individual investors' portfolio performance (β=0.367 and p value < 0.05); meaning that a raise in overconfidence bias leads to an increase in individual investors' portfolio performance by 0.367. Finally, the study established a significant positive relationship between anchoring bias and the individual investors' portfolio performance (β=0.52 and p value < 0.05); meaning that a raise in anchoring bias leads to an increase in individual investors' portfolio performance by 0.52.

Conclusions

The study concludes that behavioral biases were evident among individual investors at the Nairobi Securities Exchange. These biases manifested in different forms. These included herding bias where the individual investors were influenced in their investment decisions/actions by sentiments held by their peers or other investors at the NSE; loss aversion bias in which the individual investors held on loss making stocks for fear of incurring investment losses and became more risk averse following a loss; overconfidence bias in which the individual investors relied on their own knowledge, skills and experience of the stock market in efforts to beat the market; and anchoring bias in which the individual investors relied on shares' past performance information to guide their investment decisions at the NSE. The study also concludes that the assessed behavioral biases had a significant influence on the portfolio performance of individual investors at the NSE.

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