The Impact of Social Influence on the relationship between Behavioral Biases and Portfolio Diversification

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Abstract
The study examines the impact of behavioral biases on portfolio diversification of the investors trading at Pakistan Stock Exchange (PSX). The study also explores the moderating role of social influence in the association between behavioral biases and portfolio diversification. Biases studied in this research are overconfidence and hot hand fallacy. Primary data is collected from investors of Pakistan Stock Exchange using a structured questionnaire. A representative sample of 430 investors trading at Pakistan Stock Exchange is used in this study. The findings of this research have shown that behavioral biases impact negatively the portfolio diversification. The finding of this research also highlights that social influence moderates the association between hot hand fallacy and portfolio diversification. However, findings showed that social influence do not moderate the association between overconfidence and portfolio diversification. This research will be helpful for investors as well as for the regulators. This research will enable the investors to recognize the effect of biases in their ability to diversify the investment portfolio. They will also consider the role that social influence play in the impact of these biases on portfolio diversification. On the other hand, this research also highlighted areas where regulators can educate investors. The study finds a strong support from Theory of Planned Behavior. Previously researches have studied the effect of biases on investment horizon, investment decisions or investment risk. This research is unique in a way that it examines the effect of biases on portfolio diversification.

Keywords: Overconfidence, Hot Hand Fallacy, Social Influence, Portfolio Diversification

1. Introduction

Traditional finance assumes that investors are rational and they maintain a diversified portfolio so that the risk of their investment is minimized at a particular level of return (Markowitz 1952). One crucial strategy for portfolio management is portfolio diversification (Sulaimon, 2022). Diversified portfolio enables the investors to avoid losses when market anomalies arise (Mangram, 2013). Investors who diversify their investment portfolio are able to minimize the risk associated to their investments and ultimately the chances of loss as well (Jayeola et. al., 2017; Akhtar, 2020). Lately, the researchers have highlighted that theories of traditional finance do not apply in reality and there are factors like personality of the investors and biases in their cognition that effect the investment decision making process. Investors often keep a low number of stocks in their portfolio and do not maintain a diversified portfolio (Barber & Odean, 2000). Geographical reasons and lack of information related to the investment options are few reasons that investors are not able to act optimally in their investment decisions.

Investors in the real world scenario have beliefs and behaviors that play a role in the investment decisions they make, such beliefs are termed as behavioral biases.

Behavioral biases can be cognitive or emotional. Both cognitive and emotional biases affect the investors' decision making process. Simon (1956) introduced the concept of bounded rationality, as people have limited knowledge and time when making a decision; their decision making often is not optimal. On the other hand, decisions of the people are also influenced by the behavior of family, friend and colleagues and even by the society. Behavioral biases exist in the human nature. Due to the existence of these behavioral biases, investors are drawn into making investment decisions that are not optimal and sometimes not even rational (Byrne & Utkus, 2013). One of the key investment decisions is maintaining a diversified portfolio of investments.

Most studies conducted in the area of behavioral finance intended on checking the effect of emotional and psychological factors on process of decision making of investors (Akhtar et. al., 2018). On the other hand, so many other factors are present in the real world scenario that influences the investors' decision making. Social influence is one such factor that influences the decision making of the investors. Influence of relatives, social media and friends in the decision making is termed as social influence. People tend to gain information from different sources. Such information is a key factor in making a decision. When making an investment decision, information obtained through the discussion with relatives and friends can be very useful. In the same way, these days, one of the great sources of information for the people is the social media. The information attained via social media is a significant factor in the decision making of a person. Decision about making an investment is no different. When an investor have knowledgeable family members and friends, the investment decision making can be much better than in case where investor lacks the positive social influence. It can be said knowledgeable and learned social circle can influence the investors in maintaining a diversified portfolio of investment.

Jaiyeoba et al. (2020) studied the role of representative bias, anchoring bias, herding and religion bias in investors' decision making. They recommended that study on other biases can add to the body of knowledge. Similarly, Khan et al. (2021) focused on exploring the impact of representative bias and availability bias and suggested that other biases can be studied that effect the investor's decision making. Aren & Hamamcı (2020) studied emotional biases recommended that other factors can be studied to add to the literature of behavioral finance. Mostly studies in the context of behavioral biases have focused on studying the relationship of behavioral biases with investors' risk preference, investment decision or investment time horizon e.g. (Goyal, 2016; Aydemir & Aren, 2017) and Shah et. al (2018). This study is unique in a way that it is an attempt to highlight whether behavioral biases have an effect on investors' ability to keep a diversified portfolio. Secondly, there are numerous studies that has focus on examining the moderating role of financial literacy, emotional intelligence, locus of control e.g. Aydemir & Aren (2017), Rasheed et al. (2018), Adil et al. (2021) and Khan et al. (2021). This study aims to study the impact of social influence in the association between the behavioral biases and portfolio diversification.

2. Operational Definitions and Hypothesis Formation

2.1 Overconfidence

Overconfidence bias is a term given to a situation where investors over rely on the predictions they made about certain investment option (Budiarto, 2017). Overconfident investors are more confident about their ability to make investment decisions (Bonney et al., 2020). Such individuals generally underestimate the risk related to the investment and overestimate the

knowledge level they possess (Raut et al., 2020). Studying the impact of overconfidence of investors on different variable has been of utmost interest to the researchers (Duxbury, 2015). Individual investors do make assessment about the investments and they are at times overconfident about their assessment (Mouna & Jarboui, 2015)

2.2 Hot Hand Fallacy

Incorrect belief that certain events are positively auto correlated is called hot hand fallacy (Gilovich et al., 1985). It is believed by the investors that some events will repeat itself (Kudryavtsev et al., 2013). If an investor had made profits on a certain stocks in the past, he/she is likely to reinvest in such securities in future again (Kudryavtsev et al., 2013). This also brings trend-chasing approach of investment (Baker & Ricciardi, 2014).

2.3 Social Influence

In a decision making process, individuals do not make decisions based on the subject in hand only but the social group surroundings and environment in which the decision is taken does matter as well. This phenomenon is termed as social influence (Chih et al., 2017). In today's world, information sharing through friends and social media has become substantial part of the environment. One significant factor that influences the decision of individual investors is media. Market conditions and forecasts are often provided by the media and are of utmost importance for the decision makers (Davis, 2006; Shiller, 2000). When people observe others people doing something, they tend to believe that a particular behavior is sensible (Wang & Lin, 2011). People rather than making their own judgment often tend to follow other people's choices (Bonabeau, 2004).

2.4 Portfolio Diversification

Diversification is investment in securities of different companies so that risk of the investment can be minimized at a given level of return in the investment portfolio (Jayeola et al., 2017). It is a strategy that has been acknowledged by researchers and economists that enables to minimize the total variance of the expected return of an investment portfolio (Yu & Kim, 2021). Investors generally allocate their investments in stocks of different industries so that the overall risk associated to the investment can be spread. Diversification, is done properly, can minimize the total risk of the investment portfolio because if securities of one industry experience downturns still the losses will be offset by returns from the investment in securities of other industries. Hence, it can be said that proper diversification can make overall investments more secure especially in the times of economic uncertainty.

2.5 Underpinning Theory

Theory of Planned Behavior presented by (Azjen, 1991) supports the model of this research. TPB argues that individual's behavioral outcome is based on three elements i.e. subjective norm, attitude towards behavior and perceived behavior control. Hot hand Fallacy is the investor's attitude towards assessing the investment alternative. Beliefs of certain people and of overall society is called subjective norm. The way in which a certain behavioral is viewed by the society is termed as 'subjective norm'. Social influence is the subjective norm in the framework of this study. Furthermore, overconfidence is the perceived behavioral control that lies in the investors.

2.6 Overconfidence and Portfolio Diversification

Investors when overconfident about the correctness of the information they possess often exaggerate the accuracy of their analysis about the performance of certain stocks and hence keep low number of stocks in their portfolio (Mouna & Jarboui, 2015). Therefore, it can be said that level of diversification in the investment portfolio is directly related to the

overconfidence of the investor. Level of confidence that investors have on their prediction of the stock performance shapes the level of diversification of the investment portfolio. As investors make analysis about the future performance of the investment alternatives, they feel a sense of control over the performance that makes them overconfident about their analysis and ends up overinvesting in certain securities. Overconfident investors rely heavily on the information they possess and analysis they made, often do not diversify their portfolio as they feel they can earn larger returns through active trading in certain securities. Hence, here we hypothesize that:

H1: **Overconfidence of the investors negatively impacts portfolio diversification**

2.7 Hot Hand Fallacy and Portfolio Diversification

Hot hand fallacy has been studied and researched in different literature but have been researched insufficiently in financial and investment researches (Cohen, 2013). When investors earn from investment in certain securities, they become optimistic that those securities will perform well again. Investors tend to believe that securities that have performed well in past will perform well in future too. Such investors therefore increase the amount of investment in the stocks that have earned profits in the past. Hence, the investors don't keep a diversified investment portfolio. Based on the arguments, the following hypothesis is developed:

H2: **Hot Hand Fallacy is negatively related to portfolio diversification**

2.8 Moderating Role of Social Influence

A moderator is a variable that strengthens or weakens the relationship between an independent variable and a dependent variable (Stacy et al., 1991; Arnold, 1982). People interact with other people to obtain information that can help them to make decisions related to their investments (Shiller & Pound, 1989). According to Shive (2010), investors tend to interact with their family members and friends about the investment alternatives and such interactions influence the investment decisions they make. Number of researches has confirmed that trading frequency is directly related to the information acquired about the stocks (Abreu & Mendes, 2012). It is obvious that investors make investment decisions after they collect information about the investment alternatives (Guiso & Jappeli, 2006; Tauni et al., 2015). It is observed that individuals do not make formal investment analysis when they are influenced by the media (Baker & Nofsinger, 2002). Many previous studies have identified social influence as a significant factor that affects attitudes and intentions of the individuals and lead them toward a particular behavior (Hsu and Lu, 2004). It is evident that cognitive factors are influenced by personality and environment in which individuals make decision (Borghans et al., 2008). Social influence effects significantly decision making process of the investors (Akhtar et al., 2018).When the investor has learned family and friends, the decision making of the investor is influenced because of the information attained through discussion with them. Similarly, social media involvement also influences the decision making of the investors. It can be argued that information attained through the newspaper or via social media changes the opinion of the investors about certain investments. Similarly, advices of family members and friends are also influential when it comes to making decision. Hence, it is argued that social influence helps reduce the negative impact of biases in the investors' ability to keep a diversified portfolio of investment. Based on the discussion, we hypothesize that:

H3: **Social Influence moderates the association between behavioral biases and portfolio diversification in such a way that relationship becomes weak when social influence is high.**

H3A: **Social Influence moderates the association between overconfidence and portfolio diversification in such a way that relationship becomes weak when social influence is high.**

H3B: **Social Influence moderates the association between hot hand fallacy and in such a way that relationship becomes weak when social influence is high.**

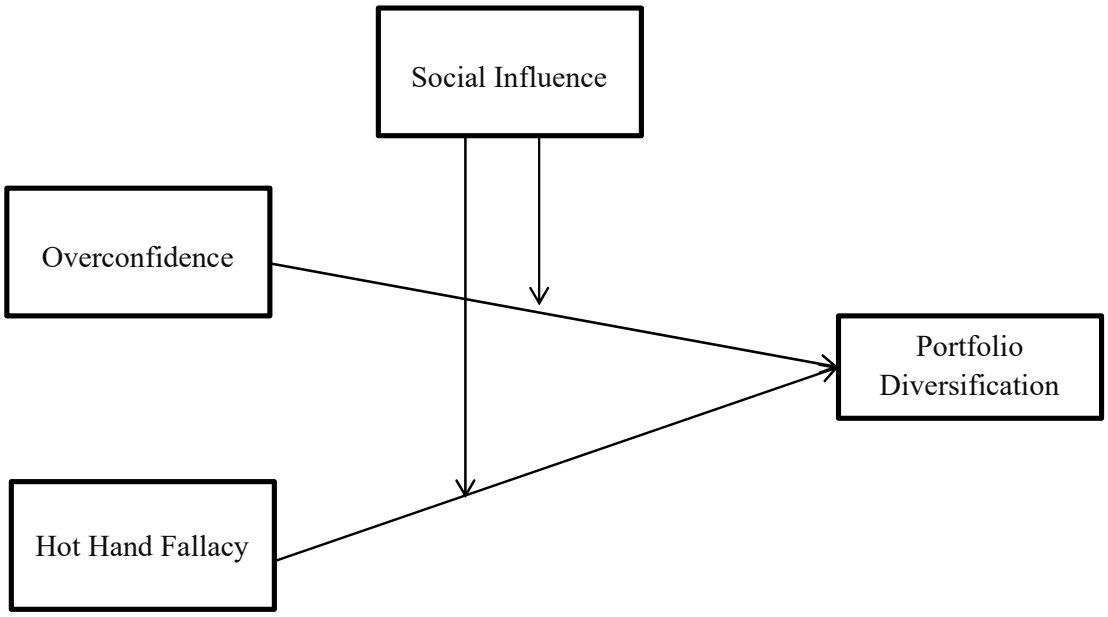


Figure 1: Model of the study

3. Research Methodology

3.1 Participants

This study is conducted to explore the impact of behavioral biases of the investors of Pakistan Stock Exchange on the portfolio diversification. Therefore, the responses are obtained from the individual investors trading at Pakistan Stock Exchange (PSX). Investors trading at Pakistan Stock Exchange are the population of this study. The data has been collected in a 2 month time period. It is estimated that more than 200,000 individual investors are involved in trading of securities at PSX. Approximately, there are 282 brokerage houses that operate in Pakistan. 32 of them are situated in Rawalpindi and Islamabad. At least 15 responses are collected from each brokerage house in Islamabad and Rawalpindi.

In a total of 430 respondents, 377 are males and 53 are females. Hence, in this study, 87.7% respondents are male and 12.3% are females. As far as the age of the respondents, 23.3% lies in the age bracket of 18 years to 30 years. 27.4% are having ages more than 30 years but less than 40 years. 18.6% respondents are of ages between 40 years and 50 years. 30.7% respondents of this study are above 50 years of age. Analysis of the education of the respondents shows that 20.2% of the respondents have a qualification of intermediate level or less. 54.8% respondents were graduates. While 24.9% respondents have a qualification level of Masters or above. 5.3% respondents have a level of income level of Rs. 50,000 or lesser. 10.2% investors have an income of above Rs. 50,000 but less than Rs. 100,000. 29.9% respondents have an income level of above Rs.100,000 but less than Rs.200,000. While 54.6% of the respondents have an income of above Rs.200,000.

3.2 Procedure

The data for the study has been collected from the investors of PSX using a close-ended structured questionnaire. In total, 495 responses are obtained from the investors of Pakistan Stock Exchange. Out of the 495 responses obtained, 430 valid responses are analyzed in this study. Sample size of the research is 430 individual investors. Many researches are conducted on the investors of Pakistan Stock Exchange (Rasheed et. al., 2018; Adil et. al., 2021; Chaudary, 2019). The samples size of the study is consistent with the past researches conducted on the investors of PSX. As per Krejcie & Morgan (1970), if the population is more than 100,000, required size of the sample is 384. This study exceeds this sample criterion. Statistical tests were applied to test the influence of common method variance (Williams & McGonagle, 2016). Recommendations of Podsakoff et al. (2003) are followed; Harman's single-factor test is used to calculate the total variance. All measures are taken as a single factor without rotation. Variance is found less than the threshold of 50% that implies that results are free from CMV.

3.3 Measures

All the measures used in this study are adopted from sources previously tested. To capture the effect of behavioral biases and social influence, 5-point likert scale is used ranging from 'strongly disagree' to 'strongly agree'. In previous researches, the adopted scales showed a reliability value of above 0.7. Given below is the detail of measures that are used to gather data for the study:

3.2.1 Overconfidence

Scale developed by Lin (2011) is adopted and used to measure the overconfidence of the investors of PSX. It is a 4-item instrument. A sample item includes "I have complete knowledge of the financial market".

3.2.2 Hot Hand Fallacy

The scale that was constructed by Kudryavtsev et al. (2013) is adopted in the study and is used to capture Hot Hand Fallacy in the investors of Pakistan Stock Exchange. In earlier researches where this scale has been used, showed a reliability of above 0.7. The scale includes three items. Sample item of the scale is "If I find out that the market price of one of the stocks I hold decreased dramatically, I decrease the sum of my stock market holdings".

3.2.3 Social Influence

Social influence is measured through a scale that was originally constructed by Shanmugham & Ramya (2012). The scale is made up of three items. One item is added in the scale that is developed by Lu (2014) to capture the effect of social media in the social influence.

3.2.4 Portfolio Diversification

The measure is adopted from Sotiropoulos & Rutterford (2017) to measure the portfolio diversification of the individual investors trading at PSX. According to Blume et al. (1974), simplest measurement of portfolio diversification is the number of different securities held in the portfolio. According to Woerheide & Persson (1993), commonest measurement of investment diversification is to sum up the number of different stocks held in the portfolio. If there are thirty or more stocks in a portfolio, the portfolio can be termed as fully diversified (Statman, 1987). A rating is developed having values 1 to 5 on the basis of the number of different stocks held in the portfolio of the respondents. If an investor has more than thirty different stocks in the portfolio "5" rating is given to the portfolio. Similarly, is an investors has less that 3 stocks in the portfolio "1" rating is given.

4. Results

4.1 Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) is used to verify how well the measured variables represent the number of constructs. CFA is performed using overconfidence, hot hand fallacy and social influence using AMOS 20 to check acceptability of the measured model on the basis of the data.

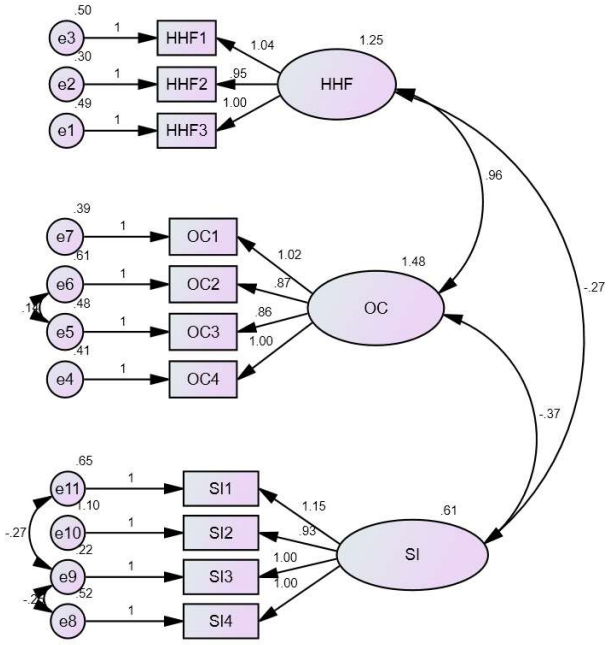


Figure 2. Path Diagram

4.2 Reliability, Validity of Constructs and Model Fitness

Reliability of the scale is the measurement of the consistency of the items within a scale. In this research, scale reliabilities are measure through Cronbach's Alpha. Similarly, Composite Reliability of the scales is also measured for further confirmation of the reliabilities of the construct. Reliabilities values of all variables are found above 0.7 that is the threshold for the scales to be considered reliable (Nunnally & Bernstein, 1994).

Convergent validity and Discriminant validity is calculated through the value of Average Variance Extracted (AVE). AVE is calculated using the 'James Gaskin Plugin' through AMOS. When the value of AVE is above 0.5, it is the evident that convergent validity holds. AVE for all variables used in the study is found above 0.5. Similarly, AVE value is compared with the value of MSV to determine the discriminant validity of the construct. When AVE of the construct is greater than the MSV score, it is determined that discriminant validity holds. In this study, AVE value of all the constructs is found greater than the MSV value. Table below is showing the reliability and validity scores of the constructs.

Table 1. Reliability and Validity

Variables	Cronbach's Alpha	CR	AVE	MSV
Hot Hand Fallacy	0.898	0.904	0.83	0.723
Overconfidence	0.921	0.928	0.807	0.71
Social Influence	0.763	0.864	0.566	0.374

Notes: *CR = Composite Reliability, AVE = Average Variance Extracted, MSV = Maximum Shared Variance*

To further ensure the validity of the constructs, Fornell Larcker criterion is also applied (Fornell & Larcker, 1981) and HTMT ratios were measured using SmartPLS. The threshold value of less than 0.85 (Henseler et al., 2015) is used as a benchmark. All the values are found under 0.85 that implies that discriminant validity holds for all the constructs. The table representing the HTMT ratios is given as follows:

Table 2. HTMT Ratios for determining Discriminant Validity

Variables	HHF	OC	PD	SI
Hot Hand Fallacy				
Overconfidence	0.701			
Portfolio Diversification	0.442	0.477		
Social Influence	0.338	0.388	0.604	

Notes: *HHF = Hot Hand Fallacy, OC = Overconfidence, PD = Portfolio Diversification, SI = Social Influence*

As AMOS enables to calculate various model fitness indices like NFI, RMSEA and CMIN/DF. AMOS is initially used to calculate the model fit indices. Model Fitness Indices are given in the Table 3:

Table 3. Model Fitness

Measure	Estimate	Threshold	Interpretation
NFI	0.861	Between 0 and 0.9	Acceptable
CMIN/DF	2.195	Between 1 and 3	Acceptable
SRMR	0.073	<0.08	Excellent
RMSEA	0.053	<0.06	Acceptable

Notes: *NFI = Normed Fit Index, CMIN = Chi – Square Value, DF = Degree of Freedom, SRMR = Standardized Root Mean Square Residual, RMSEA = Root Mean Square Error of Approximation*

All the values of model fitness are in acceptable ranges. Value of NFI is 0.861 which is between the acceptable ranges of 0 to 0.9. Similarly, CMIN/DF value for the model is found 2.195 which is within the acceptable range of 1 and 3. SRMR value is 0.073 which is lesser than the threshold of 0.08. RMSEA value of 0.053 is also acceptable i.e. less than the threshold of 0.06. As model of the study is found fit, we move towards further analysis.

4.3 Descriptive Statistics and Correlation

Correlation between the variables is the basic indication of the relationships among the variables. Correlation is also used to make an assessment about the multicollinearity between

the independent variables. If correlation between predictors is quite high it indicates towards the problem of multicollinearity. The correlation between the variables is reported as follows:

Table No. 4.4: Correlation Matrix

Variables	Mean	Standard Deviation	Portfolio Diversification	Hot Hand Fallacy	Overconfidence	Social Influence
Portfolio Diversification	3.74	0.925	1.000			
Hot Hand Fallacy	2.5	1.209	-.371**	1.000		
Overconfidence	2.43	1.192	-.368**	.455**	1.000	
Social Influence	3.21	0.857	.482**	-.275**	-.281**	1.000

Notes: *N = 430, *p < 0.05, **p < 0.01*

As the data of the study is ranked data, Spearman's Correlation is used through SPSS. The correlation table is providing the basic indication of the relationship among the variables. The relationship between hot hand fallacy and portfolio diversification is found negative (r = -0.371). Similarly, there exist a negative relationship between overconfidence and portfolio diversification (r = -0.368). On the other hand, positive relationship exist between social influence and portfolio diversification (r = 0.482). It is also found that relationship between independent variables is not significantly high so we can ascertain that there is no issue of multicollinearity. But to confirm, VIF values are also reported in the below given Table No. 5.

Table No 5. Multicollinearity Diagnostics

Variables	Tolerance	VIF
Hot Hand Fallacy	.201	4.966
Overconfidence	.202	4.933

Notes: *VIF = Variance Inflation Factor*

Value of VIF is less than 5 and Tolerance level is above 0.2 which rules out the issue of multicollinearity in the study. So we move on to the testing of hypothesis.

4.4 Testing of Hypothesis

In a single run, s series of relations among the variables can be analyzed through Structural equation modeling (SEM) (Tabachnick & Fidell, 2007). Complex multivariate data can be tested via Structural Equation Modeling (SEM) (Grace, 2008). SmartPLS 3 is used to run Structural Equation Model (SEM) for the data of the study. Results of SEM analyzed through SmartPLS are reported in the following table:

Table No 6. Results of SEM

Variables	β	p-value
HHF	-0.145	0.013
OC	-0.216	0.000
SI	0.32	0.000
Int_1 (SI x OC)	0.193	0.741
Int_2 (SI x HHF)	0.015	0.000

Outcome Variable: Portfolio Diversification (PD), HHF = Hot Hand Fallacy, OC = Overconfidence, SI = Social Influence

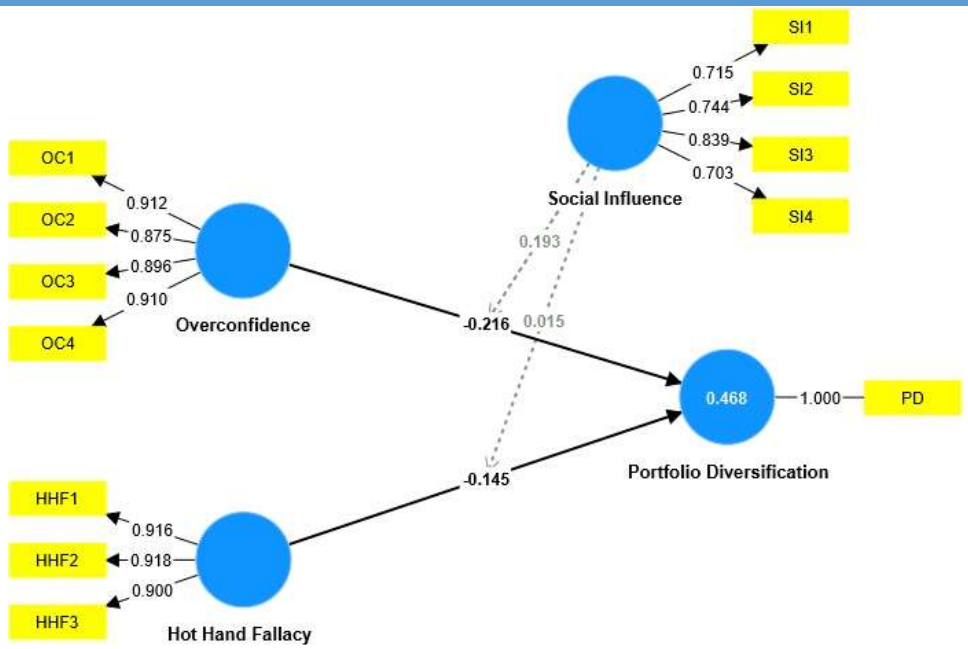


Figure 3. Test of Model

The result of SEM showed that there is a negative relationship between the OC and PD (β = -0.216, p-value = 0.000). This implies that hypothesis H_1 of the study is accepted. The coefficient of the HHF is having a value of -0.145 at a p-value of 0.013 which is less than the benchmark of 0.05. This implies that HHF negatively impact the PD of the investors. The result support the hypothesis H_2 of the study and the hypothesis stand accepted. Graphs given below represent the moderation effect of SI in the association between OC and PD:

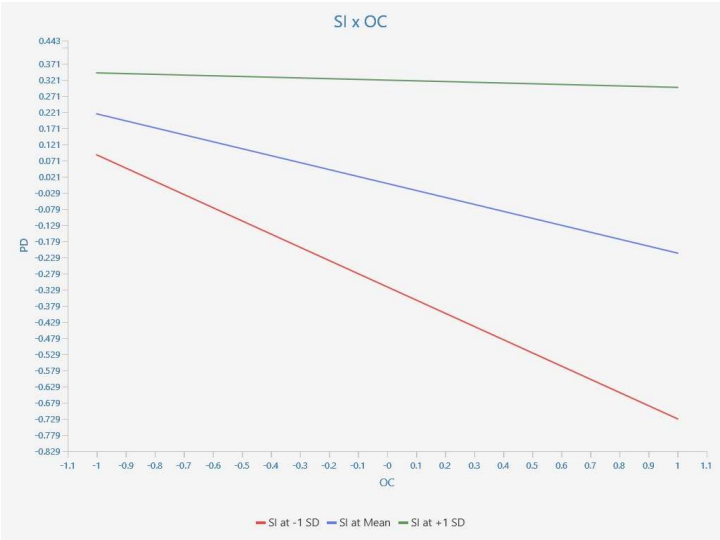


Figure 4. Moderation Effect of Social Influence in the association between Overconfidence and Portfolio Diversification

Coefficient values of the interaction terms are representing the results of the moderation of SI in the association between behavioral biases and PD. Two biases tested in this study are overconfidence and hot hand fallacy. As represented in the table 4.5, slope of the interaction term 1 (SI x OC) is 0.193 but the p-value of the interaction term is insignificant i.e. 0.741. Hence, it implies that hypothesis H_{3A} is rejected. Graph representing the moderation effect of SI in the association between HHF and PD is given as follows:

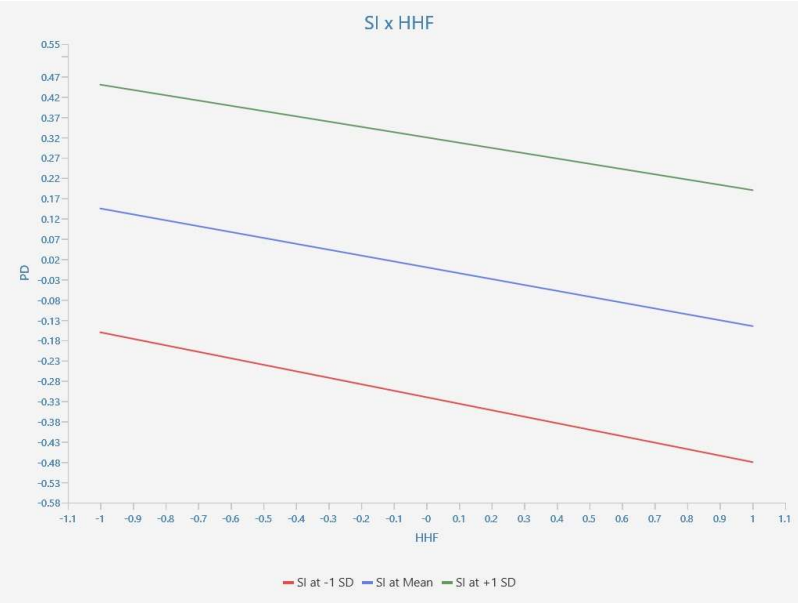


Figure 5. Moderation Effect of Social Influence in the association between Hot Hand Fallacy and Portfolio Diversification

The interaction term 2 (SI x HHF) has a coefficient value of 0.015 at a p-value of 0.000. It means that social influence significantly moderates the relationship between HHF and PD in such way that the negative impact of HHF is diffused with the presence of SI. The hypothesis H_{3B} of the study is accepted.

5. Discussion

Portfolio diversification means investing in more number of securities so that total risk of investment can be mitigated at a certain level of return. Individual occurrence can seriously expose the investment to the risk of losses if it is concentrated in few securities. Diversification can reduce such risk in an investment portfolio (Kirchner and Zunckel, 2011). Investors who maintain a diversified portfolio are able to avoid losses when market anomalies arise (Mangram, 2013). Statman (1987) argued that in reality most investors do not keep a diversified portfolio of investment and their portfolio is often concentrated in few stocks.

Despite availability of the so literature on the matter, investors in a real world scenario are less worried about maintaining a diversified portfolio of investment (Barber and Odean, 2000). One fundamental reason of this is the existence of behavioral biases that effect their decisions. The focus of this study is mainly two biases i.e. overconfidence and hot hand fallacy.

Generally, the results of this study showed that there is a negative impact of behavioral biases on portfolio diversification. When there is presence of biases in the cognition of the investors,

they are not bothered about making their investments diversified. Behavioral biases are considered a significant factor that plays a part in investor's decision making. Our research emphasized on studying the role of overconfidence and hot hand fallacy on portfolio diversification of the investors trading at PSX.

The results of this research showed that investor who perceive that past performance of the stock will be repeated (hot hand fallacy), their investment is overly concentrated on the securities that have done well in past and they do not make a proper market analysis before investing. Hence, their portfolios are not diversified. Theory of Reasoned Action gives a strong support of the results of our research. The findings of our study are also in line with (Mouna and Jarboui 2015; Kudryavtsev et al., 2013).

The outcomes of the research also revealed that overconfident investors are not focusing on developing a diversified portfolio of their investment. When investors are overconfident about the correctness of the information they possess often exaggerate the accuracy of their analysis about the performance of certain stocks and hence keep low number of stocks in their portfolio (Mouna & Jarboui, 2015). Overconfident investors weigh their analysis very highly and hence overinvest in stock that they believe will do well rather than developing a diversified portfolio of investment. The findings of this research are consistent with (Odean 1998; Mouna & Jarboui 2015).

Role of social media, opinions of friends of family are significant factors that influence decision making of people. Investment decision is no different. Suggestions from friends, opinion of family and information availed through media forums do play in the mind of investors when making investment decision. If friends and family member are educated and knowledgeable and investors have access to authentic social media that have learned investment experts, impact of biases on portfolio diversification is reduced.

The findings of this research showed that impact of hot hand fallacy on portfolio diversification is reduced when good social influence is present. When investors interact with their friends and family, they gain information on matters from them. Similarly, they also gain information from the media. The decision making of investors is influence by the information they gained from friends, family and media. Therefore, they link their hot hand fallacy of expecting repetition of past performance of the stocks with the influence of information gained. Hence investors with knowledgeable social circle despite existence of biases in their subconscious and are more likely to diversify their investment portfolio. The study showed the results that are consistent with the findings of the study conducted by Akhtar et. al. (2018).

In contract to past literature, our study revealed that social influence does not moderate the impact of overconfidence on portfolio diversification. Overconfident investors do make analysis about the performance of the stocks they intent to invest but rely on their analysis overly when taking an investment decision and hence do not diversify their investment. When investors are too confident about their analysis and prediction about the performance of the stocks, they do tend to ignore the information they attain through media, friends and family and rely overly on their own predictions. Hence, results of our study revealed that social influence do not moderate the impact of overconfidence on the portfolio diversification.

5.1 Theoretical Implications

The result of the study supports the notion of Theory of Planned Behavior. Theory of Planned Behavior explains the factors that impact individual's behavioral outcome. The factors are subjective norm, attitude and perceived behavioral control. Our framework followed

theoretical arguments that when investors are overconfident and past results are affecting their decision making, they are likely not to diversify their investment portfolio. This research adds to the body of knowledge that social influence moderates the role of biases on portfolio diversification. As social influence is a subjective norm, the result supports the argument of Theory of Planned Behavior in a developing country.

5.2 Practical Implications

This study will be helpful for investors as well as for the regulators. Firstly, this research reiterated the importance of keeping a diversified portfolio of investment for the investors. Secondly, this research will help investors to recognize the effect of biases that can influence their investment decisions especially on their ability to develop a diversified portfolio. Similarly, the research also provided them with the answer of how to reduce the effect of biases in the decision making. Investors can make their social influence positive by joining authentic media forum, discussing investment alternatives with knowledgeable family member and friends, so that the effect of the biases in their subconscious can be mitigated in the investment decisions.

This research is also helpful to the regulators as it identifies the areas where regulators can educate the investors. Stock market is an important measure of the progress of the country. When investors face losses in the stock market they often quite the investment in stock market which is a poor indicator for an economy. Therefore, responsibility of educating the investors on matters that limit their investment capabilities lies with the regulators. The study highlighted the biases on which guidance can be provided through web pages, webinars and seminar as they are affecting the decision making of the investors. Regulators can provide investors with guidance on authentic investment journals or web pages as the study highlighted the influence of social influence in the investment decisions of the investors.

5.3 Limitations and Future Research Direction

This data of this study was obtained from the investors of Pakistan Stock Exchange and hence cultural aspect was not covered in the study. In future more diversified respondents from different countries can highlight the investment pattern of different cultures. Gender diversity of the investors was also the limitation of the study. As data was obtained physically through questionnaire from investors operating at different brokerage houses of Pakistan Stock Exchange, the investors who physically trade there are mostly males. Hence, if data can be obtained from equal proportion of male and females can help in highlighting the gender aspect of investment decision making. Thirdly, the focus of this research was to check the effect of two behavioral biases i.e. overconfidence and hot hand fallacy. Effect of other biases (e.g. representative bias, anchoring bias, disposition effect, etc.) can be explored in further studies that affect investors' decision on making investment.

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