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

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DEDICATION

I would like to dedicate this thesis to my parents, spouse and child for their endless love, support and encouragement.

Acknowledgement

I would first like to thank to Allah, Allah almighty who is compassionate and merciful and whose help enabled me to complete my work. I am also very thankful to my thesis advisor Dr. Qazi Abdul Subhan. The door to Dr. Subhan's office was always open whenever I ran into a trouble spot or had a question about my thesis. He consistently allowed this paper to be my own work, but steered me in the right direction whenever he thought I needed it.

I am also grateful to Dr. Muhammad Anees Khan and Dr. Taqadus Bashir for sharing expertise, and sincere and valuable guidance and encouragement extended to me throughout my MS Finance degree.

Finally, I must express my very profound gratitude to my parents and to my spouse & child for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

ABSTRACT

There are several behavioral factors which may affect the financial decisions of individual investors like overconfidence, herding behavior, loss aversion and regret aversion. Other psychological factors also play significant role while determining the success and failure of any financial decision. Main objective of present research is to investigate the effect of overconfidence bias and herding behavior on individual financial decision while dealing with crypto currency investment. Around 650 questionnaires have been distributed among individual investors, working in different financial institutions, multinational companies including oil and gas exploration and production companies, working in Pakistan, individual investors dealing in stocks, and students regardless of investment quantum. Total 593 responses have been received and out of them total valid responses were 311, selected by using purposive sampling technique. Those investors who are dealing in crypto currency investment were considered as valid respondents. Investment classes were defined and respondents were asked to provide demographic details. Findings were developed empirical analysis performed on SPSS. The study concluded that both overconfidence bias & herding behavior has positive and significant effect on investor' financial decisions while investing in crypto currency. However, in sample of this study most of the investors were over confident in their investment decisions in crypto currency.

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CHAPTER 1

INTRODUCTION

1.1 Back ground of the Study

With the advent of modern technologies, new modes of investments have been introduced. World 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 1.86 trillion (as per April, 2022 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 18,864 Crypto currencies are traded by almost 508 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.

Investors are more aware due to technological advancement i-e, availability of information and technical analysis on single click. The prevailing technological era changed the perceptions of investors & their orientation and preferences regarding financial decisions have been changed over time. Expected utility theory believes that investors are rational while judging all the alternatives, considering risk and utility results in balance decision. Efficient Market Hypothesis introduced by

Markowitz and later developed by (Fama, 1971) was an important contribution in finance field. Such theories were mainly based on a basic assumption that investors behave rationally while taking any financial decision (Singh & Shivaprasad, 2018).

Tversky and Kahneman, (1979) have described prospect theory as, the investors decision are not always rational. Investors deviate from rationality because of different behavioral biases that influence their decision-making process to go for irrational decision. In selecting portfolios, portfolio managers have also incorporated the psychological factors such as, overreaction, overconfidence & sentiment along with risk and return. The financial and psychological factors have an impact on investment decisions, the investor displays human complications and limitations while taking decisions, eventually psychology explores human judgment & well-being and most of the time it is different from others. In stock markets the investor's decision making is dependent upon the psychological principles which tells about the question why investors buy and sell stocks (Rabin, 1996). Behavioral finance (BF) defined by (Shefrin, 2001) as "A rapidly growing area that deals with the influence of psychology on the behavior of financial practitioners". Behavioral finance is a pattern of reasoning along with behavioral factors influencing investor's decision-making process (Simon & Ricciardi, 2000).

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. (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.

Investment decision are important in every day of life for every human and organization. All the time the results or outcome from decision taken is not always favorable. Investor's primary objective is to earn profit with less exposure to the risk in any business transaction. How much risk to be absorb is always depends on the risk appetite of individual investors. Some are risk averse and some feel proud to deal with risky situations. 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. Investor faces lot of losses and unfavorable results due to miscalculation of risk which may occur in the investment decision. Moreover, the study added that it is difficult to know about the biases due to which risk is not assessed well. The biases are not easy to identify and it is directly linked with the thought process of the investors and through process is bases on the emotions and feelings (Kartini & Nuris, 2015)

Sha and Ismail, (2020) 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.

1.1.1 Legal aspect with reference to Crypto currency in Pakistan

Crypto currency is widely used as a medium of exchange and region wise user shares are Asia Pacific 40% followed by Europe 27% which is higher among all in the world (Hileman &

Rauchs, 2017). The new era of Crypto currency also attracted investors from Pakistan as well and to become active part of the game, 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)**.** 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)

1.2 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. (Nofsinger & Hirschey, 2008) explained behavioral finance as "A study of cognitive errors and emotions in financial decision". (Pompian, 2006) a great proponent of behavioral finance, categorized the decision-making biases into two biases; emotional and cognitive biases. Every decision is driven through a thought process, where both cognitive and emotional biases play a vital role to influence decisions of investors and it is the most difficult process which is experienced by every investor. Financial decisions are affected by different factors like social orientation, demographics and education etc. which make them identical and unique from each other (Chaudhary, 2013).

A few studies have been conducted for establishing the fact that investors cannot remain rational in all scenarios while exploring and making any investment decision, but there are many cognitive and emotional biases which contribute towards their financial decisions. Overconfidence affect the individual investor's decisions. Resultantly, the people start rating their selves as more capable and good while making decisions and perceive that they are better in decision making then

people around them (Simon & Ricciardi, 2000). Moreover, investors usually underestimate risks due to overconfidence which exaggerate their ability to control events (Strong, 2006). Investors believe that they are superior in decision making then others, considering their self-evaluated overrated capabilities (Odean, 1999; Pompian, 2006; Shiller, 2000).

Herding behavior, usually, witnessed in stress situations and emerging markets (Rahayu at al., 2020). Humra (2014) has examined that 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, various studies are conducted on Asian stock markets (Chang at el, 2000; Chiang and Zheng, 2010; and Zheng et al. 2017). 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.

1.3 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 (Baker et al, 1977). 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.

1.4 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?

1.5 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.

1.6 Significance of Study

Nowadays, technological advancement has been seen all over the world and now exploring new ways to strengthen economy, one of the measures is Crypto currency which is based on cryptography technology. In September 2021, Salvador becomes the first country to adopt bitcoin. Crypto currencies can be seen as one of the important measure/ reforms to control corruption especially in developing countries (www.ndtv.com). Along with intrinsic worth, some demerits are there which can negatively contribute toward economy like removing intermediaries like banks etc. Furthermore, many countries are devising strategies and formulating mechanism to be

followed by knowing its importance to facilitate corporate world to execute transactions in low cost and avoiding lethargic processes.

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

1.7 Organization of Study

This research is comprising of three main chapters. Chapter 1 comprises of introduction section which is further divided into sub sections started with back ground of study which is followed by identification of research gap, problem statement, and objectives of study, research question and significance of study. Chapter 2 covers the very important section i-e, the literature review. In this section current study tried to explain Crypto currency fundamentals along with examining different relationship between Investor's financial decisions and Behavioral biases i-e, herding behavior and overconfidence bias one by one. Based on the discussion hypothesis were formed which are tested accordingly with the help of collected data and its interpretation through various empirical analysis. The third is data and methodology, which is mainly focusing on choice of variables, population, techniques through which samples are selected & this chapter also cover the sources of data, unit of analysis and operational definitions. Research design section explains the approaches followed in order to conclude the research, which is followed by research methods and at the end all references in discussion are incorporated. The fourth chapter will highlight the Empirical Analysis and Discussion of study and will end with last chapter i-e conclusion and recommendation.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction of 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 (Kumar & Ajaz, (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)

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 (Syed at el, 2021).

A subset of digital currency is crypto currency it is also termed as virtual currency. It is a medium of exchange which is not yet regulated in all over the world and people hesitate to invest in such type due to lack of awareness. Many of investors becomes rich and included in the list of millionaires with low initial investments, this fact attracted many individual investors towards this new investment market and the market capitalization grows day by day. Bitcoin is the market leader and most of the time the price fluctuation in bitcoin bring impact to other crypto currencies in the same direction. Crypto currencies got popularity with the passage of time and ease of handling this money is the best feature of it. Many countries are working on developing their own crypto currencies which will be managed as centralized medium of exchange in future. (Manimuthu, Rejikumar & Marwaha, 2019)

Along with the positive side of new virtual currency some of the issues are also associated with it, being not regulated many of the crime partners uses it for their illegal monetary transaction. The involvment of mafias does not restricted to illegal transaction but it also contributes for the facilitation of drug mafias, terrorists and anti state agent. The same forced the other countries, to regulate all such currencies so that the facilitation network amoungst the crime agent may be discontinued. Pakistan has also imposed a ban on tokens and virtual assetst. The main intent of the governemt is to avoid the tax avasion, monetary illegal transactions, terrorism finnacing, corroption all these issues are similar in nature especially for the develpoing 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)

Inventioan of Crypto currency was not sufficient, for its growth it was necessary that it should meet the prevailing financial markets needs. The growth was totally dependent on the legislative and regulatory responses across the globe for Crypto currency. Investors confidence matter a lot, because if they are satisfied only then they can invest in crypto currency. 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 lossess were shared among late entrancts. Currently, the market capitalisation also droped to 1.68 trillion, from 2.90 trillion in just one month. New york Bitlicense proved enclined 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 bitlicense 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 inconvinience 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 finalise the regulation to become part of this race.

The biggest challenge for crypto currencies were its acceptance in all over the world, if we discuss its acceptance region wise in North America canada, America and Maxico, bitcoin is enjoying a legal status and United States has accepted it as a convertible decentralise currency in 2013. The journey did not stopped here and after two years in 2015 it is accepted as a comodotiy. In cannada it is mandatory for the companies dealing with virtual currencies to registed with the Canada's "Financial Transaction and report Analysis Centre". Companies if are not registered can face many problems, like no bank will facilitate such companies for account opening in the bank. Furthermore, dealers are also regulated in the category of Money services business. In addition to it, in South and Central America region, bitcoin is decleared as illegal virtual currency by the countires like Blolivia and Ecuador.

The other countires in region like Brazil, Chile and Colombia the same has not been registered and are not regulated accordingly. Argentina people uses it as money but is not legal and it is catregorized as a good or thing as per Argentina civil code. Venezula showed positive grounds for virtual currency and created its state owned crypto currency named as Petro. This showes that how countires behave differently in the same region of globe. Some other countries i-e, Nicaragua and Costa Rica does not regulate digital currency nor they have an illegal status for it. Jamica and Trinidad crypto currency is legal.

Europe region is also known for Economic Stability and have an important place in world economy. Bitcoin is legal in whole EU countries, but there is no specific legislation available for

making bitcoin as monetary device. The Court of justice of EU decleared that no VAT will be applied on Bitcoins by trating it as means of payment. Developing part of world globe i-e, Middle East and Central & South Asia the approach of adoptability also varies from country to countery depending upon the economic conditions. Bitcoin the first crypto currency and having highest market capital is not banned in Jordan, KSA and Lebanon, but it is discouraged. Israel known for its economic stability remained reluctant to the accepatance of Crypto currency. The UAE is under influence ot new guidelines issued by FATF guidelines of incoporating crypto currency. Some turned as rigid countires for accepting crypto currencies as medium of exchange and as a result the Bitcoins is explicitliy banned in Bangladesh & Nepal.

In India, the crypto currencies were banned since 2018 but the prevailing scenarios and accepatance to virtual currencies around the globe have also attracted them to revisit it decision and discussionshave been kicked of for devisiing a propoper frame work for making it legal. The basic issue in adopting the digital currency transaction in devloping nations is because of Corruption, terrorism fincing activitive and other illegal transaction. However, strick regulation and proper Audit can be benifical to avoid illegal transaction. In Kyrgyzstan, Bitcoin is not accepted as currency or security but it is legalised 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 legalising the crypto currencies. Bitcoin is legal in Honk Kong (Chohan, 2020).

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 accepatance amoung 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 occurs 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.

2.2 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, 2011). Investor's decision normally resulted due to self-prediction while overlooking the probabilities (Kaheeman & Tversky, 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).

To put money in any business transaction for additional income is termed as investment. People enjoy to deal with investments, as it provides ways for decision making and with this, they can easily judge their abilities of taking decisions which generates correct results. The same scenario may not lead to correct decision always there are other factors which might affect the results. In order to understand the influence of other factors, the behavioral elements introduced in decision making, which turned into behavioral finance in later stage, which revolves against that human moves from rationality to irrational decisions (Gill et al, 2018). Investors make investment

decision for a common goal i-e, to increase savings for future investment and retired life. Not all are having equal information, Moreover, all investors cannot interpret the information in same way. Financial literacy is important to behave more rationally and try in a better way to achieve the expected favorable results. Decision is a continuous process, in which many options are evaluated by considering the available resources with the main aim of reducing risk and generating high profit. This cannot be achieved without individual investor's financial literacy. Risk averse investors might not take decision spontaneously, however on other hand risk-takers may generate quick profit by timely decision.

Technology also contributed towards the process of decision making with more efficiency and effectiveness. The decision which are dependent on analytical analysis and were very time consuming in past are now turned as efficient with technological advancements, one can easily get the complex analysis within seconds and can pave way towards the right decision without any delay, with quick analysis and ease of information investors become more confident. Decision making was not easy and it cannot be a piece of cake, as it also involves the personality traits and other behavioral aspects which deviate the decision from rationality. Behavioral finance plays a vital role in achieving the best decision by addressing the biases and behavioral aspects, which can be shape accordingly to reduce the element of losses.

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). In behavioral finance the investors have to encounter the psychological factors in which they will have to face many behavioral biases during decision making and eventually they will have all of these factors more in uncertain situations. The current uncertain situation is prevailing pandemic COVID -19, in which the pattern of life changed and investment gurus got new opportunities.

Financial markets do not only capture the profits, it also experiences the crisis as well, and here comes the thought in mind, what was behind this crisis? And eventually the answer comes in different ways, as it can be happened through the political instability, terrorism activity or psychological factors which generates the results as an outcome of irrational decision making. Individuals uses their cognitive abilities and apply their best knowledge to act rationally and take the financial decision which generates profit out of every transaction. However, it is not necessary that every time their decision turn to be correct, because of complexity of the transaction and other factors. Individuals can't be rational all the time, sometimes complexity is beyond their skills and abilities and they are unable to comprehend it. The purchase decision is based on two thing one is the product choice and the other is how to finance the purchase transaction (Garling et al, 2009)

Decision is driven through thought process, which are mainly dependent on the cognitive and emotional side of human. The cognitive side/ approach drives through mind considering the logic, calculations and analysis. In comparison to it, the emotional side directly linked with the psychological factors which influence financial decisions. Individuals are identical from each other's; some are dealing with the cognitive errors and some have to deal with the emotional biases while making a financial decision. Behavioral finance proponents believe that the journey between rationality and irrationality is dependent on existing of emotional biases in individuals who are taking decisions in complex situations.

Every change is firstly opposed and then gradually accepted with awareness. Crypto currency is not easily accepted medium of exchange, lot of controversies, regulations along with various technical issue. However, with every passing day it started acceptance especially after 2017 and that is the reason that many currencies are introduced in various regions of World i-e, Senegal, China, Russia, Japan these countries have issued or planned to issue their own crypto currency as a state controlled instrument (Haryanto et al, 2019).

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).

2.3 Overconfidence Bias and Investors financial decision in crypto currency

According to Kent & 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.

Two theories are having significantly involve in behavioral factors the one is heuristic theory and the other one is prospect theory. Overconfidence, anchoring, representativeness and availability bias falls under heuristic theory while regret aversion, mental accounting & Loss aversion falls under prospect theory. All the above factors may jointly or individually contribute towards the investment decision. Moreover, investors are always prone to different psychological and emotional biases, including, conservatism, representativeness, regret aversion, anchoring, and overconfidence (Berger, 2005)

Barber and Odean (2006) conducted a study in which they identified different types of investor errors: the outcome of study states that there are mainly two types of errors i-e, too much trading and to unduly hold on to lost assets while selling winnings. The investor's most of the time think that whatever they decided will bring favorable output and their decision cannot be wrong. They believe that they are having the latest and more relevant information and no one else is having such information. Unavailability of information for others will be an advantage for them and it

will restrict other to take decision on time, resultantly they will turn as most beneficial investors. Time is money and efficient decision are not always effective the high trading volume may not match the profit of single transaction if taken with open and calm mind. Many investors face a lot of losses just because of their spontaneous and quick decisions. They also stated that both systemic biases had their roots in human psychology. The first bias in investors is caused by people's tendency to be overconfident, and the second is caused by people's desire to avoid regret.

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. The decisions are neither rational nor irrational but the psychological factors make them rational or irrational. Those who are suffering from overconfidence bias they have also high self-attribution bias (Gosling, Denizeau, & Oberle, 2006).

Investors having overconfidence bias acts that they are having the most valuable information and technical analysis which is not available to rest of investors, they have a firm belive that they can control the outcome of their decisions and everything which will happen will be positive and will bring expected returns (Szyszka, 2013). Kumar and Goyal (2015) conducted research in order to know that behavioral biases influence the investors, which leads towards illogical decision. All around the globe confidence depends on the information available in the financial markets. In Pakistan and other developing countries, the investors are less overconfident in comparison to developed countries like US and UK. Most of the time investor's behavior is tuned as herding and they rely on others information by ignoring their own analysis. It is quite evident that overconfidence is based on the basic logic i-e, the initial investment proved beneficial results will eventually boost up the confidence of investor and he will stick to the previous result

and will act irrational. A study was conducted which confirmed that the German fund managers were found involved in herding during massive market movements (Walter & Moriz, 2006).

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 investors financial decision (Chandra & Kumar,2012; Nakhjavan; Ghelichi; & Gharehdaghi, 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).

2.4 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).

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, Yalamova & Mckelvey, 2016)

The empirical side of herding behavior falls into 2 main categories. The first focused on behavior of financial analysts and fund managers herding behavior (Trueman, 1994; Graham, 1999; Hong et al., 2000; Welch, 2000; Gleason & Lee, 2003; Clement & Tse, 2005; Lakoniskok et al., 1992; Warmers, 1999). Herding behavioral does not only limited towards the financial decision but it also involved in any kind of thinking process, some get influence from their leader and some are inclined towards their family orientations. Herding is not new in discussion and it can easily be ascertained from the study conducted by (Christie & Huang, 1995), which is vital in order to understand the herding behavior imperially. Moreover, a study was conducted in 2015, which explained, utility theory explains that those investors encounter various options and after exploring all they take good decision, their investment decision shows a better association between behavioral biases and balanced decision by using structural equation Modeling (Kumar & Goyal, 2015).

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., 2019). 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). Moreover, herding behavior also increase in a scenario where there is high price volatility (Chang et al, 2000).

Investors hold their own gathered information for making a financial decision and starts following pattern of others based on their collected information due to lack of confidence (Shah, 2017). Over the past decades the researchers gave due important to the herding behavior and much attention has been given to this important psychological trait of human. A lot of experimental and scientific studies have been conducted in order to analyses the effect of this syndrome on financial decisions. Furthermore, the investors following trend can impact the instable returns or outcomes. The herding behavior create market chaos and many opportunities are created accordingly (Jalal et al, 2020). Herding behavioral is mostly witnessed in Asian Market and in comparison, with US and Latin American market there is no evidence found of herding (Chiang & Zheng, 2010) this establish the basis for Asian and developing countries like Pakistan, the financial markets are full of investors with herd behavior.

A research, conducted by (Byrne, 2007), herding behavior can be an outcome from two main reason either the investors are influenced by the social circle to which they belong to and secondly, they believe on common logic that a decision taken by majority of investors will be definitely beneficial and if the results does not bring any profit the loss will also be for all. Social pressure demands to follow the same trend or moves taken by the whole group and no one is willing to leave the group. Making investment & becoming part of price momentum most of the time investors faces losses due to ignoring the basic principle of demand and supply. Study have been conducted and concluded that the humans find difficult to go large number of people while making the investment decisions (Agrawal, Singhal & Swarup, 2016)

Vo and Plan (2017) concluded the existence of herd behavior in investors while dealing in both developing and advanced stock. 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). Herding behavior has a positive and significant effect on investor's investment decision (Yuwono & Elmadiani, 2021; Cao, Tran & Nguyen, 2021)

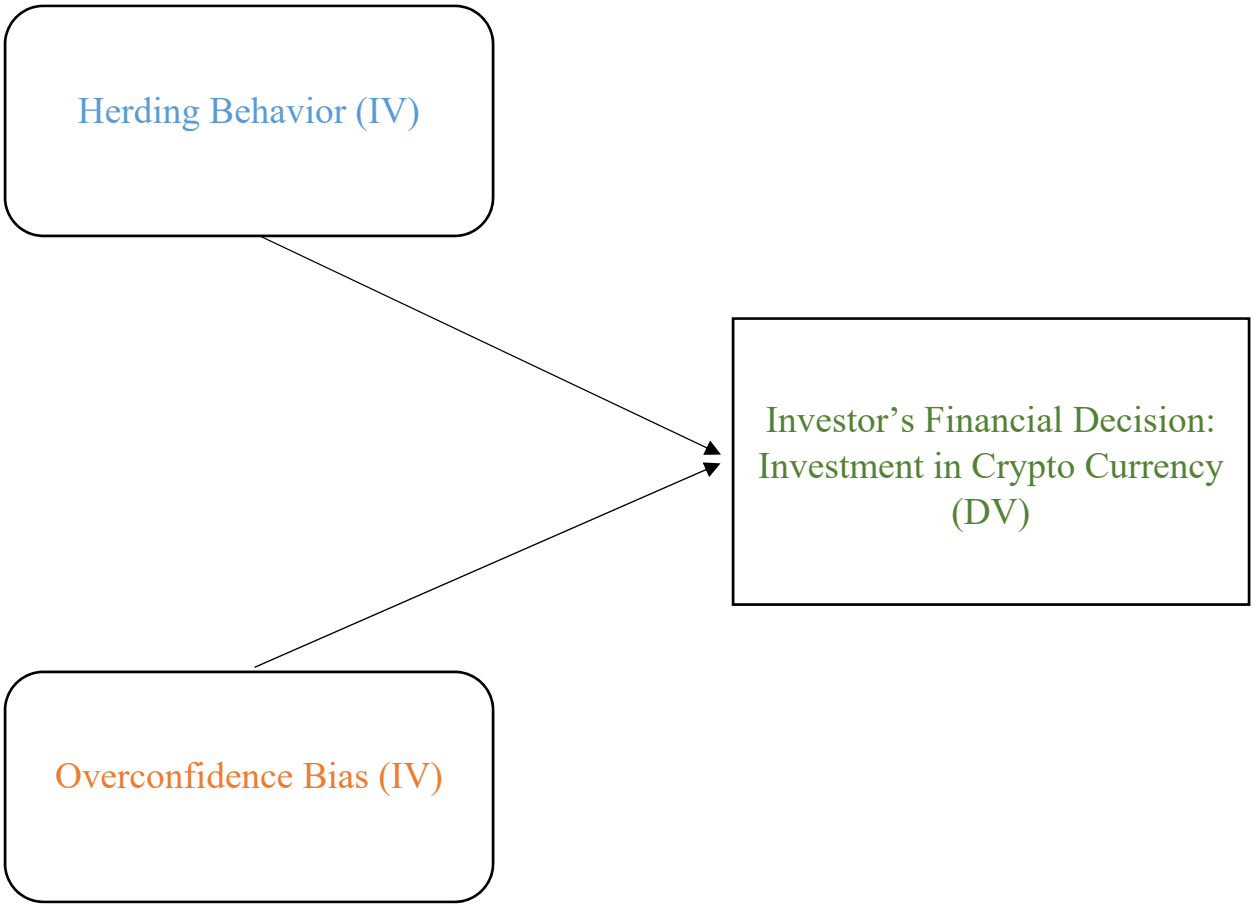
2.5 Demographics and Investors financial decision in crypto currency

Chitra and Jayashree (2014) have replaced the behavioral factors with demographic factors as they believe that it has also a very important role in decision making process. Moreover, their believe was based on that human cannot act rationally in all situation and decision of investors tends to irrationality with influence of many other factors i-e, behavioral and demographic factors. According to another important study, conducted by Sadiq Ishaq, (2014), there is a link between risk tolerance among investors and demographic traits. The study revealed that demographic parameters have a substantial and important impact on the behavior of individual investors while dealing in complex financial decisions. Normally, the most technical and complex situation for the investor is to make a decision. Demographics, education, socioeconomic background, sex, race, age and other considerations, every investor is identical (Chaudhary, 2013).

2.6 Conceptual Frame Work

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).

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



2.7 Hypothesis

H_1: Overconfidence bias is positively linked with investor's financial decision while dealing in crypto currency.

H_2: 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.

CHAPTER 3

DATA AND METHADOLOGY

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

3.1 Choice of Variables

Bases on hypothesis which are driven from previous discussion and literature review the finalized variables for current study are 1x dependent variable (DV) i-e, Investor's financial decision, dealing with Crypto currency investment (Gill et al., 2018) and two independent variables (IV) i-e, herding behavior and overconfidence bias (Sarwar & Afaf, 2016). A few studies were carried out in past reading various behavioral biases and its relationship with investor's financial decision (Cox et al., 1974).

3.2 Population

The population of our study is comprising of business professionals, working in different financial institutions, multinational companies including oil and gas exploration and production companies (working in Pakistan), individual investors dealing in stocks, and students regardless of investment quantum.

3.3 Sampling Techniques

In order to collect the data, 650 questionnaires were distributed by utilizing different conventional and non-conventional sources i-e, Questionnaire in hard copy, LinkedIn, Facebook & WhatsApp. After collecting 593 number of responses, only 311 responses were accepted (the responses of those individual investors, who are dealing in Crypto currency investment). In the study, purposive sampling technique has been used which falls under non-probability sampling technique. According to Roscoe, (1975), the appropriate sample size ranges from 30 to 500 (Sekaran, 2003).

3.4 Sources of Data

Primary data is used in order to find the effect of herding behavior and overconfidence bias on investor's financial decision while dealing in Crypto currency investment. A Questionnaire survey method has been used for gathering the responses from investors and the sample size is selected through stratified random sampling.

3.5 Unit of Analysis

Unit of analysis for this study is group of people; investors dealing with Crypto Currency investment, working in different financial institutions, multinational companies including oil and gas exploration and production companies (working in Pakistan), individual investors dealing in stocks, and students regardless of investment quantum.

3.6 Operational Definitions

3.6.1 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).

3.6.2 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)

3.6.3 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)

3.7 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).

3.8 Research Methodologies

During this research, which is primarily based on data gathering from investors through questionnaire following the quantitative stream of research design (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.

3.9 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.

3.9.1 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 have 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.

3.9.2 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.

3.9.3 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.

$$Y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \mu \qquad (3.1)$$

Where:

Y = Financial Decision

$\mathbf{X_1}$ = Overconfidence Bias

$\mathbf{X_2}$ = Herding Behavior

3.9.4 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.

3.10 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 (Clark & Creswell, 2014).

CHAPTER 4

EMPIRICAL ANALYSIS AND DISCUSSIONS

In this chapter, 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.

4.1 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.

4.2 Demographic Analysis

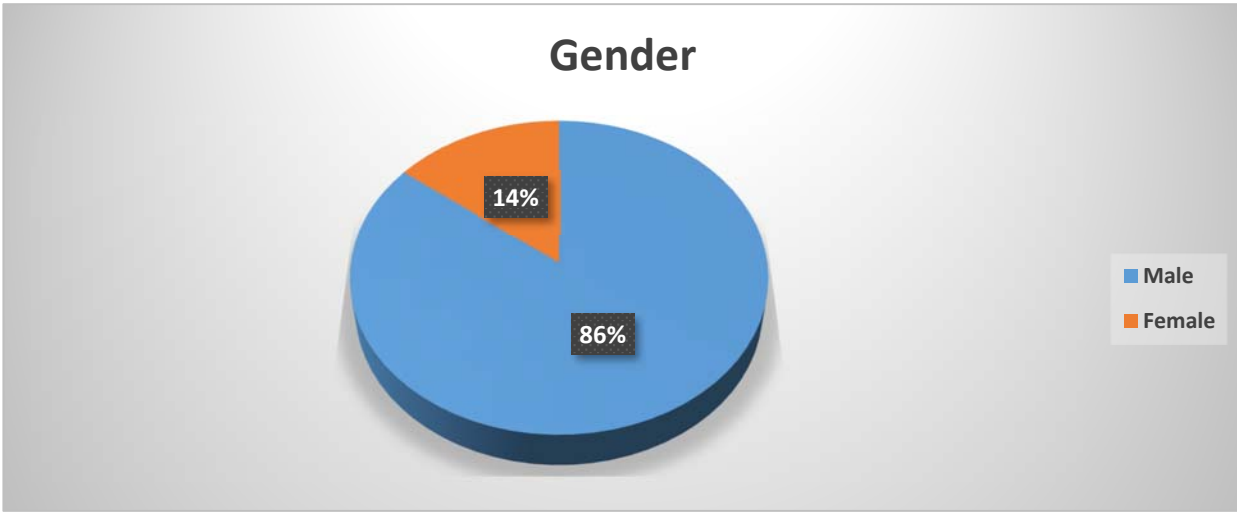
This section presents all the demographic, included in our research questionnaire i-e, Gender, Age, Academic Background, Monthly income, investment class and Investment experience. This section is based on 311 questionnaires, pertains to the individual investors, dealing in crypto currency investment. No missing values were found in the study. Appended table 4.1 shows the statistics accordingly.

Table 4.1 - Demographic Response Statistics

		Gender	Age	Academic Background	Monthly Income	Investment Class	Investment Experience
N	Valid	311	311	311	311	311	311
	Missing	0	0	0	0	0	0

Table 4.2 - Frequency distribution w.r.t Gender

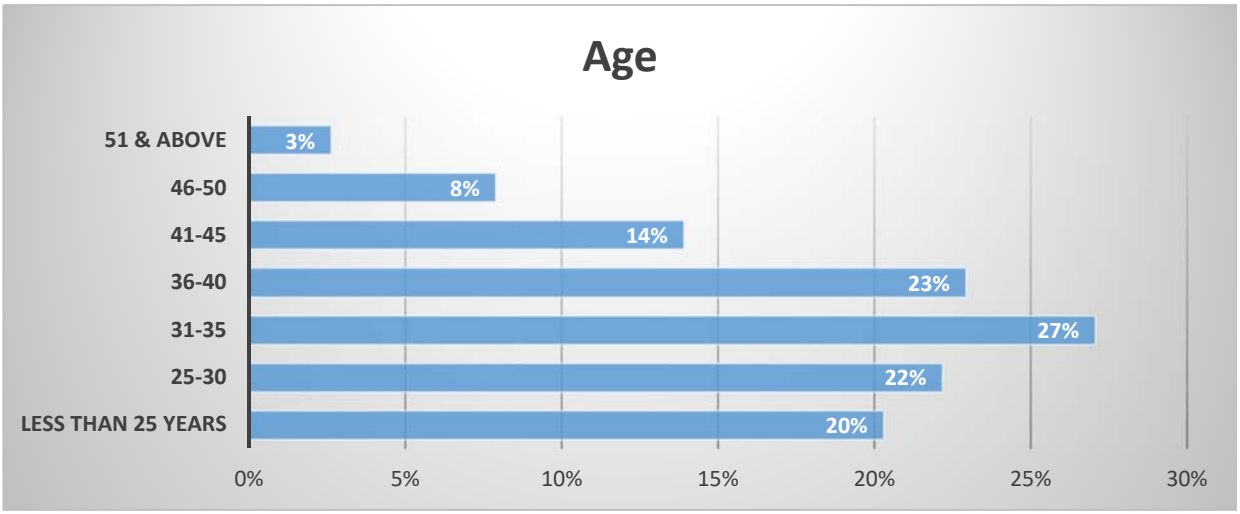
		Frequency	Percent
Valid	Male	266	86 %
	Female	45	14 %
	Total	311	100 %



The above table 4.2 and pie chart show that out of 311 overall responses received through questionnaires, the male are dominant with 266 responses with 86% and only 45 responses pertains to female which is 14% of total valid responses. As in Pakistan working female are very less in numbers in comparison to men around 21%, hence our responses is also in line with prevailing statistics.

Table 4.3 - Frequency distribution w.r.t Age

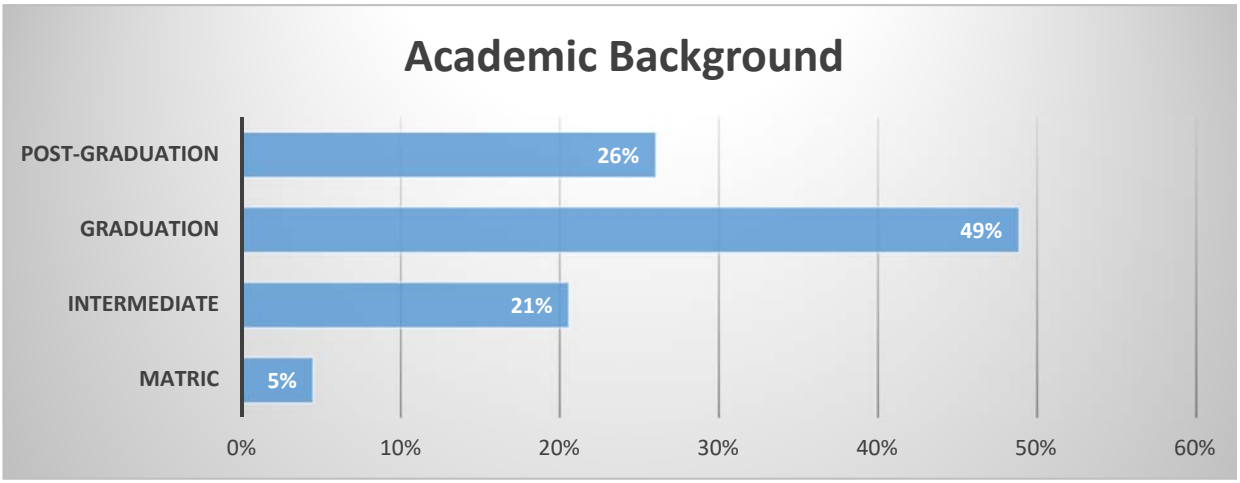
		Frequency	Percent
Valid	Less than 25 years	54	17 %
	25-30	59	19 %
	31-35	72	23 %
	36-40	61	20 %
	41-45	37	12 %
	46-50	21	7 %
	51 & above	7	2 %
	Total	311	100 %



The above table 4.3 and Bar Chart depicts the investor's frequency distribution w.r.t their age group. In the questionnaire investors were asked to select their age group from 7x option provided i-e, less than 25 years, 25-30, 31-35, 36-40, 41-45, 46-50 and 51 & above. As the whole 311 responses were complete and valid hence the investors age wise statistics are, 20% investors belong to Less than 25 years, 22% belongs to 25-30, 27% selected age group of 31-35, 23% investors belong to 36-40, 14% are from 41-45 age group, 8% and 3% investors are from age groups 46-50 and 51 & above respectively. As crypto currency is new in Pakistan, hence youngsters are more in comparison with age bracket of 45 and above.

Table 4.4 - Frequency distribution w.r.t Academic Background

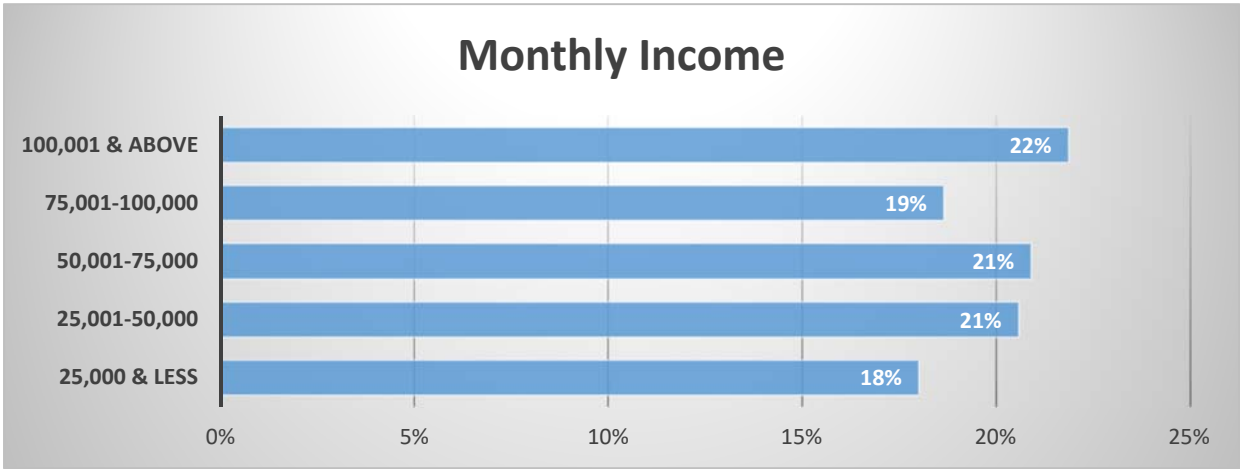
		Frequency	Percent
Valid	Matric	14	5 %
	Intermediate	64	21 %
	Graduation	152	49 %
	Post-Graduation	81	26 %
	Total	311	100 %



The above table 4.4 & Bar Chart shows the investor's responses frequency w.r.t their Academic Background. For the convenience of respondents 4x categories were provided in the questionnaires i-e, Matric, Intermediate, graduation & post-Graduation. There were only 5% matric, 21% were Intermediate, 49% investors completed their graduation and 26% were holding post-graduation qualification, The above statistics shows that in crypto currency investment. Most of the investors are having qualification intermediate, graduation & post-graduation degree and there are only few investors who are holding matric qualification. As it involves technological interface for buying and selling of crypto currency, less educated people are normally not well verse with technology results in less involvement/ interest in crypto investment.

Table 4.5 Frequency distribution w.r.t Monthly Income

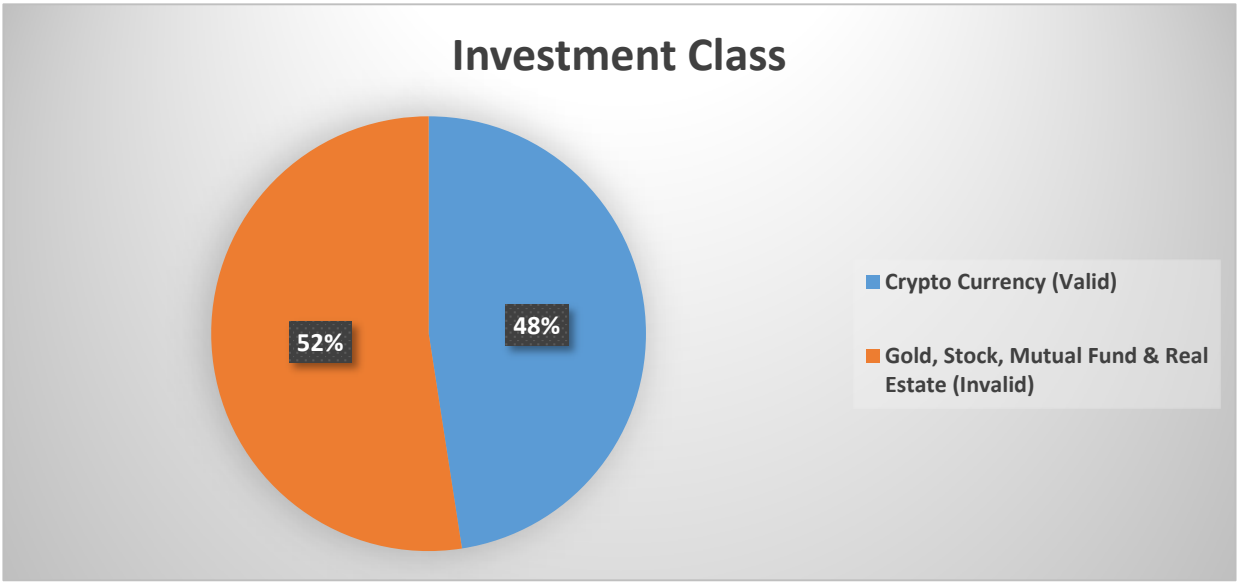
		Frequency	Percent
Valid	25,000 & Less	56	18 %
	25,001-50,000	64	21 %
	50,001-75,000	65	21 %
	75,001-100,000	58	19 %
	100,001 & above	68	22 %
	Total	311	100 %



The above chart and table 4.5 shows the investor's 311 responses frequency w.r.t their Monthly income. There were only 18% investors belongs to monthly income of Rs. 25,000 or less, 21% were Rs. 25,001 – 50,000, 21% investors were having monthly income of Rs. 50,001 – 75,000, 19% were 75,001 – 100,000 & 22% were 100,001 & above. This statistic shows that in crypto currency investment almost every income class is involved, the reason is no limit for the minimum investment. Investment can be made starting from 2$ only, which makes it convenient and different from other investment classes. **(https://e-cryptonews.com/what-is-the-minimum-bitcoin-investment/)**

4.6 Table - Frequency distribution w.r.t Investment Class

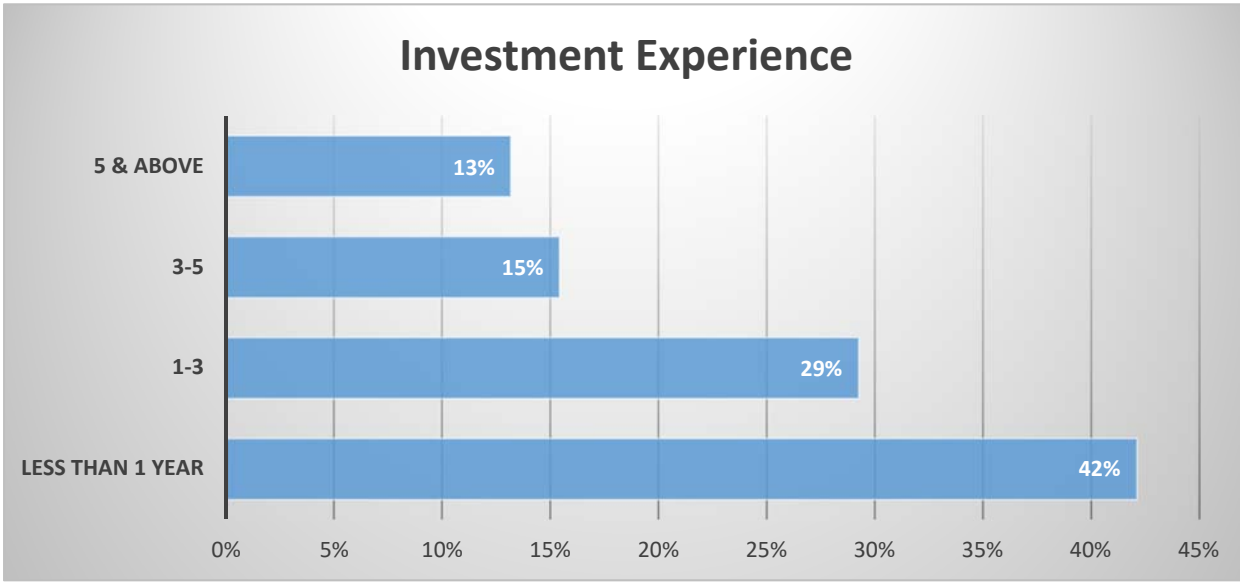
		Frequency	Percent
Valid	**Crypto Currency**	311	100 %



The above table 4.6 shows only the responses which are considered for this research, investors involved in crypto currency only. Questionnaire were provided to investors without limiting it to crypto currency only. Total 593 responses were received from investors and 311 responses which were pertaining to crypto currency are taken for data analysis which is 52% of total responses received the other 48% responses belongs to different investment classes i-e, Gold, Real Estate, Stock and Mutual Funds as shown in above pie chart.

4.7 Table - Frequency distribution w.r.t Investment Experience

		Frequency	Percent
Valid	Less than 1 Year	131	42 %
	1-3	91	29 %
	3-5	48	15 %
	5 & above	41	13 %
	Total	311	100 %



As we know that in Pakistan the crypto currency is not yet having the legal status and it is still considered as emerging assets class in the world and in Pakistan too hence the statistics shown in the above table 4.7 are in line with the statement provided earlier. Most of the investors are having less than 1 of experience, making them top among all response with 42%. Moreover, there are 29% of investors which also belongs to new investors group by having experience of 1-3 years only. Responses also shows that there 15% and 13% investors who are having experience of 3-5 and 5 & above years respectively. 5 years and above are only 13% and rest of 87% investors are having less than 5 years of experience.

4.3 Reliability Test

Hari et al, (1998) Cronbach's Alpha of 0.70 is sufficient and reliable while conducting surveys. It is used for measuring reliability in behavioral and social studies (Liu et al, 2010). 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 in performed through SPSS.

Table 4.8 Cronbach's Alpha

	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 4.8 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).

4.4 Descriptive Statistics

Table 4.9 - Descriptive statistics

	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 4.9 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.

4.5 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 4.10 Results of Correlation Analysis

		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 4.10 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.

4.6 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 4.11 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 **(X_1)**, Herding Behavior **(X_2)**

The table 4.11 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 4.12 - 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 4.12 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 4.13 - Coefficients of regression analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
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 4.13. 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 (Chandra & Kumar, 2012; Nakhjavan; Ghelichi; & Gharehdaghi, 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 4.13 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) & 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, Tran & Nguyen, 2021)

4.7 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.

4.8 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 (Hunag, 2003), 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.

4.9 Summary Results of Hypothesis

H_1: Overconfidence Bias is positively & significantly linked with investor's financial decision while dealing in crypto currency. **Accepted**

H_2: There is positive and significant relationship between herding behavior and investor's financial decision in Crypto currency. **Accepted**

CHAPTER 5

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.

5.1 Main Conclusion

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 finical 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.

5.2 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.

5.3 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.

5.4 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.

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

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Submission date: 13-Apr-2022 10:42AM (UTC+0500)
Submission ID: 1809492494
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Character count: 70188

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Demographics

1. Gender

Check all that apply.

- [ ] Male
- [ ] Female

2. Age

Check all that apply.

- [ ] Less than 25 years
- [ ] 25-30
- [ ] 31-35
- [ ] 36-40
- [ ] 41-45
- [ ] 46-50
- [ ] 51 & Above

3. Academic Background

Check all that apply.

- [ ] Matric
- [ ] Intermediate
- [ ] Graduation
- [ ] Post-Graduation

4. Monthly Income

Check all that apply.

- [ ] 25,000 & Less
- [ ] 25,001-50,000
- [ ] 50,001-75,000
- [ ] 7,5001-100,000
- [ ] 100,001 & Above

5. Investment Class

Check all that apply.

- [ ] Crypto Currency
- [ ] Gold
- [ ] Stocks
- [ ] Reat Estate
- [ ] Mutual Funds

6. Investment Experience

Check all that apply.

- [ ] Less then 1 Year
- [ ] 1-3
- [ ] 3-5
- [ ] 5 & above

Section A

(1= Strongly Disagree, 2= Disagree, 3 = Slightly Disagree, 4= Slightly Agree, 5= Agree, 6=Strongly Agree)

7. My past profitable investments were mainly due to my specific investment skills

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree	◯	◯	◯	◯	◯	◯	Strongly Agree

8. Relative to others, my ability to predict future prices is better

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree	◯	◯	◯	◯	◯	◯	Strongly Agree

9. I have complete knowledge of Crypto Currency

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree	◯	◯	◯	◯	◯	◯	Strongly Agree

10. I feel confident to evaluate Crypto Currency prices in my investment portfolio myself

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree	◯	◯	◯	◯	◯	◯	Strongly Agree

11. Irrespective of the movements in Crypto Currency Market, I continue to invest.

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree							Strongly Agree

12. I invest in the Crypto Currency which I think to be the best according to my own experience

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree							Strongly Agree

13. I believe that the Crypto Currency is an attractive investment channel

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree							Strongly Agree

Section B

(1= Strongly Disagree, 2= Disagree, 3 = Slightly Disagree, 4= Slightly Agree, 5= Agree, 6=Strongly Agree)

14. I believe that information from friends has high reliability

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree							Strongly Agree

15. I believe that information from colleagues has high reliability

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree							Strongly Agree

16. I believe that information from relatives has high reliability

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree							Strongly Agree

Section C

(1= Strongly Disagree, 2= Disagree, 3 = Slightly Disagree, 4= Slightly Agree, 5= Agree, 6=Strongly Agree)

17. I consider levels of risk associated with particular Crypto currency before investing in Crypto currency market.

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree							Strongly Agree

18. I would like to realize the gain as soon as the Crypto currency increases in price.

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree							Strongly Agree

19. I make sure that my investment has a high degree of safety investment decision making.

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree							Strongly Agree

20. In my opinion, it is safe to invest in local stocks rather than to buy international stocks.

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree							Strongly Agree

21. Considering a stock purchased one month ago for Rs.200, it is found that the stock is now selling at Rs.210. After hold, the stock for one more period, there are 50-50 odds between gaining an additional Rs.10 or“breaking even” I would like to sell the stock to realize the Rs.10 gains now.

Mark only one oval.

	1	2	3	4	5	6	
Strongly Disagree	◯	◯	◯	◯	◯	◯	Strongly Agree