



Research Article

Effect of herding behavior and overconfidence bias on investor's financial decisions: A case of investment in crypto currency in Pakistan

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ABSTRACT

There are various behavioral aspects that influence the financial decisions of individual investors, such as overconfidence, herding behavior, loss aversion, and regret aversion. Other psychological elements may play a substantial influence in deciding the success or failure of any financial action. The primary aims of the present research article are to examine the effects of overconfidence bias and herding behavior on individual financial decisions regarding crypto currency investment. The markets for crypto currencies are extremely sensitive to any minute or significant changes in the economy, as well as to any changes in the individual behaviors of investors. To achieve these aims, 650 questionnaires were distributed to individual investors employed by various financial institutions, multinational corporations, including oil and gas exploration and production companies, operating in Pakistan, individual investors dealing in stocks, and students regardless of investment size. Purposive sampling was used to choose 311 valid responses from a total of 593. Those investors that engage in crypto currency investments were deemed valid responses. Classifications of investments were outlined, and demographic information was requested from respondents. SPSS-based empirical analysis provided the basis for the conclusions. The primary findings indicate that both overconfidence bias and herding tendency have a favorable and statistically significant impact on investors' financial decisions when investing in cryptocurrencies. In this study's sample, however, the majority of investors were overconfident in their crypto currency investing decisions.

Keywords: *Financial Decision; Overconfidence; Herding Behavior; Psychological Factors; Crypto Currency*

1. INTRODUCTION

1.1. BACKGROUND OF THE STUDY

With the advent of modern technologies, new modes of investments have been introduced. Global economy has witnessed momentous transformation in past two decades, especially towards the investments in Crypto currency. Investors in any country always explore new ways for investments and finalizing their investment opportunities with the principle of high returns rule with least cost combination (Press, 1965). Crypto currency market capitalization was observed up to US\$ 148.3 billion in 2017 and just after 4 year it has grown up to 2.90 trillion (as per Nov, 2021 statistics) which is strong evidence of investor's



confidence. Crypto currencies are very popular in the world economy which can be ascertained easily as rapid growth in Crypto investments all over the world.

Historically, the first renowned digital currency was Bitcoin, invented by Satoshi Nakamoto in 2008 which was ultimately a kick start to the new era of Crypto currencies. It is based on cryptographic technology and having a different algorithm design. New avenues for new investment opportunities have opened with this invention and currently there are almost 17,180 Crypto currencies are traded by almost 458 Exchanges (source: <https://coinmarketcap.com>). Crypto currency is getting its popularity day by day and establishing grounds for new crypto currency and investors. It is pertinent to mention that, after Europe, Asia pacific region has large number of exchanges where the volume of investments has been experienced a stunning growth, particularly, in emerging markets like in China, India, Malaysia, Thailand, Africa and Middle East.

A renowned theory presented by (Markowitz, 1952), was related to the investment portfolios focusing on how portfolios are chosen by investors while encountering various risk and return combination. (Dacre & Sewell, 2007) described Behavioral Finance as “A study in which we study the influence of psychology on the behavior of individual financial decision and subsequently its effect on market is called behavioral finance”. Behavioral Finance argues that some individuals/investors are rational & their decisions are in line with consideration of return & risk.

Decision making is not only dependent on different standard finance analysis but there are many other factors which can have the potential to influence decision making process. A study was conducted in 2015, in which it is identified that biases which occurs during the decision-making process of individual investor are detrimental. Sha and Ismail, (2021) have described that the decision of individual investors are dependent on the information around them, information can be from various sources. The issue prevails when the entered in to the phase of filtering out their information and on the basis of which theory develop their perception. Not only it is limited to this but also there are many cognitive biases which can lead their decisions to get fruitful results or they may face losses. They concluded that investor’s decisions are influenced by many cognitive biases. Investors normally evaluate different options critically only with the intention to minimize risk and get high return but all the time the expected results are hard to achieve their cognitive ability and emotional biases contributes towards their decisions.

Kartini and Nahda, (2021) have conducted their study in which they evaluated the influence of emotional and cognitive biases which effect the investor’s financial decisions. The human beings always strive hard to get fascinating results, after evaluating different aspects of various investment and try to avoid risk or deal with it as per their risk appetite. Many individuals are good in dealing with problems but some are not comfortable with problems around them. In order to avoid it they follow others decisions but ignoring their own analysis and information available to them. Moreover, it is concluded that over confidence and herding behavior have a significant effect on individual investment decisions.

2. RESEARCH GAP

The primary intent of behavioral finance is to know about the key concepts of how psychological factors and emotions effect the individual thought process while making decisions. (Anggini et al., 2021). explained behavioral finance as “A study of cognitive errors and emotions in financial decision”. Investors usually underestimate risks due to overconfidence which exaggerate their ability to control events (Areiqat et al, 2019). Investors believe that they are superior in decision making then others, considering their self-evaluated overrated capabilities (Barber & Odean, 2006; Pompian, 2006; Shiller, 2000).

Herding behavior, usually, witnessed in stress situations and emerging markets (Wali et al., 2022). Herd behavior happens when a collective decision is taken on collective leads or information. In addition to it, if the decision turn wrong it brings significant uncertainty in market prices. Herding behavior is more common in developing countries (Ahmad & Wu, 2022). Considering the above discussions, there are few studies conducted especially in Pakistan and in crypto currency investment decision. While addressing the identified gap, current study has examined the effect of herding behavior and overconfidence bias on investor’s financial decisions, particularly, dealing in crypto currency investment in Pakistan.

3. PROBLEM STATEMENT

In standard finance, all investor’s decisions are rationale with the aim to maximize the wealth, depending on some elementary financial rules and all their decisions, relating to investment, evolve around the trade-off between return and risk by applying different strategies (Kahneman & Riepe, 1998). However, in investment decision, the emotional preferences, thought patterns and psychological factors like overconfidence and herding may affect the rationality of individuals (Hasnawati & Ernie, 2022). Investors may judge rationally and earn high returns while making financial decisions on the basis of best available information but still their decisions may vary next time with the same information and financial environment because of behavioral factors.

In view of the above research discussions, the current study has investigated the effect of herding behavior and overconfidence bias on an investor’s financial decisions while making investments in crypto currency in Pakistan.

4. RESEARCH QUESTIONS

Based on the research objectives, following Research questions are addressed in this

Study:

1. What are main determinants of investor’s financial decisions in Crypto currency?
2. Does herding behavior affect investor’s financial decision while investing in Crypto currency?
3. Does overconfidence bias has an effect on investor’s financial decision in Crypto currency?

5. OBJECTIVES OF STUDY

The objectives of present study comprise as follows:

1. To identify main determinants of investor's financial decision in Crypto currency in Pakistan.
2. To investigate the effect of herding behavior on investor's financial decision while investing in Crypto currency.
3. To examine the effect of overconfidence bias on Investor's financial decision in Crypto Currency.

6. LITERATURE REVIEW

6.1. LITERATURE ON CRYPTO CURRENCY

Technological advancement has a great impact on the economy all around the world. After the invention of currency, the remarkable thing that hit the global market is invention of bitcoin. Bitcoin as an important breakthrough for secure and decentralize payment with the features of storage, verification and audit. Adoptability of crypto currency as a mode of payment is encouraged in countries like Switzerland and Japan but still lot of countries are having stubborn attitude. It's amazing to know that in 2020 the Bitcoin trading volume was recorded as USD 1.52 billion and in Pakistan it was USD 12.4 million, which was higher than renowned countries like Vietnam, KSA, Indonesia, Turkey etc. (www.statista.com). Various features of digital currency proven as a bull eye for the watchdogs of Pakistan. In the beginning, it was also considered as a fraud and most of the investors were reluctant to buy the crypto currency (Syed et al., 2021).

Bitcoin was traded as USD 20,000 and suddenly crashed to USD 10,000, but still it attracted a new asset class i-e, Crypto currency. This awareness and interest resulted in high demand of Crypto currency and addition of new crypto currencies in the market called alt-coins (Ajaz & Kumar, 2019). The extreme fluctuations have been witnessed in the Bitcoin over the past years and many studies have been conducted to examine the Bitcoin as asset bubble and the same is verified accordingly (Dowd, 2014; Garcia et al., 2014; Cheah & Fry, 2015; Godsiff, 2015; Fry & Cheah, 2016)

In India, the crypto currencies were banned since 2018 but the prevailing scenarios and acceptance to virtual currencies around the globe have also attracted them to revisit it decision and discussions have been kicked off for devising a proposer frame work for making it legal. The basic issue in adopting the digital currency transaction in developing nations is because of Corruption, terrorism financing activities and other illegal transaction. However, stick regulation and proper Audit can be beneficial to avoid illegal transaction. In Kyrgyzstan, Bitcoin is not accepted as currency or security but it is legalized as good. China, despite of having strong economic atmosphere and being a market leader in almost every field of life, it is still reluctant for legalizing the crypto currencies. Bitcoin is legal in Honk Kong (Chohan, 2022).

In making investment decision all investors have to deal with various things like uncertainty and risk associated with the financial decision. While selecting investment among many available options, the investors try to evaluate the same by putting all the possible efforts which for gathering the related information which will eventually help them in order to narrow down available options. While doing so, along with other factors, behavioral factors contribute towards decision making process (Yuwono & Erika, 2020).

The new era is proving itself in inventions with the primary motive of making the human life easier. The same pace can also be seen with the invention of Crypto currency based on technology, if we look in past in 17th century the barter system was replaced with the banknotes which lasted till 20th century. This technological advancement making transactions more efficient. Acceptance to new things is not welcomed and it took time to prove itself for being essential and important. Investor's feels confident while dealing with Bitcoins and it also attracted the investors who want to become rich and this is the reason that the value of bitcoin improved day by day.

Crypto currencies has been banned by State Bank of Pakistan since 2018 and still the status did not changed. The prevailing atmosphere of crypto currencies around the globe and acceptance among Developed nations also attracted the government to revisit its decision & devise a Comprehensive frame work. The first coin was launched in Pakistan was Pakcoin (PAK). However, in absence of the government regulations, the coin was refused by government & State Bank of Pakistan asked FIA and FBR for the help in order to take legal action against international and local trade (Syed et al., 2021). Currently, the news regarding detection of Crypto currency online fraud by FIA amounting to Rs. 17.7 billion, provides an insight to the Government of Pakistan, if crypto currencies are not regularized, such frauds may possibly occur again, which cannot be beneficial for the current economy where we are already facing many challenges. Pakistan is still in FATF grey list and is striving hard to formulate the crypto currency transaction as per the mechanism or regulation provided in FATF.

New tax regulations have been issued by the FBR, the corporate tax payer on payments exceeding Rs. 250,000 will be using digital mode of payment only and this arrangement or regulation is mandatory for all. This initiative is considering as an important step in acceptance of technological advancement in Pakistan & seems very positive, which will eventually pave ways towards more technological advancements like Crypto currency. KPK Government passes a resolution in order to legalize crypto currency and crypto mining and demanded Federal Government to formulate laws in order to regulate Crypto currency (<https://tribune.com.pk/story/2274888/kp-assembly-passes-resolution-to-legalise-cryptocurrency>) The main intent of the government is to avoid the tax evasion, monetary illegal transactions, terrorism financing, corruption all these issues are similar in nature especially for the developing countries. Pakistan's strategy is more in line with china's strategy however to be the part of economic advancement all around the world we cannot stop the crypto currencies, the only way which can be adopted is to regulate it as early as possible (Ibrahim, 2019).

6.2. LITERATURE ON INVESTOR'S FINANCIAL DECISIONS AND BEHAVIORAL FINANCE

Behavioral Finance is a good concept in order to understand different feelings, emotions and all behavioral factors which can affect the individual financial decision and eventually their outcome which is financial performance (Carter & Kryczkowski, 2005).

A huge group of peoples have intentions by purchasing the company stock in order to control the decision-making process of the company by acquiring the Major No. of shares. Human Psychology have a strong impact on investor's behavior who invest in shares and it gain a significance in making arguments that the investors who believes the theory of BF that behavioral factors make impact on market crashes and bubbles (Gao & Schmidt, 2005). While not taking the behavioral factors into account in making investment decisions this ignorance become harmful and results in losses, because when we say that investor is rational, the investors decision without considering the B Factors like biases and emotions eventually blame his self in case of loss.

Investors who make investment decision during uncertainty a heuristic theory applies in such case with which it makes the decision easy. (Ritter & Preston, 2013). Investor's decision normally resulted due to self-prediction while overlooking the probabilities (Tversky & Kahneman, 1974). (Statman, M, 1999) stated behavioral finance as "A rapidly growing area that deals with the influence of psychology on the behavior of financial practitioners". BF explains about patterns of reasoning along with explanation, the decision making of investors are influenced by behavioral factors (Ricciardi & Simon, 2000).

The main intent of behavioral finance is to identify that how financial decision of individual investors are affected by the emotional and philological side of investors. The decision is driven through the emotional side of the human, no decision can be taken without influence of behavioral factors. In standard finance we believe that decision is taken with complete rationality and people behave rationally in all situation while taking investment decision if they are provided with adequate information but most of the time, they act irrationally which establish the fact that some other factors can also have they tendency to affect the decision-making process and Behavioral factors can also add positively or negatively (Chaudhary, 2013).

The massive volatility in crypto currency has attracted the investors finding shortcuts for becoming rich, many are successful but a lot are those who have yet not recovered the losses happened to them in 2017, where the burden of losses were shared among late entrants. Currently, the market capitalization also dropped to 1.68 trillion, from 2.90 trillion in just one month. New York Bit license proved inclined towards the crypto currency and regulations have be framed which will help other countries to regulate the crypto currency. It is important to know that since 5 years the bit license are awarded to only 18 companies which is quite evident that the regulations are not easy to adopt, the standard is high to avoid any inconvenience in future. Due to the fact mentioned earlier, many regions of world also reacted positively to frame regulations, some have already done with it and many are still working on it to finalize the regulation to become part of this race.

6.3. LITERATURE ON OVERCONFIDENCE BIAS AND INVESTORS FINANCIAL DECISION IN CRYPTO CURRENCY

According to Daniel and Titman, (1999) decision taken with influence of overconfidence generates high and abnormal return. Overconfident investors are those who have a strong believes on their decision-making skills while dealing in the financial markets, they believe that their analysis cannot match the analysis of other and eventually the markets behave slowly by having the over confident investors as they react slowly towards any information entered to alter the decision (Scott et al, 2003). Existence of overconfidence bias in investors not always leads towards successful decisions nor do they only generate wrong decision. Knowledge is one of the factors on the basis of which an individual perceive that he is better than other while dealing with decision making process. A study was conducted with an intent to know about the how overconfidence bias influences the investor's investment decisions.

According to a researcher there are mainly three ways which can demonstrate the overconfidence i-e, individual own faith that their abilities are above average, they can easily judge and understand facts and their decision are correct. Investor's decision are effected by various biases among which one of the important bias is Overconfidence where an individual investor can rely on his decision and value his decision as superior then other investor's decision while making financial decision. Overconfidence has a significant and positive effect on investor's financial decision (Ghelichi et al., 2016). A study conducted by (Qasim et al, 2019) which concluded that Pakistani investor's decision are significantly influenced by overconfidence bias. Another study proved that an overconfidence bias has significant and positive relationship with financial decision (Herlina et al., 2020).

When making financial decisions, investors might sometimes exhibit biased behavior, such as being overly confident in the accuracy of the information they possess. Investors who have an unhealthy amount of faith in themselves are more likely to make erroneous assessments, which can lead to poor investment choices (Sulhia et al., 2022).

6.4. LITERATURE ON HERDING BEHAVIOR AND INVESTORS FINANCIAL DECISION IN CRYPTO CURRENCY

Herding normally depicts the trend followers. People tries to avoid the technical analysis and complex processes while making investment decisions, By having no option left, they follow other and mimics the decision of other. In one of the studies, a model was developed to explain the behavior of corporate investors including several forces which have the tendency to affect the decision-making process. The model suggested that herding is although not optimal but can be rational, they explain it through example that herding behavior may be followed by corporate managers to protect their reputation because same like negative result in industry may not directly put blame on them (Scharfstein & Stein, 1990).

Herding is following others while ignore own information and avoiding any kind of investment analysis. In order to avoid the complex situations, investors with herding

attitude adopt the easy way and start following others, as they want to get benefit from analysis and time spend by other investors in the market and even after facing losses, they don't blame their self. Like other investment in stock, gold or any other class while dealing in crypto currency investment the research found that herding increases either there is bullish trend or bearish trend subject to increase or decrease in the price of Bitcoin respectively. Moreover, herding behavior is positively linked with financial decision (Haryanto et al., 2020).

Herding behavior is found in many of the situation or scenarios i-e, when the investors are individual not the companies (Shapira & Venezia, 2001). Secondly when there is difficult to determine the intrinsic value of any asset (Daniel et al. 1997). Investors depends on the group information rather than following the information collected by them which causes deviation in prices of stocks and its intrinsic value (Chen & Volpe, 1998).

Behavior of an investors which is not based on his/her own logics or analysis but is based on others investors while making an investment decision. Following those investors investment behavior, whose transaction volumes are very high, means they have an influence on the market sale and purchase trend. The investors having herding attitudes normally shows dissatisfaction on return on investments, their decisions are dependent on the analysis of others and such behavioral are most commonly found in developing countries financial markets. Moreover, if the investor restrict himself from herding behavior and remained involved in independent decision-making process based on own information gathering, calculation and analysis will have a positive result and will eventually add to investors' confidence (Torrecillas et al., 2016)

Keeping in view the discussion it is easy to relate all the above conditions with crypto currency. Crypto currency started individually as it was not that much common in start and most of the investors were not having complete awareness. Investors normally avoid long calculation and technical analysis which force them to react in herding capacity. High volatility can be easily witnessed in Crypto currency market. Investor's decisions in Pakistan are significantly influenced by the herding behavior (Qasim et al, 2019).

A study conducted by (Naveed & Taib, 2021) in which they found out the behavioral biases effect on financial decision. They concluded that the overconfidence bias has an ability to distort the rationality of the investor's decision-making process. Capital markets play an important role for making the financial efficiency better by mobilizing unique assets and themes effectively. The advancement in capital market helps to assess the country financial development. Market efficiency always proved as main determinant to the public economy. Experience in investments makes the individuals more confident and their personality traits shaped accordingly by getting the positive results all the time making them able to think that this is because of them which makes a difference. Facing losses for number of times shape the individual investors from confident to herding nature.

Herding behavior, which occurs when investors make financial decisions in unison, influences investor sentiment. Emotions and stock market judgement are influenced by psychological factors (herding behavior). In a difficult economy, individuals have less capital for investment and financial management, and the majority have a conservative

investment mindset. All investors require knowledge of financial behavior in order to identify the effects of biased investment behavior and establish acceptable investment strategies (Wang, & Nuangjamnong, 2022)

7. CONCEPTUAL FRAMEWORK

In this study the researcher used one dependent variable (DV) i-e, investor's financial decision regarding Crypto Currency Investment & two independent variables (IV) i-e, herding behavior and overconfidence bias to examine, effect of IVs on DV either positively and significantly or negatively or insignificantly (Herlina et al., 2020).

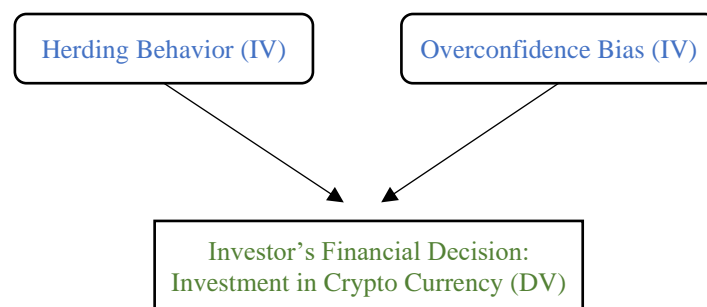


Fig. 1. Effect of Herding Behavior and Overconfidence Bias on Investor's Financial Decisions; A Case of Investment in Crypto Currency in Pakistan

8. HYPOTHESIS

H1: Overconfidence bias is positively linked with investor's financial decision while dealing in crypto currency.

H2: There is positive relationship between herding behavior and investor's financial decision in Crypto currency.

These hypotheses are interlinked with each other. The investor's financial decisions are relying on multiple factors like herding behaviors of the investors and overconfidence biases. These factors are varying from person to person and have an abrupt effect on financial decisions. The Crypto currency markets are very sensitive to any minute or drastic policy changes in the economy or in the individual behaviors of the investors. These hypotheses would be tested in the next section Data and Methodology.

9. SAMPLE, MEASUREMENT AND RESEARCH DESIGN

This section provides details regarding choice of variables, Population, sample selection techniques, sources of data, and unit of analysis. Furthermore, this section also explain which research methods and approaches are adopted for conducting the current study.

9.1. CHOICE OF VARIABLES

Based on prior discussion and literature review, the finalized variables for current study are 1x dependent variable (DV) i-e, Investor's financial choice, dealing with Crypto currency investment (Gill et al., 2018) and 2x independent variables (IV), herding behavior and overconfidence bias (Sarwar & Afaf, 2016).

9.2. POPULATION

Our study population includes financial experts, international oil and gas companies (operating in Pakistan), individual stock investors, and students.

9.3. SAMPLING TECHNIQUES

650 questionnaires are collected through LinkedIn, Facebook, WhatsApp & hard copies, 311 of 593 replies were accepted (the responses of individual investors dealing in Crypto currency investment only). The study employed non-probability purposive sampling (Arthur et al., 2019).

9.4. SOURCES OF DATA

Primary data is used to determine the impact of herding and overconfidence on crypto currency investors' financial decisions. Investor responses were collected via a questionnaire.

9.5. UNIT OF ANALYSIS

Investors dealing in Crypto Currency investment, working in different financial institutions, multinational companies including oil and gas exploration and production companies, individual investors, and students.

9.6. OPERATIONAL DEFINITIONS

9.6.1. Financial Investment Decision - Crypto Currency

Investors having different goals while investing in company stocks some of them wants to become owner of the company, some want to earn dividends and some are clear about making capital gains. The investor become more confident while dealing with investment decision if they are having adequate information and have a potential to improve his decision. Level of overconfidence is dependent on genders of individual investors (Bakar & Yi, 2016)

Assessing the investment decisions, 5 items are assessed through 6 points Likert scale ranging from "1 = strongly disagree" to "6 = strongly agree" (Gill et al., 2018).

9.6.2. Herding Behavior

Individual conduct gives up his choices in favor of the group, according to herd theory. Hamilton Smith, an English biologist, was the first to formulate this theory as a philosophical science. He claims that every member of a group helps themselves first and foremost by lowering risk by participating in group activities and acting without thinking or planning. This is considered as irrational decision as investors follows others decisions (Altman, 2012)

Examining the herding behavior 3 items are assessed through 6 points Likert scale ranging from "1 = strongly disagree" to "6 = strongly agree" (Sarwar & Afaf, 2016)

9.6.3. Overconfidence Bias

Overconfidence also effect the individual investors risk perception and decision, people most of the time rate their abilities high or above average. Moreover, they also overestimate about their knowledge in comparison to knowledge of their peers (Statman, 2008).

To examine overconfidence bias 7 items are assessed through 6 points Likert scale ranging from "1 = strongly disagree" to "6 = strongly agree" (Sarwar & Afaf, 2016)

10. RESEARCH DESIGN

A research design is used to develop a strategy for examining different variables in a logical manner to arrive at a solution to the problem. There are mainly two streams of research design i-e, Qualitative and Quantitative approaches (Punch, 2013). Research design is comprising of research philosophy, research approach, research strategy, and data collection method and time horizon. The research design of this study is based on research onion (Saunders et al., 2009).

11. RESEARCH METHODOLOGIES

During this research, which is primarily based on data gathering from investors through questionnaire following the quantitative stream of research design (Noble & Smith, 2015). The study falls in research philosophy i-e, positivism and deductive approach is followed accordingly. Data gathering is done through survey method and questionnaire is used as tool for data gathering.

12. TESTS AND PROCEDURES

The primary data (responses from investors) have been collected through questionnaire, sampling was conducted as explained above, in order to analyze the data following analytical tests are applied for empirical analysis.

12.1. CRONBACH'S ALPHA

Cronbach's alpha is considered as measure of internal consistency. Usually, in any research it is very important to check the reliability of variables in order to get valid results. If in questionnaire all questions are not answered, it is required to be removed while performing Cronbach's Alpha. In current study the empirical analysis has been performed through SPSS. Cronbach's alpha minimum required value must be above 0.70 (McNeish, 2018). The results of Cronbach's Alpha are provided at empirical analysis and discussion chapter.

12.2. CORRELATION ANALYSIS

Furthermore, while examining the herding behavior and over confidence Bias (IVs) are either positively or negatively linked with Investor's financial decision while dealing with Crypto Currency investment (DV) a correlation matrix is beneficial for the study. Correlation is one of the important analysis methods which is used for identifying the strength of association between dependent variable and independent variables along with direction

of relationship. In simple words, correlation analysis tells that there is positive or negative relationship between DV and IV. The results are detailed at empirical analysis and discussion chapter.

12.3. REGRESSION ANALYSIS

In order to evaluate the relationship among the investor's financial decision in Crypto currency and herding behavior and over confidence bias variable regression analysis has been used accordingly. It is pertinent to mention that regression analysis is very helpful in understanding that how much the Investor's financial decision changes due to deviation in herding behavior and overconfidence bias. In other words, it tells how much change in Dependent Variable occurs due to change in Independent Variables Basically, conditional expectation among variables is estimated through regression analysis.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \mu \quad (1)$$

Where:

Y = Financial Decision, x_1 = Overconfidence Bias & x_2 = Herding Behavior

12.4. ANOVA TEST

ANOVA test has been used in order to find out the overall fitness of model and the relationship between Investor's financial decisions while dealing in crypto currency investments (DV) with over confidence bias (IV) and herding behavior (IV) in term of its significance with each other, on the basis of which hypothesis are also tested. The results are detailed at empirical analysis and discussion chapter.

13. RESEARCH ETHICS

All the data have gathered though various medium as enlisted in data collection section. The point of contact was single and no one else was involved in gathering the information, in order to collect the accurate and truthful data. In current research, the responses are kept confidential (Creswell et al., 2014).

14. EMPIRICAL ANALYSIS AND DISCUSSIONS

In this section, the research questions are answered through performing the empirical analysis on data collected through the questionnaires. All the required empirical analysis as described in detail at Test and procedure section in chapter 4 are performed on SPSS. In this section, we firstly analyzed the demographic frequencies of 311 received responses of all the individual investors dealing in crypto currency investment and in second part empirical analysis i-e correlation and regression analyses are performed on SPSS in order to obtain the concluding results. All the findings are incorporated along with their interpretation in the subsequent sub sections for better understanding and concluded with fruitful discussion.

14.1. RESPONSE RATE OF RESPONDENTS AND DEMOGRAPHIC ANALYSIS

Response rate is determined that how many responses are received against distributed questionnaires. In totality 593 responses were received from individual investors out of which only the valid responses for current study were 311 responses (around 650 questionnaires were distributed through Hard copy, LinkedIn, WhatsApp, and Facebook). The overall response rate was 91% & valid responses rate against received responses is 52%. As the crypto currency is an emerging field and having no legal status in Pakistan, considering this fact the response rate seems good for our research.

14.1.1. Demographic Analysis

Table 1. Demographic Analysis

Descriptions	Options	Frequency	%
Gender	Male	266	86%
	Female	45	14%
Age	Less than 25 years	54	17%
	25-30	59	19%
	31-35	72	23%
	36-40	61	20%
	41-45	37	12%
	46-50	21	7%
	51 & above	7	2%
Academic Background	Matric	14	5%
	Intermediate	64	21%
	Graduation	152	49%
	Post-Graduation	81	26%
Monthly Income (Rs.)	25,000 & Less	56	18%
	25,001-50,000	64	21%
	50,001-75,000	65	21%
	75,001-100,000	58	19%
	100,001 & above	68	22%
Investment Experience	Less than 1 Year	131	42%
	3-Jan	91	29%
	5-Mar	48	15%
	5 & above	41	13%

This section presents all the demographic, included in our research questionnaire i-e, Gender, Age, Academic Background, Monthly income, investment class and Investment experience. This section is based on 311 questionnaires, pertains to the individual investors, dealing in crypto currency investment. No missing values were found in the study. Appended table 1 shows the statistics accordingly.

14.2. RELIABILITY TEST

Husnal'Az'Hari (2022), Cronbach's Alpha of 0.70 or above is good and reliable while conducting surveys. It is used for measuring reliability in behavioral and social studies. If in

case all questions are not answered in the response received the same will be excluded in order to run Cronbach's Alpha test. In current study, the test is performed through SPSS.

Table 2. Cronbach's Alpha

Variables	Cronbach's Alpha	N of Items
Financial Decision (DV)	0.762	5
Overconfidence Bias (IV)	0.900	7
Herding Behavior (IV)	0.913	3

As discussed above that favorable value for Cronbach's Alpha is above 0.70 which makes reliable and valid. In current study, we are having 3x variables. Dependent variable is Financial Decision and 2x Independent variables are Overconfidence bias and herding behavior of individual investors while dealing in crypto currency investment decision. Hence, the above table 2 clearly states that all of 3x variable have Cronbach's Alpha of 0.762 (Finance decision), 0.900 (Overconfidence bias) & 0.913 (herding behavior) which is reliable and valid. The overall values are more than 0.70 which shows that the total reliability of questionnaire used in conducting this study. The minimum value required for Cronbach's Alpha is above 0.70 (McNeish, 2018).

14.3. DESCRIPTIVE STATISTICS

Table 3. Descriptive statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Financial Decision	311	2.00	6.00	4.5743	0.98327	-0.544	-0.451
Over confidence Bias	311	1.29	6.00	4.4084	1.14112	-0.748	-0.079
Herding Behavior	311	1.00	6.00	4.2315	1.32956	-0.622	-0.563

In order to present the nature of sample data used in current research table 3 showing descriptive statistics for all variables. The minimum and maximum value for dependent variable (DV) which is financial decision is 2 and 6 respectively. The mean value for financial decision is 4.57 with standard deviation of 0.98 which means that mostly respondent selected the responses towards strongly agree and above the neutral response. The standard deviation of 0.98 which is less than 1, tells that the reply of investors did not have much variation while recording a response towards DV. The skewness is -0.544 which means the data is fairly symmetrical. Data in between -0.5 and 0.5 termed as fairly symmetrical data. The kurtosis of data set tells that it is heavy tailed or light tailed relative to normal distribution. The kurtosis for DV is -0.451 which is very good, as the kurtosis value falls in the range of +/-1 is considered as very good, the kurtosis for financial decision is negative which means it has lighter tail than normal distribution.

The minimum and maximum value for first independent variable (IV) which is overconfidence bias is 1.29 to 6 respectively. The mean value for overconfidence bias is 4.41 with standard deviation of 1.14 which means that mostly respondent was agreed and above the neutral response. The standard deviation of 1.14 which is slightly higher than 1, tells that the reply of investors has a slight variation while recording a response towards Overconfidence bias. The skewness is -0.748 which means the data is fairly symmetrical. Kurtosis value falls in the range of +/-1 is considered as very good, Overconfidence bias has

a kurtosis value of -0.079 which is considered as very good & it has a lighter tail than normal distribution for having a negative kurtosis value.

The minimum and maximum value for Herding behavior (IV) is 1 and 6 respectively. The mean value for herding behavior is 4.23 with standard deviation of 1.33 which means that mostly respondent selected the responses towards agree and strongly agree. The standard deviation of 1.33 which is greater than 1, tells that the reply of investors has variation in response towards herding behavior. The skewness is -0.622 which means the data is fairly symmetrical. Data in between -0.5 & 0.5 consider as fairly symmetrical data. The kurtosis is -0.563 which is very good, as the kurtosis value falls in the range of +/-1 is considered as very good, the kurtosis for herding behavior is negative which means it has lighter tail than normal distribution.

14.4. CORRELATIONS ANALYSIS

To find the relationship between Dependent variable (Financial Decision) and 2x independent variables (Overconfidence bias and Herding behavior) correlation analysis done with the help of SPSS software.

Table 4. Results of Correlation Analysis

Variables		Financial Decision	Overconfidence	Herding Behavior
Financial Decision	Pearson Correlation	1	.665**	.494**
	Sig. (2-tailed)		0.000	0.000
	N	311	311	311
Overconfidence Bias	Pearson Correlation	.665**	1	.418**
	Sig. (2-tailed)	0.000		0.000
	N	311	311	311
Herding Behavior	Pearson Correlation	.494**	.418**	1
	Sig. (2-tailed)	0.000	0.000	
	N	311	311	311

***.* Correlation is significant at the 0.01 level (2-tailed).

The above table 4 shows the summary of correlation analysis performed on SPSS, the finding depicts that the dependent variable i-e, financial decision is positively and significantly correlated with 2x Independent variable Overconfidence bias and herding behavior. The result of correlation statistics shows that all the values are in between -1 & +1 and all variable are related to each other. However, in comparison to Overconfidence bias, herding behavior has a less correlation value of 0.494 which means most of the individual investors are over confidence while making crypto currency investments.

14.5. REGRESSION ANALYSIS

The strength and direction of relationship between dependent and independent variables can be ascertained by performing correlation testing. However, in order to find the nature of relationship between these variables, regression analysis is used. The value of dependent variable is determined on two independent variables in current study by using regression analysis on SPSS.

Table 5. Results of Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.706 ^a	0.499	0.495	0.69840

a. Predictors: (Constant), Overconfidence (X1), Herding Behavior (X2)

Table 5 shows the value of R Square of overall regression model which explains the degree of change in financial decision as explained by behavioral bias and independent variable i.e, overconfidence bias and herding behavior. The value of R square is accepted for current study. R square is considered good if the value is above 0.6. However, where a study attempts to predict human behavior the R square value normally falls below 0.5 as human are very difficult to predict.

Table 6. ANOVA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	149.483	2	74.742	153.234	.000 ^b
	Residual	150.231	308	0.488		
	Total	299.714	310			

a. Dependent Variable: Financial Decision

b. Predictors: (Constant), Herding Behavior, Overconfidence

The above table 6 of ANOVA is used to determine the overall fitness of the model. The higher the F value, the better the model is. In current study the F Value is 153.23 at 0.000 level of significance which shows that the Model for current study is fit as the value of F is greater than 4.

Table 7. Coefficients of regression analysis

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.645	0.172		9.535	0.000
	Overconfidence Bias	0.479	0.038	0.556	12.520	0.000
	Herding Behavior	0.193	0.033	0.262	5.890	0.000

a. Dependent Variable: Financial Decision

As shown in above table 7, the results of regression analysis supported the first hypothesis which was Overconfidence Bias is positively linked with investor's financial decision while dealing in crypto currency. The beta value of 0.479 represents that there is a positive relationship between financial decision and over confidence bias. The beta value of 0.479 means that due to 1 unit change in overconfidence bias there will be 0.479 unit change in financial decision. First hypothesis has significant relationship with investor's financial decision while dealing in Crypto Currency, is also confirmed by P-value of 0.000. The results are in line with the study conducted by (Ghelichi et al., 2016). Moreover, the findings of current study are also in support of a study conducted by (Qasim et al, 2019). Furthermore, it also support the findings of study conducted by (Herlina et al., 2020) which proved that an overconfidence bias has a significant and positive relationship with financial decision.

The above table 7 also shows that the regression analysis results also displayed that the second hypothesis which was, there is positive relationship between herding behavior and investor's financial decision in Crypto currency is also supported. The beta value of 0.193 represents that there is a positive relationship between financial decision and herding behavior. The beta value of 0.193 means that due to 1 unit change in herding behavior there will be 0.193-unit change in financial decision. There is significant relationship between herding behavior and investor's financial decision in Crypto currency is also proven true as the P-value for it also turned as 0.000. These hypotheses which are duly accepted after required analysis are supporting the findings of (Qasim et al, 2019) and also in line with finding of a study "Herding behavior has a positive and significant effect on investor's investment decision" (Yuwono & Elmadiani, 2021; Cao et al., 2021)

15. MAIN FINDINGS

In current study based on research objectives, research questions and literature review two hypothesis were formed in order to conduct the study. The regression analysis supported the first hypothesis that Overconfidence bias is positively linked with investor's financial decision. The beta of 0.479 signifies the existing of a strong positive relationship between financial decision and over confidence bias. Keeping in view the results, beta value of 0.479 indicates that if there is a 1 unit change in overconfidence bias it will bring 0.479 unit change in financial decision. The results further displays that the second hypothesis which was, there is positive relationship between herding behavior and investor's financial decision in Crypto currency is also supported by correlation and regression analysis. The beta value of 0.193 represents that there is a positive relationship between financial decision and herding behavior. The beta value of 0.193 means that due to 1 unit change in herding behavior there will be 0.193-unit change in financial decision.

16. DISCUSSIONS

Human decides by applying their best abilities and skills while making any decision of life, an investors having lot of information creates linkage between investment decision and available information. The investor's decision making is based on 2 major components i-e, intellectual ability and emotional affiliation. Both cognitive error and emotional biases plays a vital role in the decision-making process, which drives decision from rationality to irrationality. According to (Virigineni, & Rao, 2017) investors possess the behavior which is not only emotional but also an intellectual. Both the investor's cognitive ability and emotions are interlinked with each other's and they have the potential to influence decision making of an individual. The purpose of current study was to examine the effect of herding behavior and overconfidence bias on investor's financial decision while dealing in crypto currency investment. In order to achieve the research objectives a questionnaire was distributed by utilizing all technological sources and social network like LinkedIn, WhatsApp and Facebook.

Around 650 questionnaires were distributed, and total 593 responses were received against closed ended questions pertaining to demographics, overconfidence, herding behavior and financial decisions from individual investors dealing in different kind of investment

classes Crypto currency, Gold, stock, real estate & Mutual Fund. As the current research objective was to examine the effect of behavioral factors (overconfidence bias and herding behavior) on investor's decision only dealing with crypto currency. Hence, only 311 responses were considered as valid (crypto currency responses) for all testing and analysis, rest of 282 were considered as invalid responses and considered as outliers for the study. In questionnaire the investment class was not restricted to crypto currency investment in order to avoid biased responses. SPSS software is used to analyses the data, different analysis was run in order to find out descriptive analysis, correlation and regression etc. The sample of crypto currency investors are mainly educated individuals working in financial institutions, multinational companies and students of different educational institutions.

The study's findings allow us to conclude that overconfidence bias has strong positive and statistically significant effect on investors' financial decisions. Additionally, investor herding behavior adds in a good and important way to an individual's investment decision.

Results also indicate that overconfidence has a stronger association with financial choice than herding behavior, since correlation and beta values for herding behavior are substantially lower than those for overconfidence bias. The majority of the 311 investors surveyed were overconfident while making crypto currency investment decisions.

17. SUMMARY RESULTS OF HYPOTHESIS

H1: Overconfidence Bias is positively & significantly linked with investor's financial decision while dealing in crypto currency. Accepted

H2: There is positive and significant relationship between herding behavior and investor's financial decision in Crypto currency. Accepted

18. CONCLUSIONS AND RECOMMENDATIONS

In this chapter, the researcher brings all important points together and presented the Conclusion & Recommendation on the basis of finding of Empirical Analysis of response received. The results paved ways towards the suggestions for researcher which will help other researchers in conducting different same like studies. At the end some limitation of study especially related to data collection will further add as a fruitful input for all the readers/ researcher.

19. MAIN CONCLUSIONS

The aim of this study was to examine the effect of behavioral biases i-e, overconfidence and herding behavior on investor's financial decision while investing in crypto currency. The finding of results helps us in conclusion of study to state that there is a strong positive and significant effect of overconfidence bias on investor's financial decision. Moreover, herding behavior of investors also contributes in positive and significant way towards individual's investment decision. Results also showed that overconfidence has more strong relationship with financial decision in comparison to herding behavior as herding behavior correlation & beta values are significantly less than then overconfidence bias values. The

results showed that among 311, most of the investors were overconfident while taking investment decision in crypto currency.

20. PRACTICAL IMPLICATIONS

Considering the findings and discussions, this study will be beneficial for general public, corporate world, Government and academic researchers. General Public will know the findings of the study and can overcome biases that can influence their financial decisions. Corporate world will explore more ways for adoptability of Crypto currency. Moreover, government will devise strategies for devising regulations to facilitate investors. This study will be beneficial for academic researchers to focus on behavioral aspects of investment decision and will help them to explore more cognitive and emotional bias which can affect the individual investment decisions.

21. LIMITATION OF STUDY

The current study is restricted to only two behavioral biases and their effects on single investment class i.e crypto currency. Moreover, the target audience was only from Pakistan due to limited time frame.

22. FUTURE DIRECTION & RECOMMENDATION

In order to find out the effect of herding behavior and overconfidence bias on investor's financial decision while investing in crypto currency, some of issues have brought forward for future research after detail analysis and discussions. Considering the findings & discussions, further studies can be done on other emotional and cognitive biases on investor's dealing in crypto currency. Moreover, comparative research can be conducted by keeping same behavioral biases and its effect on stock, gold, mutual fund. Research on only cognitive biases and its effect on investment decision in comparison with emotional biases and its effect on investment decision can also be an interesting field of research. In future studies, addition of financial literacy as a mediating variable can also be beneficial for the researcher. Keeping the same variable, a study can also be conducted in various countries or regions of world. A comparative study can be conducted between the countries where crypto currencies having legal status against where it is still illegal.

Author Contributions:

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