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Abstract

The effect of demographic characteristics in the market and how it influences investor sentiment and risk appetite is a concept that has not been exhaustively investigated. Moreover, most of the reviewed literature, investigated the moderating influence of demographic characteristics but not the moderated mediation effect. Hence, the objective of the study was to determine the effect of demographic characteristics in the relationship between investor sentiment and risk appetite. Demographic characteristics like age or experience could influence sentiments such as fear, joy or sadness that an investor manifests in the market and thus affect performance. The study adopted a positivistic approach since it wanted to get insights into a phenomenon. In addition, a correlational descriptive survey was deemed appropriate because the study was about investigating the relationship between variables. This implies that primary data was collected from individual investors at NSE using a structured questionnaire and the response rate was 70.3%. ANOVA and stepwise regression were used to examine the moderated mediation effect of demographic characteristics on the relationship between investor sentiment and risk appetite. Moderated mediation occurs when the moderating term impacts the link between the independent and mediating variable meaning that the relationship is not bivariate. The outcome of the study revealed that the coefficient tests were not significant and therefore the study concluded that demographic characteristics did not have a moderated mediation effect.

Keywords: *Demographic Characteristics, Investor Sentiment, Risk Appetite, Individual Investors, Moderated Mediation*

Introduction

Demographic characteristics are factors that have gained importance with the emergence of behavioural finance which investigates the irrationality of investors. Further it is believed that demographic characteristics influence the sentiments an investor manifests and hence the risk appetite towards assets (Shinde & Zanvar, 2015). The influence of demographic characteristics has been investigated as a moderating variable but not as moderating the mediation link between the independent and dependent terms. Moderated mediation is a concept that argues that the relationship between variables may be better defined if both the direct and indiect effects are considered. Moderated mediation occurs when a moderating term impacts the relationship between the dependent and mediating variable (Fairchild and Mackinnon (2009). Consequently, the relationship of intangible variables like investor sentiment and risk appetite would be better defined if the indirect effects of demographic characteristics are considered. Investors are impacted by demographic characteristics whose effects as such cannot be isolated from the decision making process since they are part of their way of being. Therefore, the moderated mediation effect of demographic characteristics is believed to determine investor sentiment and which in turn affects their risk appetite (Shinde & Zanvar, 2015; Onsomu, 2018).

Investor sentiments vary depending on the demographic characteristics of each individual for example experienced traders tend to be more optimistic than new ones and thus are more risk seeking. Sentiment is a phenomenon that cannot be fixed but fluctuates between euphoria and sadness and it can determine whether an investor is risk seeking or risk averse (Shefrin, 2008. Risk is a key aspect of decision making and it establishes the level of tolerance for uncertainty in an investment and it is dependent on whether the investor is optimistic or pessimistic (Sayim, Morris, & Rahman, 2013). In other words, the risk appetite of an investor determines which type of asset they will select. Sentiment and risk interact in such a way that the investor tends to go for risky assets when the mood is high and more certain stocks when they are low. The process of determining risk appetite also involves identifying demographic factors that may affect the investor's tolerance level. Demographic characteristics determine the investor sentiment and risk appetite manifested while trading for instance male and female investors are known to reflect varied behaviour in the market (Onsomu, Kajiage, Aduda, & Iraya, 2017).

Investor Sentiment

Baker and Wurgler (2007) define investor sentiment as the expectation of future cash flow that is unsupported by facts and figures. In other words, investors make predictions about objectively valued stocks that tends to lead to unstable prices. According to Zhang (2008) sentiments are the subjective beliefs and expectations of investors about assets that replace fundamental data. Accordingly, by not considering objective information, investors risk having suboptimal returns from their investments. Hu and Wang (2013) define sentiment as the interpretation of objective information in a biased way such as relying on instinct and sentiment. Sentiment is an intangible and unobservable reality that is difficult to measure and hence it should be estimated using appropriately chosen proxies. For example, Hu and Wang (2013) used the Buy-Sell-Imbalance Index (BSI) as a proxy of investor sentiment. BSI is the difference between the purchase and sale of stocks. The inputs of this method are the purchases and sales of assets by individual investors however for a study at NSE it would not be easy to find this kind mistrust of people when the information needed is confidential.

The method of estimating investor sentiment index at the NSE market should include data that is readily accessible. The index can be developed from a survey like the one done by the American Association of Individual Investors (AAII). This index is computed from a survey conducted among its members which consists of a list of questions asking how investors feel about the market and then an estimate is derived from the responses. The AAII is the method that this study adopted to measure investor sentiment at the NSE. This method involves conducting a survey among a sample of investors and computing an average from their responses, it is the most appropriate since it is easily applicable (American Association of Individual Investors, 2019). It is important to study the influence of investor sentiment because fluctuating prices may lead to abnormal gains or losses when the prices are inflated or deflated respectively. However, more importantly they could trigger instability and increase risk in the market (Sreenu & Naik, 2021).

Risk Appetite

Gai and Vause (2006) define risk appetite as the investors' willingness to tolerate the likelihood of a loss. This refers to the amount of risk an investor is willing to bear because of the impossibility of totally eliminating uncertainty in investment. In other words, risk appetite is the tolerance of the uncertainty associated with investing in stocks for a future return. In an investment, the level of tolerance depends on two things; first on the quantity of risk and second on how much uncertainty the investor is willing to bear. Rajararan (2003) defines risk appetite as the decision the investor makes regarding the level of uncertainty he is willing to undertake. Risk appetite refers to two aspects; one is the subjective level of willingness to bear a degree of uncertainty and the other is the objective risk brought about by external factors that affect prices (Gonzalez-Hermosillo, 2008). Thus the riskiness that is perceived in an asset can determine whether the investor is risk seeking or averse to uncertainty.

Investors can be risk seeking or averse towards an asset depending on how they perceive the likelihood of loss. Hence, risk appetite can be approximated by two indicators; risk seeking and risk aversion (Dickason & Ferreira, 2018). Thus, risk seekers are investors who tend to go for risky securities and trade actively while the risk averse ones have a preference for more secure assets. Risk seeking is more common among investors who manifest optimistic sentiments like overconfidence and who have certain demographic characteristics like financial stability, young in age and have a good level of financial knowledge. The risk seekers tend to rely more on noise and rumours than on objective data. The risk averse investors who manifest pessimistic emotions like fear tend to have fewer financial means, less experience in trading or are older. The investors who are objective or neutral in their sentiments tend to rely on objective data to determine a balanced level of risk and portfolio (Kasoga, 2021). Thus, risk is a key factor in investment and thus an investor must decide the level of uncertainty that they are willing to bear as a result of selecting an asset.

From the preceding discussion the investors' decisions are noted as being affected by their attitude towards risk which is contrary to the traditional finance argument on rationality and objective data (Barberis, Mukherjee, & Wang, 2016). Therefore, this study estimated the risk appetite of investors at NSE using data collected from a self-administered questionnaire. This survey instrument was developed based on RBS Morgan Emerging Market Risk Tolerance Index (RBS EM RTI). This model considers the prevailing market circumstances and how the individual investor determines the risk level they can take in an investment. An investor can be classified as risk seeking or as

risk averse depending on what their attitude they manifest towards the likelihood of a loss related to an asset (Dickason & Ferreira, 2018).

Demographic Characteristics

Jackson et al. (2011) define demographics as aspects that differentiate the persons who are members of a unit under investigation. These demographic aspects include age, gender, income or education and they unique in each person and because of this differentiation one can be distinguished from the next one. Kim and Kim (2014) refer to demographic characteristics as personal data such as age, gender or marital status which can be used to identify different individuals in a population. Therefore, these features occur in different people in varied quantities and thus determine how they respond to stimuli in the environment. Demographics can also be defined as the vital, physical or social data about a human population like age, gender, residence, marital status and occupation. Demographic features are aspects identified in members of a population that are then applied to statistical analysis (Shinde & Zanvar, 2015). Since these characteristics are varied in each individual, they can affect how investors perceive investment options for example, male and female investors may have varied sentiments and risk appetite towards the same financial asset.

The sentiment and risk appetite manifested by investors towards investments is different because of the influence of their demographic characteristics. For example, a young person may be more risk seeking because they have fewer responsibilities than older people and so they can afford to take bigger chances. This means that characteristics like age or gender can determine the type of sentiments and risk appetite an investor manifests (Brooks et al., 2020). Similarly, male and female investors have different sentiment and risk appetite because of their gender, men are more risk seeking than women which can be attributed to their nature. Experienced investors tend to be more risk seeking than their newer counterparts. Family and marital obligations limit the amount of risk a person can take (Onsomu, 2014). This is because a committed person usually has more financial demands to attend to than a person who has no family. Consequently, the returns of investors with varied demographic characteristics tend to be different because of the influence of those personal features on sentiments and risk appetite (Bayar, Sezgin, & Ozturk, 2020). Demographics characteristics in this research were operationalized according to Lan et al. (2018) into age, gender, marital status, children and education. Investors do not have similar investment outcomes because they have different demographic characteristics which affect how they take their decisions (Kannadhasan, 2015). The foregoing demonstrates a possible moderated mediation effect of demographic characteristics on the relationship between investor sentiment and risk appetite (Alber & Gamal, 2019).

Research Problem

Individual investors have for the longest time been believed to be rational however in later years a new branch of finance has been developed to study their behaviour. Behavioural finance is a field of study that has been developed to investigate irraionality. Behavioural finance was developed as an alternative to classical finance which argues the case for the rationality of investors. Behavioural finance has demonstrated the potential to explain the anomalies in the market that classical theories has not managed to unravel up to now. The relationship between investor irrationality such as reliance on sentiment and market anomalies remains a conceptual gap

that is yet to filled. Thus, investigation guided by behavioural finance theories is needed to fill this gap on the relationship between investor sentiment, demographic characteristics and risk appetite which will contribute towards understanding irrationality in the market (Onsomu et al., 2017).

Irrationality of individual investors while making investment decisions in most stock markets is an undeniable reality and NSE is not an exception to this occurrence. Bias in decision making is exhibited when the individual investors rush to buy stocks from companies because they have issued profit or dividend warnings. At the NSE the investor has manifested irrationality by buying assets only from well-known companies like Safaricom, Equity, Absa, KCB and other banks (Musembi, Simiyu, & Njoka, 2020). Additionally, circumstances like the COVID-19 pandemic created a climate of fear and insecurity among individual investors about the present and the future such that trading drastically reduced and bourses around the world were closed to avoid market crunch. Individual investors have not been extensively studied at the NSE compared to institutional investors and hence a contextual gap is revealed (Onsomu, Kajiage, Aduda, & Iraya, 2017). Therefore, investigating individual investors would contribute to filling the gap on whether investors rely on rumours and noise to make decisions and whether this affects their risk appetite (Nairobi Securities Exchange, 2022).

Majority of the studies conducted so far were conducted in developed markets and thus revealing a contextual gap. For example, Lan et. al (2018) established that in the Chinese stock market demographics were highly correlated to investment selection. This study however apart from being done in China, only relied on a correlational analysis and did not conduct any inferential statistics. Alber and Gamal (2019) investigated the relationship between demographics and risk tolerance in Giza and Cairo using Fuzzy Analytic Hierarchical Process (FAHP) and established that the two variables were related. FAHP is too specialised and the rate of error increases with the number of variables in the model. Bayar, Sezgin and Oztuk (2020) investigated whether risk tolerance is determined by demographics and the level of financial literacy in a University in Turkey. The study found that demographics were related to risk tolerance however, the study sample seemed biased since it only included university employees. Brooks et al. (2020) established that high emotions led to increase risk appetite and vice versa among individual investors in the UK. Parveen et al. (2021) found a significant negative relationship between fear and investment decisions in Pakistan the study was done during the pandemic and so the findings may be different if the study is conducted during another period. The above studies are from more developed countries therefore a local study at the NSE is needed to reflect the influence or irrationality in a developing market.

Investor irrationality, sentiments and risk appetite that manifest while trading vary from one individual to the next and this could affect the outcome. Risk is inherent in every asset and an investor must determine the level they are willing to tolerate. Similar to sentiment, the level of risk an individual is willing to bear in an investment varies among investors. Demographic characteristics are believed to explain the variations in investor sentiment, risk appetite and outcome in returns (Baker, Kumar, & Goyal, 2019). For instance, a demographic feature like gender influence an individual to be optimistic, risk seeking or pessimistic, risk averse and cautious which may have an impact on the investors returns. However, the relationship between investor sentiment, demographic characteristics and risk appetite is not yet fully defined since the three variables have not been investigated together at the NSE. Further, the moderated mediation effect of demographic characteristics on the relationship between investor sentiment and risk appetite

has not been examined at the NSE. Therefore, a theoretical gap is revealed in the relationship among these three variables. To define the influence of investor sentiment on risk appetite, other indirect effects such as demographic characteristics should be considered in order to fill the gap on this relationship.

Literature Review

Noise Trader Theory

Trueman (1988) developed the noise trader theory which states that there are traders in market who rely on noise and rumours to make decisions. These investors since they rely on noise can be overconfident and optimistic and their trading activity can inflate prices leading to a market crash. The theory also states that limited arbitrage and investor sentiments have a role to play in the determination of asset prices. The theory argues that arbitrage is limited by the presence of noise traders and that rationality cannot eliminate its impact. Thus, the activity of rational arbitrageurs is not enough to maintain market equilibrium. Another argument is that the pricing of risky assets usually includes some noise since not everything about the asset is included in its valuation. Hence if assets were only priced by fundamentals they would not reflect its true value. Thus, beliefs that are not well founded could easily lead to overtrading which affects asset prices. This theory goes on to propose that the profits of both rational arbitrageurs and noise traders are affected by noise trading (Shleifer & Summers, 1990). It can be deduced from this that the behaviour of noise traders tends to increase asset risk and thus an investor may be in a worse off position for relying on rumours. Furthermore, the presence of both irrational and rational investors makes it difficult to beat the market since it is difficult to forecast the behaviour of noise traders (Chang & Fang, 2020).

Noise traders tend to be overconfident because they rely on rumours and private information, which lead to overtrading and inflating asset prices in the market (Hu & Wang, 2013). Generally, markets do not allow investors to earn abnormal returns without also bearing a higher level of risk. Hence, the trade-off between return and uncertainty argues the case for rationality in that higher risk may not as a necessary consequence, lead to greater gains. Due to this, noise traders who rely mainly on rumours and instinct may end up making negative returns. In addition, the market corrects any asset mispricing as new information becomes available (Malkiel, 2003). Hence, the price adjusting to new information concept opposes the influence of sentiments on asset prices. However, investors at the market seem to use their own instincts and beliefs to make predictions about future cash flows and also noise traders tend to give weight to their subjective beliefs more than objective information (Rashid, Fayyaz, & Karim, 2019).

Empirical Review Investor Sentiment, Demographic Characteristics and Risk Appetite

Lan et al. (2018) investigated the preference of investors regarding investment in the Chinese stock market by examining whether demographics could predict asset selection. The study conducted a Pearson's Chi square and Spearman's correlational analysis on data from 9000 questionnaires. Findings showed that demographics were highly correlated to decision making however further analysis would have given more insights into the relationship of the variables. Alber and Gamal (2019) investigated the effect of demographics on investor risk tolerance in Cairo and Giza among 73 investment consultants and 40 individual investors. The study found that age, education, wealth, occupation, experience and the number of dependents influenced risk tolerance. In addition, the study established that the estimation of risk using FAHP and the investors approximation were

similar. FAHP is a specialized method of analysis and when the factors being analysed are many the hierarchical steps increase as well as the complexity of the model and risk of errors.

Bayar, Sezgin and Oztuk (2020), investigated whether risk tolerance is determined by demographics and the level of financial literacy among the employees of the University of Usak in Turkey using multinomial logistic regression. The study established that gender, education, age, income and education level had an influence on risk tolerance. The study was limited since it focused on university employees who may not even be representative of the nation's population. Brooks et al. (2020) found that high emotions were related to increased risk tolerance and low feelings also decreased risk acceptance. The study was conducted among 970 individual investors in the UK. These findings contradict what is proposed by prospect theory that lower moods were more influential in investment than higher emotions.

Parveen et al. (2021) sought to establish the influence of the Pandemic on sentiment, investor bias and decisions. A significant and negative relationship between heuristic biases of fear caused by the pandemic and investment decisions was found among 401 individual investors in Pakistan. The research was done during the pandemic implying that the findings were limited to a specific time. Consequently, the study outcomes may not be applicable outside the pandemic times. Blake, Cannon and Wright (2021) sought to estimate the sentiments towards loss that are manifested by people of varied demographic characteristics, socio-economic status and personal traits through a digital survey among 4,000 people in the UK. The study found that the responses from the national population differed a lot from those of other researchers whose sample consisted mainly of students. The study found that loss aversion of a certain amount was related to demographic factors and personality traits. Further, demographics were not related to change in income they were also not related to change in sentiments. Sentiments were found to be related to change in income. This study did not include a mediation effect thus the indirect effect of demographics on loss sentiment was not considered. Furthermore; it was conducted in the UK which is a more advanced country than Kenya.

Research method

Positivism is the philosophy that seeks to draw conclusions about a phenomenon and to test existing theories about it. It involves the collection of data about a phenomenon using an appropriate instrument, analyzing the data and drawing conclusions from it. Thus, the approach ensures objectivity of the data and interpretation of findings the researcher opinion is kept at a distance. Positivism tests whether existing theories about phenomena still hold or should be reformulated. This approach argues that knowledge must be scientifically tested to be confirmed as true or rejected as false (Sekaran & Bougie, 2016).

Phenomenology is another approach to research whereby, the role of the researcher is to draw conclusions from the observations and experiences gained from the world. In other words, the researcher gets personally involved in the study as their opinion about the observations and experiences is required in this approach. The conclusions that are drawn from the observations are dependent on the experience of the researcher therefore interaction with the phenomenon being investigated is important for this approach. Phenomenology is largely concerned with understanding behaviour thus it may consist of observing or interviewing members of a population. The approach a study undertakes depends on the objective of the investigation.

The current study was positivistic in its approach since it sought to define a phenomenon. The study conducted a correlational descriptive survey since it aimed at establishing relationships among variables through testing a sample from a population. The population of this study was the individual investors of NSE who total 1.1million (CMA, 2022). Data was collected from the active individual investors of the NSE who were picked through randomly selected brokerage firms. Therefore, a structured questionnaire was distributed to the sample of individual investors. However, only 270 questionnaires were analysable which was represented a 70.3% response rate.

Regression Diagnostics

Shapiro-Wilk was applied to test normality in Sharpe ratio, investor sentiment and risk appetite. The results of the test were as follows; Sharpe ratio (W-stat=.518, $p < .01$), investor sentiment (W-stat=.988, $p < .01$) and risk appetite (W-stat=.985, $p < .01$) which meant that they were significant since the p value was lower than .05. Thus, the null hypothesis that the distribution was not different from normal was rejected. Thus, the three variables were not normally distributed but skewed and consequently, Spearman's rank coefficient which does not require the normal distribution of data was applied to conduct the correlational analysis of the variables. The results from the plot of the regression standardized residual was bell shaped and the mean of the error term was close to zero with $8.174e^{-16}$. This means that the error term could not predict itself.

Homoscedasticity was tested using Breusch-Pagan and White test. The results were Breusch-Pagan had (LM stat =.358, $p > .05$) and (F=.356, $p > .05$) while White Test had (LM stat =.556, $p > .05$) and (F =.275, $p > .05$). The results of both tests were not significant hence the null hypothesis that the data had heteroscedasticity or that the error term could predict the independent variable was rejected thus homoscedasticity existed. The ANOVA applied to test linearity showed that F-statistics was as (F = .946, $p > .05$) which implied that the model was not significant and therefore linearity did not exist in the data. Durbin-Watson was applied to measure autocorrelation which occurs when a variable is related to itself such that it can predict the following intervals. It also means that the error term can project itself in a series. The value of Durbin-Watson was D-statistic = 1.522 and since it is between 1.5 and 3.0 thus there was no autocorrelation in the variables. Collinearity was tested using Variance Inflation Factor (VIF) which is an inverse of Tolerance. The values of VIF were all below 2 therefore multicollinearity did not exist because the outcome was below 10 (Wooldridge, 2010).

Hypothesis Testing and Discussions of Findings Investor Sentiment, Demographic Characteristics and Risk Appetite

The premise of the study was that there was no significant moderating mediation effect of demographic characteristics in the relationship among investor sentiment (independent variable), demographic characteristics (moderating variable) and risk appetite (mediating variable). The indicators of investor sentiment were joy-optimism, neutral-objective and sad-pessimism which was according to Sun et al. (2021) and the indicators of risk appetite were risk seeking and risk aversion based on Dickason and Ferreira (2018). The indicators of demographics were age, gender, marital status, children and education following Lan et al. (2018). The relationship among the variables is shown in the conceptual framework below. The null hypothesis is as shown below:

H_1: There is no significant moderating mediation effect of demographic characteristics in the relationship between investor sentiment and risk appetite of individual investors at NSE.

Figure 1: Conceptual Model
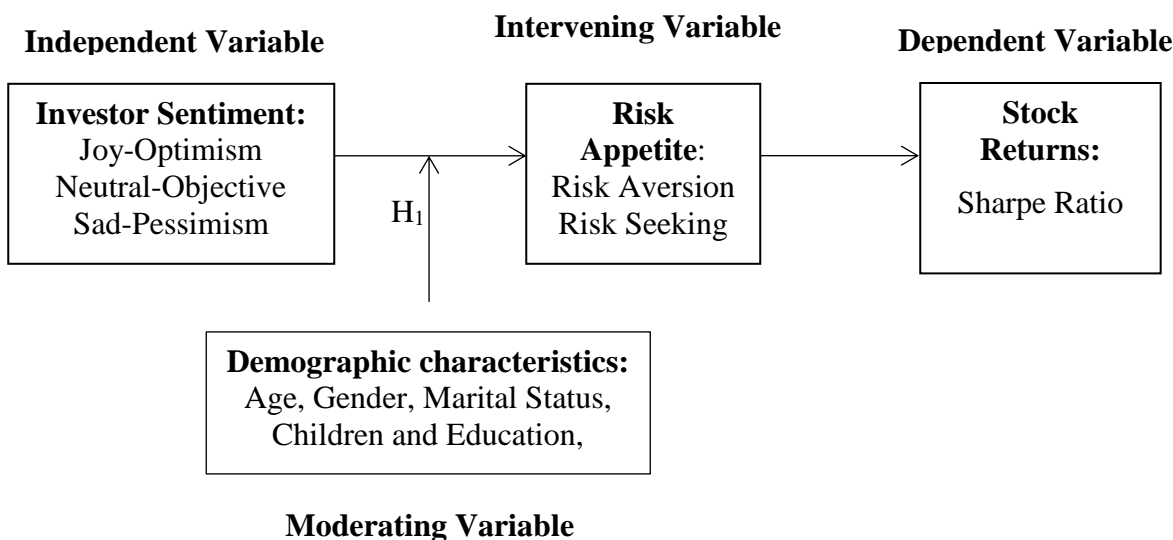
The hypothesis was tested using the following equation:

$$RA = \beta_0 + \alpha_1(IS) + \alpha_2(DC) + \alpha_3((IS)*(DC)) + \varepsilon$$

Where;

β_0 is a constant or intercept,

α_1, α_2, and α_3 are the regression coefficients,

RA is a composite of risk appetite,

IS is a composite of investor sentiment,

DC is demographic characteristics and

ε is the random factor that represents the variations that are not explained in the model.

The analysis of the moderated mediation involved five steps. The first step consisted of regressing risk appetite against investor sentiment indicators. The second step involved regressing risk appetite against investor sentiment indicators and demographic characteristics. The third step had three sections for each of the investor sentiment indicators. In order to forecast risk appetite, the interaction terms were computed for each of the three investor sentiment indicators with the demographic characteristics (**IS*DC**) and then added to the model together with investor sentiment indicators and demographic characteristics. The fourth step estimated the effect on risk appetite resulting from all investor sentiment indicators, demographic characteristics and the interaction terms. The fifth step estimated the moderated mediation effect of risk appetite on Sharpe ratio.

Table 1 shows the outcome of all the steps undertaken to measure the moderated mediation effect of risk appetite. The outcome of the first step which involved the regression of risk appetite and investor sentiment (joy-optimism, neutral-objective and sad-pessimism) was $\overline{R}^2 = .175$ and it meant that the model could explain 17.5% of the variation in risk appetite. The F-statistic of the model was (F=19.99, p < .001) and it implied that the model was significant and thus it could be used to predict risk appetite depending on coefficient test results. The coefficients of the first model were; joy-optimism (β_1=.312, p < .001) and sad-pessimism (β_3=.147, p < .01) consequently they were significant in forecasting risk appetite.

In the second step the demographic characteristics (gender, age-group, marital status, children and education) were added to investor sentiment (joy-optimism, neutral-objective and sad-pessimism) and used to estimate risk appetite. The model test results were $\overline{R}^2$ =.187 meaning that it could explain 18.7 % of the variation in risk appetite which was an improvement of 1.2% from the first step. The F-statistic (F=8.713, p < .001) was also significant in forecasting risk appetite however, it was a reduction of 11.277 from the first step. The outcome of the coefficient tests of the second model were; joy-optimism (β_1=.320, p < .001), sad-pessimism (β_3=.134, p < .01), JO*gender (β_4=.155, p < .01) and JO*marital-status (β_5=-.205, p < .01) and hence these variables were significant and thus the model can predict risk appetite.

In the first section of the third step the interaction terms (JO*DC) of investor sentiment (joy-optimism (JO)) and demographic characteristics (DC) were computed. Then risk appetite was estimated by regressing the interaction terms (JO*gender, JO*age-group, JO*marital status, JO*children and JO*education), investor sentiment (joy-optimism, neutral-objective and sad-pessimism) and demographic characteristics (gender, age-group, marital status, children and education). $\overline{R}2$ =.186 which implied that 18.6 % of the variation in risk appetite was due to the model however, it was reduction of .1% from the model in step two. F-statistic the model was (F=5.737, p < .001) which meant that it was significant and could project risk appetite. However, after adding the interaction terms (JO*DC) the model dropped in strength by 2.976 from the second step. The outcomes of the coefficients tests were as follows; joy-optimism (β_1= .382, p < .05) and sad-pessimism (β_3=.119, p < .05) meaning they were significant.

The second section of the third step involved computing the interaction terms (NO*DC) of investor sentiment (neutral-objective (NO)) and demographic characteristics (DC). The approximation of risk appetite was done by the regression of the interaction terms (NO*gender, NO*age-group, NO*marital status, NO*children and NO*education), investor sentiment (joy-optimism, neutral-objective and sad-pessimism) and demographic characteristics (gender, age-group, marital status, children and education). Tests showed that $\overline{R}^2$ = .181 which meant that 18.1% of the variation in risk appetite was due to the model. Compared to the second step $\overline{R}^2$ reduced by .6 %. The F-statistic was (F=5.569, p < .001) hence the model was significant and could be used to estimate risk appetite. This was however a reduction from the second model of 3.144 which meant that the model was weakened by including the interaction terms of neutral-objective and demographic characteristics. The coefficient outcome was as follows; joy-optimism (β_1= .306, p < .001) sad-pessimism (β_3=.134, p < .05) which were significant in forecasting risk appetite.

The third section of the third step consisted of computing the interaction terms (SP*DC) of investor sentiment (sad-pessimism (SP)) and demographic characteristics (DC). Then risk seeking was

approximated by the regression of the interaction terms (SP*gender, SP*age-group, SP*marital status, SP*children and SP*education), investor sentiment (joy-optimism, neutral-objective and sad-pessimism) and demographic characteristics (gender, age-group, marital status, children and education). $\overline{R}^2$ =.18 implying that 18% of the variation in risk appetite could be explained by the model. In comparison to the second step there was a reduction in $\overline{R}^2$ of .7%. The F test outcome was (F=5.555, p < .001) which showed that the model was significant subject to coefficient tests however, it was weakened by 3.158 after the addition of sad-pessimism and demographic characteristics interaction terms. The significant coefficient was joy-optimism (β_1= .330, p < .001).

The fourth step involved estimating risk appetite by including investor sentiment (joy-optimism, neutral-objective and sad-pessimism), demographic characteristics (gender, age-group, marital status, children and education) and all the interaction terms ((DC*JO) + (DC*NO) + (DC*SP)). The model had $\overline{R}^2$ =.194 and therefore it could explain 19.4% of the variation in risk appetite which was an increase of .7 % above the model in step two. In addition, there was an improvement in $\overline{R}^2$ of .3% compared to step 3.1, an increase of .4% from step 3.2 and of 1% higher than step 3.3. The F-statistic was (F=3.823, p < .001) which was significant in forecasting risk appetite but was a reduction in prediction power from step two of 4.89, it was a reduction of 1.914 compared to section 3.1, a reduction of 1.746 in comparison to section 3.2 and a reduction of 1.732 when compared to section 3.3. The coefficient tests outcomes were significant with joy-optimism (β_1= .780, p < .001), JO*children (β_{12}=-.114, p < .05) and JO*education (β_{13}= -.482, p < .01) and SP*children (β_{22}= .578, p <.001 therefore the model could be used to predict risk appetite.

The fifth step estimated Sharpe ratio using investor sentiment (joy-optimism, neutral-objective and sad-pessimism), demographic characteristics (gender, age-group, marital status, children and education), the interaction terms ((DC*JO) + (DC*NO) + (DC*SP)) and risk appetite. The statistical tests showed that $\overline{R}^2$ =.126 which implied that 12.6% of the change in risk appetite was due to the model but it was a decrease of 6.8% in comparison to the fourth step. F-statistic was (F=2.615, p < .01) and it was significant however it was a reduction in prediction power of 1.208 from the fourth step. The coefficient tests had the following results; joy-optimism (β_1= -2.718, p < .001), sad-pessimism (β_3= 3.062, p < .001), children (β_7= -6.710, p < .001), JO*education (β_{12}= 2.156, p < .001) and SP*children (β_{22}= -3.453, p < .001) thus, they were significant and could predict Sharpe ratio. However, from Table 1.1 below the outcome of the coefficient tests in the fifth and final step show that risk appetite was not significant with (β_{25}= -.096, p > .05). Hence, though the model was significant (F=2.615, p < .01) but including the effect of risk appetite lowered the prediction power of the equation. The study therefore failed to reject the null hypothesis that there was no moderated mediation effect of demographic characteristics in the relationship between investor sentiment, risk appetite and Sharpe ratio.

Discussion of Findings

The above outcome implies that, being pessimistic about the market contributed positively to returns. This is because as shown in Table 1.1 a unit of Sharpe ratio was similar to 3.062 units of sad-pessimism. On the other hand, a unit of Sharpe ratio was equivalent to -2.718 of joy-optimism meaning that being optimistic led to a reduction in returns. However, demographics have no effect in the relationship between investor sentiment and risk appetite and consequently there was no influence on Sharpe ratio. The findings of this study are similar to Olweny, Namusonge and

Onyango (2013) which found that there was no significant relationship between demographic factors and risk tolerance. Similarly, Onsomu (2017) and Blake, Cannon and Wright (2021) found that demographic characteristics had no significant moderating effect on investor behaviour and investment decisions. The outcome of the current study can be explained by the public health crisis and political tension that the investors were facing where investors were afraid of trading.

The interaction between joy-optimism and education as shown in Table 1.1 had a positive influence of 2.156 on a unit of Sharpe ratio. This meant that optimism was positively associated to Sharpe ratio when the investor had a high level of education. While on the contrary the interaction between sad-optimism and children had negative effect of -3.453 on a unit of Sharpe ratio. Similarly, a unit of Sharpe Ratio was equivalent to -6.170 of children which mean they were negatively associated implying that having children led to lower returns since there would be less income to invest. The findings of the study agree with Onsomu (2014) which established that demographic characteristics had a moderating effect in the relationship between overconfidence and investment strategy. The current study is consistent with the one by Nyamute et al. (2015) which examined the relationship between investor behaviour, demographics and portfolio performance. The study found that demographics had a moderating influence in the relationship between investor behaviour and performance. Lan et al. (2018) investigated which investment options were preferred by investors and found that demographic characteristics determined investor behaviour and asset selection. Dickason and Ferreira (2018) investigated the link between risk tolerance, investor biases and personality. The study found that personality affected risk tolerance which influenced investor bias.

Recommendations for Future Study

A study investigating which investor education topics are most useful in improving performance at the NSE could be done so as not to spend money on programmes that do not add value. Therefore, a survey could be conducted on the gaps that investors feel that they have and then a curriculum can be developed addressing the need that was highlighted. The investors could then go through a period of training. A longitudinal study could then be conducted on a sample of the investors undergoing the curriculum to track if there is any change in their performance that is related to the learning that they are undertaking. In addition the current study could be repeated during a non-political period and when there is stability in the market to check whether the outcome would be different.

Table 1: Regression of Investor Sentiment, Demographic Characteristics and Risk Appetite

DEPENDENT VARIABLE	Risk_Appetite	Risk_Appetite	Risk_Appetite	Risk_Appetite	Risk_Appetite	Risk_Appetite	Sharpe Ratio
Independent variables							
Joy_Optimism	0.312***	0.320***	0.382*	0.306***	0.330***	0.780***	-2.718***
Neutral_Objective	-0.009	-0.005	-0.007	-0.039	0.005	0.044	-0.342
Sad_Pessimism	0.147**	0.134**	0.119*	0.134**	-0.138	-0.442	3.062***
Moderating variables							
Gender		0.155**	-0.185	0.788	0.103	0.162	2.183
Marital Status		-0.205**	-0.061	-0.288	-0.27	-0.052	-3.947
Age_ Group		-0.082	-0.606	-0.126	-0.092	-0.981	2.096
Children		-0.02	0.495	0.408	-0.175	1.292	-6.710**
Education		0.147	0.534	-0.534	-0.499	0.068	1.954
Interaction terms							
Joy_Optimism_Gender			0.121			0.132	0.151
Joy_Optimism_Age_Group			0.177			0.196	-0.22
Joy_Optimism_Children			-0.184			-0.314*	0.305
Joy_Optimism_Education			-0.116			-0.482**	2.156***
Joy_Optimism_Marital Status			-0.05			-0.096	0.549
Neutral_Objective_Gender				-0.195		-0.115	-0.593
Neutral_Objective_Age_Group				0.013		0.166	-0.914
Neutral_Objective_Children				-0.138		-0.252	1.072
Neutral_Objective_Education				0.223		0.075	0.029
Neutral_Objective_Marital Status				0.023		-0.002	0.863
Sad_Pessimism_Gender					0.016	-0.014	-0.275
Sad_Pessimism_Age_Group					-0.004	-0.112	0.656
Sad_Pessimism_Children					0.072	0.188	0.93
Sad_Pessimism_Education					0.257	0.578***	-3.453***
Sad_Pessimism_Marital Status					0.033	0.075	-0.358
Mediating variable							
Risk Appetite							-0.096
Constant	1.218***	1.143***	0.938	1.268	1.775***	0.897	-0.061
Observations	270	270	270	270	270	270	270
R-squared	0.184	0.211	0.226	0.22	0.22	0.263	0.204
Adjusted R-squared	0.175	0.187	0.186	0.181	0.18	0.194	0.126
F	19.99	8.713	5.737	5.569	5.555	3.823	2.615
P value	-	0.000	0.000	0.000	0.000	0.000	0.000
Root MSE	0.595	0.591	0.591	0.593	0.593	0.588	1.877

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

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