DETERMINANTS OF HERDING BEHAVIOUR AMONG INDIVIDUAL INVESTORS OF PAKISTAN STOCK EXCHANGE

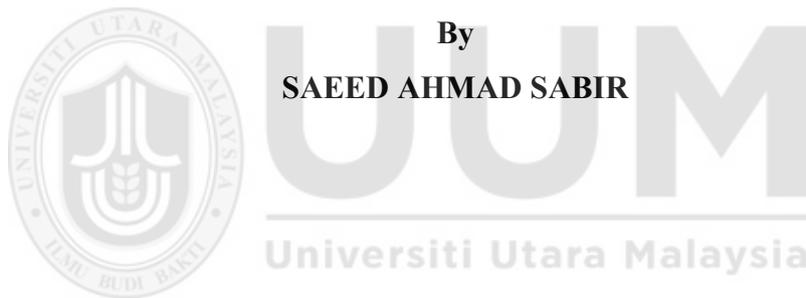## SAEED AHMAD SABIR

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DETERMINANTS OF HERDING BEHAVIOUR AMONG INDIVIDUAL
INVESTORS OF PAKISTAN STOCK EXCHANGE

By

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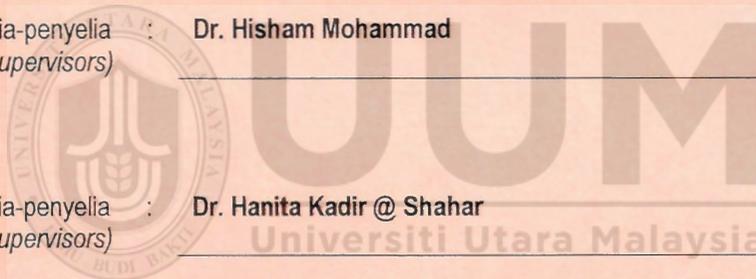
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ABSTRACT

The most crucial role for investors is to make rational investment decisions in which it depends on their investment behaviour. Investment behaviour of investors plays a vital role in the performance of an investment. Normally, investors are unable to gather relevant information which leads them to behavioural biases and cognitive errors. Ultimately, investors might make a wrong investment decision that could become the cause of failure to the investment. Numerous cognitive factors have influenced investors' behaviour during the decision-making process, and lead them to herd the acts of others. This herding behaviour is irrational as it becomes the cause of asset mispricing in the stock market. To address these issues, the current study highlights the role of investors' cognitive profile, past investment experience and information availability on herding behaviour. This study also examines the moderating role of financial literacy on the relationship between the cognitive factors, past investment experience, information availability and herding behaviour. The data of the study was gathered from individual investors in the Pakistan Stock Exchange by using random sampling technique. Using the survey questionnaire, 540 questionnaires were distributed which yielded a 56.29% response rate. Partial Least Square (PLS)-Structural Equation Modeling (SEM) was used to analyse the data. It was concluded that illusion of control, self-attribution, overconfidence and past investment experience have a significant positive influence on the herding behaviour among individual investors in the Pakistan Stock Exchange. Meanwhile, information availability mitigated the herding behaviour of individual investors in Pakistan Stock Exchange. Besides, financial literacy has moderating role on the relationship of illusion of control and past investment experience with herding behaviour. This study could be beneficial for Pakistan Stock Exchange (PSX), Security and Exchange Commission of Pakistan (SECP) and the Pakistani government in formulating strategies to mitigate the herding behaviour among individual investors by enhancing their financial literacy.

Keywords: herding behaviour, cognitive factors, past investment experience, information availability, financial literacy

ABSTRAK

Peranan pelabur yang paling penting adalah untuk membuat keputusan pelaburan yang rasional di mana ianya bergantung kepada tingkah laku pelabur. Tingkah laku pelaburan seseorang pelabur memainkan peranan penting dalam prestasi sesuatu pelaburan. Kebiasaannya, pelabur tidak dapat mengumpulkan maklumat yang berkaitan sehingga membawa kepada tingkah laku berat sebelah dan kesilapan kognitif. Akhirnya, pelabur mungkin membuat keputusan pelaburan yang salah dan boleh menjadi punca kegagalan kepada pelaburannya. Banyak faktor kognitif telah mempengaruhi tingkah laku pelabur semasa proses membuat keputusan, dan menyebabkan mereka mengikuti tingkah laku orang lain. Kelakuan tingkah laku kawanan (herding) ini adalah tidak rasional kerana ia menjadi punca kepada kesilapan dalam perletakan harga aset dalam pasaran saham. Bagi menangani isu ini, kajian ini menekankan peranan profil kognitif pelabur, pengalaman pelaburan lalu dan ketersediaan maklumat ke atas tingkah laku kawanan. Kajian ini juga mengkaji peranan celik kewangan sebagai pengantara terhadap hubungan di antara faktor-faktor kognitif, ketersediaan maklumat dan tingkah laku kawanan. Data bagi penyelidikan ini dikumpulkan daripada para pelabur individu dalam Bursa Saham Pakistan dengan menggunakan teknik persampelan rawak. Dengan menggunakan soal selidik tinjauan, 540 soal selidik telah diedarkan dan ianya menghasilkan kadar maklum balas sebanyak 56.29%. *Partial Least Square (PLS)-Structural Equation Modeling* (*SEM*) telah digunakan untuk menganalisis data. Dapat disimpulkan bahawa ilusi kawalan, pengiktirafan diri, keyakinan diri yang terlalu tinggi dan pengalaman pelaburan yang lalu mempunyai pengaruh positif yang signifikan ke atas tingkah laku kawanan dalam kalangan pelabur individu Bursa Saham Pakistan. Sementara itu, ketersediaan maklumat menghilangkan tingkah laku pelabur individu di Bursa Saham Pakistan. Di samping itu, celik kewangan berperanan sebagai penyederhana ke atas hubungan di antara ilusi kawalan dan pengalaman pelaburan masa lalu dengan tingkah laku kawanan. Kajian ini dapat memberikan manfaat bagi Bursa Saham Pakistan (PSX), Suruhanjaya Sekuriti dan Bursa Pakistan (SECP) dan kerajaan Pakistan dalam merangka strategi untuk mengurangkan tingkah laku kawanan di kalangan pelabur individu dengan meningkatkan celik kewangan mereka.

Kata kunci: tingkah laku kawanan, faktor kognitif, pengalaman pelaburan lalu, ketersediaan maklumat, celik kewangan

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LIST OF ABBREVIATIONS

PSX   Pakistan Stock Exchange
KSE   Karachi Stock Exchange
SECP   Security and Exchange Commission of Pakistan
NYSE   New York Stock Exchange
PT   Prospect Theory
SLT   Social Learning Theory
HB   Herding Behaviour
OC   Overconfidence
IOC   Illusion of Control
SA   Self-Attribution
PIE   Past Investment Experience
IA   Information Availability
FL   Financial Literacy
GFL   General Financial Literacy
SIK   Stock Investment knowledge
EMH   Efficient Market Hypotheses
EUT   Expected Utility Theory
PLS   Partial Least Square
SEM   Structural Equation Modeling

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The rationality of investors remains as the centre of interest for academicians and researchers since the introduction of the Efficient Market Theory. There are a lot of criticisms on the idea of investor's rationality (Baker & Nofsinger, 2002; Oprean, 2014). It is hard to measure the rationality of human behaviour which is often unpredictable (Oprean, 2014). In traditional finance, investors are considered as "rational" in the financial markets. Several traditional theories consider investors as rational in their decision making (Nofsinger, 2001, 2017; Thaler, 2005).

On the contrary, many investors demonstrate irrational behaviour particularly when they make investment decisions in uncertain and risky situations (Bernstein & Bernstein, 1996; Kumar & Goyal, 2016). Behavioural finance and irrationalities of individual investors' behaviour have become an area of interest for researchers in the past few years (Akhtar & Das, 2019; Dhiman & Raheja, 2017; Forbes, 2009; Subrahmanyam, 2008).

Many factors have been recognized as significant in providing a better understanding of individual investors' behaviour including personality, culture, psychology and economics. Traditional finance is based on the notion that investors make unbiased and rational investment decisions in stock markets (Kumar & Goyal, 2016). Meanwhile, many researchers have identified that humans indulge in irrational

behaviour for the purpose of profit maximization or loss minimization (Tuyon & Ahmad, 2016; Zafar & Hassan, 2016).

Investors' irrational behaviour at the time of making investment decision affects financial and economic systems (Ahmad, Ibrahim, & Tuyon, 2017). It affects stock markets as well and could lead from one extreme to another hence creating abnormalities and uncertain environments (Nathie, 2009). In uncertain environments, investment decision making is a very crucial challenge for the investors. Investment decision making in risky situations is influenced by various elements in which investment behaviour possesses significant importance (Chaffai & Medhioub, 2018). However, the risk aptitude of investors shapes their behaviours and decision preferences.

Behavioural finance describes the investors' investment behaviour with the help of psychological studies. It describes how individuals behave when they make investment decisions (Ansari & Moid, 2013) and how behavioural biases influence the investors' behaviour and cause them to deviate from logical or rational decisions (Kumar & Goyal, 2016). Kahneman and Tversky (1979) further developed the prospect theory and illuminated that the investment decision of investors is based on expected gains and losses instead of ultimate results. This situation arises due to the cognitive biases which affect the judgement of potential gains and losses.

Behavioural finance shows that many individual investors mostly make wrong investment decisions due to the lack of knowledge, inaccurate information, insufficient or incorrect analysis and cognitive or emotional biases influence.

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Rumours circulate in the market and investors are unable to gather all relevant information regarding the stock market (Jaiyeoba & Haron, 2016). This situation creates an uncertain and risky environment in the market, causing decision making especially regarding investment in these circumstances a very difficult process, especially on stocks.

Due to the uncertain environment, investors indulge in behavioural biases and extreme emotions at the time of making investment decisions which subsequently leads towards irrationalities (Kumar & Goyal, 2016). In this situation, gathering correct information regarding the choice of stocks among several different stocks becomes a very difficult process (John & Varma, 2014). In the process of decision making, most of the investors indulge in cognitive and behavioural biases and follow the market trend; such tendencies of the investors are connoted as herding behaviour (Kumar & Goyal, 2016).

Herding is defined as the tendency to overlook their own information and copy the decision of other investors (Bikhchandani & Sharma, 2000; Otjes & de Graaf, 2012). Hirshleifer and Teoh (2003) described herding as "everybody doing what everyone else is doing even when their private information suggests doing something else". In stock markets, herding behaviour could lead to the wrong pricing of securities because of unfair judgment or anticipation of predictable risks which leads to irrational decision making (Chang, Cheng, & Khorana, 2000).

By nature, human beings have pattern to live in groups to ensure their survival and to avoid loneliness and isolation. In the days of negative and declining trends in the

market, investors assume that they will remain safe from loss if they invest according to contemporary market behaviour (Barber & Odean, 2013). In uncertain environments, investors avoid taking bold decisions on the bases of their personal judgement. On the contrary, during times of positive and profitable market trends, investors not only invest out of hopes for high returns, but also out of greed and jealousy (Blasco, Corredor, & Ferreruela, 2012; DeBelleville Katzenbach, 1987).

Academic researchers in behavioural finance identified that individual investors demonstrate herding behaviour due to several reasons. For instance, they imitate others in uncertain and risky situations due to insufficient information and influence of emotions (Chiang *et al.*, 2015; Kumar & Goyal, 2016; Ngoc, 2013). Individual investors indulge in herding behaviour because they rely on the decisions of noise traders and follow the larger group of traders (Chandra, Sanningammanavara, & Nandini, 2017). Herding behaviour could lead to over-speculation in the stock market (DeBondt *et al.*, 2010; Prieto & Perote, 2017).

Cognitive profile of investors and lack of financial knowledge are also causes of herding behaviour (Zafar, 2017; Zafar & Hassan, 2016). Cognition is "the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses" (Manz & Sims Jr, 1980). Cognitive profile comprises on illusion of control, self-attribution and overconfidence (Bashir, Fatima, *et al.*, 2013). Herding is a well-documented behaviour design noticed in such extreme types of stock markets (Cakan & Balagyozyan, 2016). Herding behaviour creates a speculative environment in the stock market and this environment exaggerates assets prices beyond their intrinsic values and also causes excess volatility in the market (Prieto &

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Perote, 2017). Uncertainties arise in equity markets due to highly speculative transactions. The speculation in stock markets is related to the making of profits through buying or selling the stocks by artificial change of price (Filip, Pochea, & Pece, 2015). Speculative environments damage the wealth of investors (Sullivan, 2013).

Herding behaviour is influenced by each individual's realization of the degree of uncertainty around them (Fernández *et al.*, 2011) which depends on the individuals' cognitive profiles (Sabir, Mohammad, & Shahar, 2019). Cognitive limitations of the investors affect their trading behaviour, attitude and own beliefs (Fernández *et al.*, 2011). Most of the investors do not continuously behave as perfect rational investors (Bashir *et al.*, 2014; Metilda, 2015; Mishra & Metilda, 2015). The responses to market indications significantly differ from one individual to another. Each investor has different characteristics regarding the feeling of uncertainty which depends on his attitudes, risk propensity, degree of intuitive character, illusion of control (ILC), level of confidence, and level of patience for ambiguity (Fernández *et al.*, 2011). These factors are interconnected and frame the individual's cognitive profile, which defines how the investors receive and illuminate the information regarding investment. The investors' cognitive profiles are helpful in describing the situations in which the investors decide to overlook their own information and imitate the decisions of others in the stock market.

Investors with the illusion of control believe that they can control, regulate and affect the outcome of random events; they underestimate the role of luck and overstate their abilities and skills to control the events (Bashir *et al.*, 2014; Langer, 1975; Metilda,

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2015). In situations where social interactions are less operative with a lack of sharing of information, investors think that all the other investors are making decisions in similar ways (Pompian, 2011). Therefore, they collect information from the decisions of other investors and use it in their own decision making, assuming that the other investors made decisions using all the relevant information. Investors with an Illusion of Control are motivated to give more weightage to the behaviour of other investors (Quiamzade & L'Huillier, 2009).

Not only prioritizing on other investors' behaviour, the past successes and failures of individuals' investment could affect one's investment behaviour. When investors look at their past investment decision and evaluate their estimations regarding investment, they are usually affected by cognitive biases like self-attribution (Thaler, 2010). Previous successful investments motivate individual investors to take more risks in future investments (Nofsinger 2005) which leads to self-attribution. Investors who are affected by self-attribution think that their achievements are due to their personal skills and their failures are due to their bad luck or the activities of others (Pompian, 2011). In self-attribution, individual investors tend to overlook, or at least give very low weight to information that does not validate their decision (Daniel & Titman, 1999). Subsequently, such investors tend to overlook their past failures in investment. It is concluded that self-attribution affects the behaviour of investors. Investors who are affected by self-attribution more likely to imitate the decision of others (Fernández *et al.*, 2011).

Herding behaviour also happens when investors demonstrate less confidence about their own information (Baddeley *et al.*, 2012). According to Fernández *et al.* (2011),

overconfident investors are less likely to herd because herding behaviour depends on the degree of confidence. Overconfidence occurs when investors overstate their skills and knowledge and overlook the risk connected with the investment (Tan, Tan, & Teo, 2012). Psychologists assume overconfident investors as individuals who exaggerate their knowledge and skills, understate the risk and overstate their capability to govern and control events (Glaser, Nöth, & Weber, 2003; Koehler & Harvey, 2008). However, overconfident investors exaggerate the information that they have collected, overstate their own predictive abilities and ignore the actual facts.

Beside cognitive factors that affects herding behaviour is past investment experience (Thaler, 2010). The brain records bad and good experiences through a process and stores different features of the experience. Investors are more likely to become risk takers when they realise profit and become risk averse when they confront financial loss in past investments (Nofsinger 2005). Bad past performance in investment will lead investors to adopt herding behaviour (Merli & Roger, 2013). Following an unprofitable investment, investors tend to demonstrate a risk adverse attitude; therefore, they indulge in herding behaviour (Nofsinger 2005).

Herding behaviour does not only occur due to cognitive factors. Many individual stock market investors indulge in this behaviour due to lack of information. As argued by Fernández *et al*. (2011), herding behaviour and availability of information are interconnected. Incomplete or uncertain information leads investors to imitate the decisions of larger groups. Furthermore, the trading frequency of individual investors is also associated with the acquisition of information regarding stocks (Abreu & Mendes, 2012; Grossman & Stiglitz, 1980; Holthausen & Verrecchia, 1990). Hence,

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the availability of quality information has an influence on the individuals' investment behaviour.

The quality of information depends on the source of information whereby reliable sources lead to rational investment decision making as compared to information from less trustworthy sources (Epstein & Schneider, 2008). Coordination among various investors or the investor's observation about decision makers creates herding (Devenow & Welch, 1996). Therefore, the intention of investors to observe and act in the same patterns as other investors while ignoring their own beliefs and information instigate the herding behaviour (Avery & Zemsky, 1998; Bikhchandani & Sharma, 2000; Wang, 2008).

The existence of herding in stock markets may lead to an incorrect valuation of stock prices, while the rational decisions of the investors may be influenced by the correct assessment of risk and profitability connected to the projected investment (Filip *et al.*, 2015). The intensity of the herding is correlated to the size of the price momentum (Rannou, 2010). Therefore, the existence of herding behaviour is a sign of an inefficient market that often creates price momentum and ultimately leads towards the declining of the assets prices (Caparrelli, D'Arcangelis, & Cassuto, 2004). The decline in stock prices causes a decrease in the wealth of stock market investors (Granger, Huangb, & Yang, 2000; Phylaktis & Ravazzolo, 2005; Sabir, Mohammad, & Shahar, 2018).

Herding behaviour is an irrational behaviour of investors because it leads to the mispricing of assets (Shiller, 2015; Spyrou, 2013). Herding behaviour causes rational

investors to start imitating the assessment of irrational investors during investment decisions making (Jaiyeoba & Haron, 2016). Due to herding behaviour, investors copy the acts of others without having proper information and analysis (Caparrelli *et al.*, 2004). In a speculative environment, the prices of assets are significantly higher as compared to the fundamental values of that asset; trading volume and volatility of market are also at their highest levels. These situations push the stock prices farther from the fair value of the stocks which subsequently creates price momentum and excess volatility (Chiang *et al.*, 2015; Filip *et al.*, 2015; Gębka & Wohar, 2013; Ngoc, 2013).

Financial literacy entails financial skills and capabilities that considerably affect the performance of individual investors (Bateman *et al.*, 2012). Multiple and complex financial products in the stock market have further underlined the importance of financial literacy for stock market investors (Abdallah & Hilu, 2015). The current study will help in assessing the financial literacy of stock market investors in developing countries. Financial knowledge assists in investment and economic decision making for those participating in the stock markets (Lusardi, Michaud, & Mitchell, 2017). People without financial knowledge and skills face more problems in investment decisions as compared to those that have financial literacy (Al-Tamimi & Kalli, 2009).

It is generally acknowledged that stock markets work as an engine for the financial and economic growth of a country. Meanwhile, the behaviour of stock market participants affects its functions (Marques, Fuinhas, & Marques, 2013). Many studies have indicated that investors indulge in irrational behaviours due to cognitive factors,

the influence of behaviour biases, unavailability of information and uncertain stock market environment (Duncan *et al*., 2012; Zafar & Hassan, 2016). Thus, Zafar and Hassan (2016) and Prieto and Perote (2017) suggested that these irrational behaviours of the investors are worth investigating on empirical grounds. Therefore, this study intends to examine the impact of illusion of control, self-attribution, overconfidence, past investment experience and information availability on the herding behaviour of stock market investors.

Pakistan is a developing country with a relatively small size stock market. At present, 580 companies are listed on the Pakistan Stock Exchange (PSX), which are distributed into 35 sectors that contribute towards the market capitalization. KSE-100 index, an indicator of the top 100 companies' activity, is used as the benchmark in measuring the activity of the Pakistan Stock Market. PSX has almost 400 registered brokerage houses and 21 registered asset management companies (AMC). PSX stock exchange (PSX) has 1,886 foreign and 883 domestic institutional investors and approximately 0.25 million individual investors that are participating in stock market activities (Naqvi, 2016). According to economic survey of Pakistan (2019) PSX has total $ 5.04 billion market capitalization as on March 31, 2019. In free-float stocks, approximately 40% stocks hold by individual investors of PSX (Finance Division Government of Pakistan, 2019). The proportion of market capitalization available in stock market for trading considered as free float stock.

PSX is a very unpredictable and volatile market due to its sensitivity towards unexpected shocks and news which affect the market activities instantly (Ghufran *et al.*, 2016). For instance, the Karachi stock market reached its peak on March 15, 2005

with 10,303 points. On April 12, 2005 it turned bearish which resulted in a decline of 3,364 points in the index; a drop of 32.7 percent in a single month. Such sudden increase in the KSE-100 index and a succeeding sharp drop denoted unhealthy and abnormal movements in the stock market. This bearish trend continued until the end of October 2005, when the KSE-100 index was at its lowest level of 8,247 points. Again, in November 2005, the stock market turned bullish and showed a persistently rising trend until 2006. The KSE-100 Index crossed the barrier of 12,000 points for the first time in the history of the Pakistan stock market on April 13, 2006. The KSE-100 index made further inroads and reached 12,274 points on April 17, 2006.

On April 20, 2008, KSE-100 achieved a milestone by crossing the barrier of 15,000 points and closed at 15,737 points. In May 2008, inflation in the country increased; to control that situation, the State Bank of Pakistan announced an increase in interest rate which caused a sharp decrease in stock prices at the PSX. The prices continued to fall unreasonably and KSE-100 index lost almost 5,600 points in four months. In anticipation of further decline, a minimum trading rate was set up at the KSE at 9144 points on August 20, 2008 and the KSE-100 index was not allowed to fall below this level. After much condemnation, the floor was lifted on December 14, 2008. Consequently, KSE-100 again dropped to 4782 points in just fifteen market sessions (Javid, 2009). Again, at the start of May 2017, the KSE-100 index crossed the barriers of 50,000 points and stood at a level of 51,511.41 points as of May 17, 2017 from its previous standing at 31,298.6 points on Jan 29, 2016 (PSX website).

The movement of the KSE-100 index showed that the Pakistan stock exchange is a very volatile market. Due to extreme market volatility, most of the investors of PSX

prefer to follow the market trend instead of utilising the necessary available information to support their investment judgments (Sabir *et al.*, 2018; Zafar & Hassan, 2016). Such move could lead investors to overreact to any news hitting the stock market (Zaidi & Tauni, 2012) and this behaviour proves to be harmful for investors (Prieto & Perote, 2017).

To conclude, herding behaviour is one of the most persistent issues in developing stock markets, especially in Pakistan. Investors follow the decisions of others due to unavailability of proper information, insufficient financial literacy, poor past performance in investing/trading and influence of cognitive biases. Herding behaviour leads to stock market speculation which subsequently creates an uncertain environment.

1.2 Problem Statement

Herding behaviour is a crucial issue in most developing countries, including Pakistan (Ghufran *et al.*, 2016; Malik & Elahi, 2014). It is evident from previous studies that most investors indulge in herding behaviour due to the extreme volatility of stock markets (Helbling & Terrones, 2003). Pakistan stock exchange is a very unpredictable and volatile market and its volatility affects the behaviour of individual investors (Shah, Shah, & Khan, 2017). Information availability and cognitive profile of an individual investor such as illusion of control, self-attribution and overconfidence have been identified as key factors that affect individuals behaviours at the time of making an investment decision and lead them towards imitating the decision of others (Bashir, Javed, *et al.*, 2013). According to the board of directors of PSX, investors

lose their confidence when they make investment decisions emotionally and ultimately lose their investments (Hussain, 2019).

Chairman Security and Exchange Commission of Pakistan (SECP) Mr. Aamir Khan highlighted this issue during his interview with 'DAWN NEWS' and argued that on the trading floor, individual investors think that brokers and big players of the market are ruling in stock and have superior information regarding sentiment of the market. Therefore, individual investors follow them in their trading. It is also argued that there is a need to educate them about the stock market mechanism to make a better investment decision based on facts. Moreover, they must be capable of avoiding any emotional influence in taking investment decisions (Hussain, 2019).

PSX has 250,000 individual investors, hold approximately 40% of free-float stocks (Finance Division Government of Pakistan, 2019). They must beware of cognitive factors that instigate towards being herd because this behaviour is the biggest challenge for individual investors and a cause of damage to their investment (Sabir *et al.*, 2018; Zafar, 2017), this loss cause of discouraging individual investors for future investments in the stock market (Shah *et al*., 2017; Zafar & Hassan, 2016). The recent statistics demonstrate the significant decrease in the participation of individuals in trading activity at PSX due to the irrational investment decision of investors.

The statistics regarding the participation of individuals in PSX highlighted an alarming situation in the recent five years of a crucial decrease in the number of individual investors at PSX. It is reported by SECP and PSX that in March 2013, there were 318,565 individual investors, but there was an abnormal decrease has been

observed to 238,763 in the recent five years, which shows a tragic loss of approximately 80,000 investors. Further, a 2.8% decrease in individual investors was reported during the last year 2017-2018 (FY) in PSX (MLNews, 2019).

Most individual investors of the Pakistan stock market face problems in dealing with different stocks in the market (Anum, 2017). Several psychological and cognitive factors influence individuals' behaviour and decisions making process (Dhiman & Raheja, 2017; Mathuraswamy & Rajendran, 2015). Individuals' behaviour depends on how an individual deals with uncertain situations (Fernandes, Lynch , & Netemeyer, 2014). Each individual has a diverse characteristic for the realization of uncertainty and it depends on his risk-taking attitude, illusion of control (ILC), and degree of confidence (Sivaramakrishnan, Srivastava, & Rastogi, 2017). Therefore, the current study proposed that illusion of control, self-attribution, overconfidence, past investment experience, and information availability are the key factors that influence behaviour of investors. Hence, there is a need to study these factors for the contribution in the field of behavioural finance.

Furthermore, literature provides conflicting evidence that information availability and investors' cognitive profile may affect the behaviour of individual investors, especially herding behaviour. For instance, illusion of control is found to have a significantly negative relationship with risk-taking attitude (Mark, Houghton, & Aquino, 2000), and a positive correlation with the herding behaviour (Fernández *et al.*, 2011; Metilda, 2015). With regards to overconfidence, Chuang and Lee (2006) claim that overconfidence leads investors to understate the investment related risks,

overstate their stock market knowledge and excessive trading which ultimately affect the behaviour of stock market investors.

In contrast, Jain, Jain, and Jain (2015) argue that there is no significant association between overconfidence and investment decision. According to Merli and Roger (2013), bad past performance in investment will lead to herding, while Bikhchandani and Sharma (2000) concluded that past investment experience does not affect the herding behaviour of investors. The studies of Abreu and Mendes (2012) and Huber, Kirchler, and Sutter (2008) found that availability of information has a positive relationship with the behaviour of individual investors. Conversely, Fernández *et al.* (2011) found that availability of information has a negative influence on the herding behaviour of individual investors. According to Zhang (2006), herding tendency of individual investors depends on how the investors use available information.

According to Hirshleifer and Teoh (2003), the herding behaviour of investors depends on information reliability and the investors' risk-taking attitude. In short, there are inconclusive findings related to the relationship of illusion of control, overconfidence and information availability with the herding behaviour of investors. Therefore, according to Baron and Kenny (1986), there is a need to introduce a moderator variable that could make the relationship clearer. The relationship between illusion of control, self-attribution, overconfidence, past investment experience and information availability with herding behaviour could be moderated through the role of financial literacy.

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Financial knowledge is one of the important elements which can control the irrational behaviour of investors because financial literacy significantly affects investors' behaviours (Cole, Sampson, & Zia, 2011). In general, most of the Pakistani investors have low financial knowledge (Arif, 2015a). Due to the lack of financial literacy, investors could not easily forecast uncertain and risky situations in the stock market. Financial literacy entails the knowledge, expertise and skills to take relational financial decisions (Altman, 2012). Financial literacy provides understanding to investors regarding the stock market function and behaviour of market participants (Giesler & Veresiu, 2014).

Due to the lack of financial literacy, Pakistani investors could not easily forecast uncertain and risky situations in the stock market (Awais *et al.*, 2016). Investors who have financial knowledge could make a proper analysis and use different procedures when making an investment decision. They gather proper relevant information through different sources such as financial publications, news, and social media. On the contrary, investors who have insufficient knowledge rely more on advice from peers, colleagues, and stockbrokers (Al-Tamimi & Kalli, 2009). Individual investors who indulge in herding behaviour in the stock market have insufficient knowledge or unable to process the information for investment decision making (Fernández *et al.*, 2011).

Financial literacy provides the knowledge of financial products and services in the market and improves financial decision-making (Altman, 2012) because financial education and valuable information are the main elements of financial literacy (Lusardi & Mitchell, 2007). Financial literacy also enhances the skills of individuals

to analyse information regarding financial decision making (Lusardi & Mitchell, 2014). In a nutshell, the above arguments indicate that investors' cognitive profile, past investment experience, and information availability have a relationship with herding behaviour which can be moderated through the role of financial literacy.

This study in particular, addresses the gap on the effect of cognitive profile (illusion of control, self-attribution, and overconfidence), past investment experience, and information availability on herding behaviour of individual investors in PSX. Earlier literature shows that the scholars have conducted studies only on the investigation of the presence of herding behaviour of individual investors in PSX (Javaira & Hassan, 2015; Javed, Zafar, & Hafeez, 2013; Shah *et al*., 2017), however, in a rare case; the literature formally documented the determinants of the herding behaviour of individual investors. Although, such studies have contributed valuable information to the body of knowledge, however, factors determine herding behaviour is more important than only identifying its existence. Hence, cognitive profile, past investment experience, and information availability are crucial for determining herding behaviour among individual investors in PXS. Besides, such previous studies reveal conflicting finding and thus proposing possible operation moderating that could strengthen the effect. In this regard, financial literacy could moderate the effect between cognitive profile, past investment experience, and information availability on herding behaviour of individual investors in PSX.

1.3 Research Questions

This section identifies and highlights the research questions for the study. The research questions to address the research gaps are as follows:

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1. Does illusion of control affect herding behaviour of individual investors in PSX?

2. Does self-attribution influence herding behaviour of individual investors in PSX?

3. Does overconfidence influence herding behaviour of individual investors in PSX?

4. Does past investment experience affect herding behaviour of individual investors in PSX?

5. Does information availability affect herding behaviour of individual investors in PSX?

6. Does financial literacy moderate the relationship between investors' cognitive profile, past investment experience and information availability with herding behaviour of individual investors in PSX?

1.4 Research Objectives

The basic objective of this study is to draw implications of cognitive profile and financial literacy in relevance to the herding behaviour of individual investors in the Pakistani stock market. The following are the specific objectives of this study.

1. To investigate whether illusion of control affects herding behaviour of individual investors in PSX.

2. To investigate whether self-attribution influences herding behaviour of individual investors in PSX.

3. To investigate whether overconfidence affects herding behaviour of individual investors in PSX.

4. To investigate whether past investment experience affects herding behaviour of individual investors in PSX.

5. To investigate whether information availability affects herding behaviour of individual investors in PSX.

6. To examine whether financial literacy moderates the relationship between investors' cognitive profile, past investment experience and information availability with herding behaviour of individual investors in PSX.

1.5 Scope of the Study

The purpose of the current study is to examine the influence of investors' cognitive profile, past investment experience, and information availability on the herding behaviour of individual investors in PSX. The current study is limited to individual investors of PSX because individual investors are an important group of the stock market and their behaviour has an impact on the stock market (DeBondt *et al.*, 2010). It is suggested by literature that there is a need to conduct a research on the herding behaviour of PSX's investors (Ghufran *et al.*, 2016). Furthermore, this research uses primary data and survey method.

1.6 Significance of the Study

The current study is significant in several aspects. This study is significant because it provides implications of cognitive factors such as illusion of control, self-attribution, and overconfidence on the herding behaviour of individual investors in the Pakistan stock market. This study also elaborates the implications of information availability and past investment experience on the herding behaviour of individual investors in the

Pakistan stock market. In addition, this study also identifies the moderating effect of financial literacy on the investigated relationship.

This study provides insight into the phenomenon of herding, and thus provides explanations as to how individual investors could be involved in herding behaviour which can be alleviated through the alertness of cognitive profile of individual investors.

Additionally, most of the prior studies focused only on the investigation of the presence of herding behaviour among stock market investors. However, in rare cases, the literature formally documented the ways to mitigate the herding behaviour of investors. Hence, the findings of this study are more significant for individual investors to enhance their alertness and awareness about the influence of herding behaviour. In addition, it could also help them in the decision making process. Therefore, investors will be able to overcome their irrational herding behaviour and improve their decision-making process regarding investment. This study is amongst the earliest attempts to investigate the influence of cognitive profile, past investment experience, and information availability on herding behaviour. It also attempts to examine the moderating role of financial literacy in the relationship between investors' cognitive profile, past investment experience, and information availability with the herding behaviour of individual investors.

Finally, for the government and policymakers, the findings could help them formulate better legislation to help the Pakistani authorities (Security and exchange of Pakistan) in regulating the Pakistan stock market. This study will be significantly helpful in

evolving financial literacy programs for stock market investors. Cognitive factors may negatively affect the ability to handle complicated financial situations. It may be compulsory for every college and university student to take on financial management subject. This will ensure individuals' survival in complex financial situations in the stock market and even in everyday financial matters.

Thus, this shall mitigate the prevalence of herding behaviour which ultimately protects the investors' investment interest through the dissemination of financial knowledge. The policies shall help to reduce the possibility of individual investors and society incurring financial losses that occurred due to their irrational herding behaviour. From the behavioural finance perspective, a focus on financial literacy within the context of investment decision making is one of the effective ways to help investors minimize the risk of bearing losses due to herding behaviour. This could be achieved by utilizing financial knowledge when making investment analyses and decisions.

1.7 Chapter Summary

The first section of this chapter presented the background of the study; the second section consists of the problem statement; the subsequent sections explained the research questions and research objectives of this study and the last section presented the scope and significance of the study.

1.8 Organization of the Thesis

This thesis contains five chapters. The first chapter entails a brief explanation of the thesis. This chapter explains the background of this research, the problem statements,

the research questions, the research objectives, the significance of the study, and lastly the organization of the thesis.

Chapter Two presents theories related to the current research and the review of literature related to herding behaviour, information availability, illusion of control, self-attribution, overconfidence, and past experience regarding investment with respect to the investors of stock market. Additionally, the relationship between all the variables is evaluated and strengthened with the literature from previous studies.

Chapter Three consists of the methodology and techniques applied in the collection and processing of data. Firstly, it describes the research framework development adapted for the study. Next, this chapter presents the research design as well as the sources of data, the description of the research instrument and the sampling method used to collect data. Furthermore, this chapter also explains the procedures of data analysis that are applied to the estimation of the hypotheses.

Chapter Four contains the findings estimated after the analysis of data. The first part of this chapter entails the discussion on the response rate, data entering, and screening of data. The second section of this chapter discusses the respondents' profile and statistics results of the data screening on all the variables. The third section explains the statistics results regarding the association between the independent variables with dependent variable and moderating effect of the moderator. It also elucidates the findings of the hypotheses estimation and presents a concise discussion on the findings.

Lastly, Chapter Five entails the conclusion of the study. Further, it presents a comprehensive discussion on the theoretical novelties of the study. The next section in this chapter describes the implications of this study from the theoretical, methodological and practical perspectives. This chapter also explains the limitations of the current research as well as recommendations for future similar studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The first section of this chapter begins with the definitions of herding behaviour. This section also highlights the consequences and ways to mitigate herding behaviour. Second section of this chapter begins with the theoretical discussion and development of a link between herding behaviour and two theories namely, Prospect Theory and Social Learning Theory. The Prospect Theory describes the behaviour of investors in uncertain and risky situations. Social Learning Theory describes how the behaviour of individuals is affected by the society and their cognitive profile.

In the third section of this chapter, herding behaviour with regards to the investors' cognitive profile, information availability and past investment experience is discussed. Additionally, it also presents the empirical reviews of herding behaviour, illusion of control, self-attribution, overconfidence, past investment experience and information availability. This chapter provides the body of knowledge and scholarly contributions relevant to the research problems.

2.2 Herding Behaviour (Dependent Variable, DV)

In the context of this study, herding means deliberately replicating the actions of other investors in their decision making regarding investment, regardless if their own information recommends something different (Kumar & Goyal, 2016). Herding behaviour represents a collective way of conduct and the term herd is articulated as a "resemblance in behaviour" where the "interactive observation" of actions are taken

into consideration (Hirshleifer & Teoh, 2003). According to Kumar and Goyal (2016), herding behaviour relates to circumstances when rational investors start copying the behaviour of irrational investors in investment decision making process. Individual investors demonstrate this behaviour as a result of replicating the decision of large groups or noise traders (Kumar & Goyal, 2016).

In the stock market, herding is part of the investors' behaviour because most of them give more weightage to the action of other investors irrespective of their own private information and stock fundamentals (Bikhchandani & Sharma, 2000; Hwang & Salmon, 2004). Herding behaviour affects stock market functioning negatively as well as the investment decisions of investors (Mandelbrot, 1997). According to Akerlof and Shiller (2010) and Parisi, Sornette, and Helbing (2013), herding leads to speculative transactions which in turn causes the mispricing of assets. During the wave of uncertainty, individual investors try to imitate their peers, colleagues and friends, leading them to make irrational investment decisions which ultimately damage the wealth of investors.

There are two different schools of thoughts that are used to explain the investment decision-making process namely traditional theories and behavioural theories. "Efficient Market Hypotheses/Theory" (EMH) and "Expected Utility Theory" (EUT) are the bases for traditional finance while the Prospect Theory is the basis for behavioural finance. These theories describe how investors make investment decisions under uncertain conditions.

The EMH assumes that markets are always efficient and that prices of assets reflect all relevant facts (Fama, 1970). Moreover, traditional finance assumes that investors make investment decisions on the basis of the EUT. The EUT assumes that investors follow the logical process of decision making and that all available information have been taken into account at the time of execution of an investment decision (Kishore, 2004; Malkiel & Fama, 1970). Meanwhile, it is unrealistic that all relevant information is available to investors in the stock market. Therefore, investment decisions involve highly complicated processes in the presence of uncertainty and risks (Ackert, 2014).

The EMH and EUT assume that a rational investor has constant preference even in complicated investment situations. Both theories ignore the behavioural aspect of investors. But in risky situations, how does a rational investor choose the best plan of action? Financial markets are not efficient all the time; inefficiency prevails although it varies from market to market. The EMH seems impossible in the context of actual financial system. Von Neumann and Morgenstern (2007) highlighted that the EUT explains how selections are made in the presence of uncertainty and risks.

The EMH and EUT are based on the rationality of investors. For instance, Malkiel and Fama (1970) argue that investors take into consideration all available information at the time of price estimation of assets in an efficient financial market. Because of this reason, the supporters of these theories claim that active investors are not expected to produce abnormal earnings (Ricciardi & Simon, 2000). However, it is problematic to prove these notions because many studies provide evidence against the

relationship between market efficiency and expected returns that adversely affect the rationality of the hypothesis in the traditional finance theory.

Recent empirical evidences on the presence and magnitude of fundamental anomalies in stock markets pose a viable challenge to conventional finance theories (Zafar, 2017). Thus, a new school of thought has emerged to explain the deficiencies in the traditional theories of finance i.e. behavioural finance (Andrikopoulos, 2005; Hirshleifer, 2001). Behavioural finance assumes that various investors resort to destructive behaviour at the time of decision making and damage their portfolio as a result of under-diversification, over-trading, representative bias and loss aversion (Barber & Odean, 1999). Thus, the emphasis of behavioural finance is on the irrationalities and behavioural biases which influence investors' behaviour at the time of financial decision making (DeBondt *et al.*, 2010).

The recent increasing number of investigations on this domain indicates that it has grown to become a viable explanation in the discipline of asset pricing. In the early stages of behavioural finance, scholars paid attention on introducing various psychological theories in the field of finance for the study of financial decision making. In fact, now neuroscientists can explain how the investment decision making process is affected by brain functioning in the area of neuro-finance (Ackert, 2014).

Parallel to traditional financial theories, Tversky and Kahneman (1973) made substantial contributions in the field of finance and developed the Prospect Theory in the 1980s (Kumar & Goyal, 2016). Psychologists before the 1980s knew that the assumptions of traditional finance theory were not entirely true all the time because

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people act irrationally and make predictable errors at the time of investment decision making.

Behavioural finance prevents stock market investors from making common behavioural mistakes and assists them in their investment decisions (Ricciardi & Simon, 2000). This does not mean that it replaces traditional finance; rather, it enlarges the field of finance beyond portfolio building, market efficiency and asset pricing (Statman, 2014). Moreover, behavioural finance is beneficial for investors to recognize their abilities and to give good recommendations regarding investment behaviour (Muradoglu & Harvey, 2012).

It is very important for investors to understand themselves first prior to having adequate knowledge about stocks because financially educated investors sometimes fail in making rational investment decisions due the influence of cognitive biases. Many explanations are available in the context of individuals' decisions being affected by group influence. Here, the explanation of two main groups is focused on namely rational learning explanations based on the Bayesian assumptions, and explanations based on individual differences. It is necessary to highlight that these explanations are not an alternative of each other.

2.2.1 Rational Learning and Informational Cascades

A notable model of microeconomic herding is the Bayesian model i.e. a rational learning method in which the assessments of various people are interdependent and supportive of one another. Individual investors may rationally make an assessment on the actions of others and valuable information is generated in the process (Keynes,

1937, 2016). In uncertain and risky situations, rational implications can be invented by the Bayesian rule (Salop, 1987). The Bayesian model of a preceding likelihood will conclude a far-reaching set of statistics comprising societal information regarding the realistic activities of other investors. A major problem with the Bayesian herding model is that valuable personal information is ignored in support of the activities of other people (Scharfstein & Stein, 1990).

To demonstrate the principles, Banerjee (1992) illustrated that in herding behaviour, people note the actions of other people while they make selections in balloting as well as in business and investment decisions. Herding would be the consequence of logical but theoretically misleading facts in the information acquisition procedure. Banerjee (1992) also highlighted that ignoring material information in the case of herding may negatively affect the behaviour of investors when they make investment decisions. Although herding may be rational, it is not based on material information because herding occurs at that time when people follow others without knowing the facts.

Bikhchandani, Hirshleifer, and Welch (1998) also proposed a model of serial decision making in which informational cascades elucidate limited confirmation which appears when it is ideal for a specific person to copy the activities of his previous investors and ignore his own personal information. Similarly, Banerjee (1992) in an empirical investigation of his model observed that every sequential decision maker fails to articulate relevant information to the next individual investor in herding. Both of these models define herding as an irrational action, which is based on social imitation instead of personal information.

Substantial economic and financial investigations have been carried out to examine the Bayesian rational herding theories, beginning with Anderson and Holt (1996). Among these, many investigations had validated the Bayesian theories but without evaluating the marginal explanatory power of Bayesian assumptions opposing alternative hypotheses of why individuals herd. On the other hand, some researchers extended the results of their experiments for the purpose of differentiating between information cascades herding and aggregate repetition of the behaviours of other individuals in uncertain and risky situations (Alevy, Haigh, & List, 2007; Sgroi, 2003).

Subsequently, Park and Sabourian (2009) and Avery and Zemsky (1998) used rational herding in their herding behaviour investigations that allowed them to look into various situations. They examined both types of herding (information cascades herding and aggregate repetition), but seventy percent of their investigations supported their standard of rationality. These studies concluded that strategy makers must be vigilant in categorizing herding because not all herding is irrational; in fact, rational herding can improve material information that would lead to the mitigation of irrational herding. Many experimental studies found that herding behaviour has a systematic pattern, although the results of these studies contradict the Bayesian Model.

Cipriani and Guarino (2005) used the Bayesian model to integrate elastic prices in a framework in which informational cascades cannot occur. They found that some individuals ignore their personal material information at the time of selecting or rejecting the alternative, but get involved in opponent trading. Moreover, Ivanov,

Levin, and Peck (2009) also evaluated the Bayesian model and found that it was not necessary for individuals to use probability thinking. They may use bounded rationality or intuition-based rule of thumb instead of rational thinking. Litimi (2017) also used the Bayesian model to investigate herding behaviour among stock market investors in France and concluded that herding behaviour exists among stock market investors regarding some sectors however the effect of this behaviour vary from sector to sector.

2.2.2 The Role of Individual Difference

The "Role of Individual Difference" recommends that the behaviour of different individuals is fundamentally dissimilar. Evidence indicates that decision making is not only the result of statistical inference, but also the statistical capabilities of individuals who may not be capable of applying ideologies of statistical inference in exercise (Salop, 1987; Tversky & Kahneman, 1973). Cognitive biases may bind rational behaviour in opposite cascades when wrong decisions escort information cascades down the wrong track (Sgroi, 2003).

Moreover, there is proof that financial decisions are influenced by personal dissimilarities and emotional aspects; personality characters may have an impact on decision-making if they produce certain emotional tendencies (Baddeley *et al.*, 2007; Elster, 1996). Kamstra, Kramer, and Levi (2003) and Hirshleifer and Shumway (2003) examined the influence of mood variations on financial markets and showed that the variations in mood, attitude and emotion influence economic and investment decisions. Lo, Repin, and Steenbarger (2005) highlighted that personality traits affect investors' behaviour.

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Shiv *et al.* (2005) studied the association between impaired emotional feedback and risk tolerance behaviour and found a significant impact. Kuhnen and Knutson (2005) examined the role of emotions in deviations of rational behaviour at the time of financial decision making. These experiments indicated that moods, personality characteristics and emotions have notable influence on economic and financial decisions and there may be similarities in certain psychological characteristics and tendencies to herd.

In accordance with the above findings, alternative descriptions for herding can be demonstrated. Behavioural studies argued that individual decisions are significantly affected by situational factors (Milgram, 1963). The procedure of social inspiration, even without face-to-face human communications, can be understood as proof that social adaptability is an indicator of information attainment (Bikhchandani, Hirshleifer, & Welch, 1992; Deutsch & Gerard, 1955). Similarly, the theory of mind describes that herding can occur without face-to-face communications if the imaginary colleague's pressure acts as a true colleague's pressure (Hirshleifer & Teoh, 2003). Therefore, various psychologists claim that the presence of herding does not oppose the model of rational herding, but some others may claim that it does. It depends on the assumptions about the individual's cognition and sentiment.

2.2.3 Reconciling Rational and Socio-Psychological Theories of Herding

In the previous segments of this study, different explanations for herding are provided and different ideas were adopted from sociology, psychology and economics fields. These theories are obviously not mutually exclusive; economic literature of conformity discusses the sociological conflict between the normative implications of

an individual's tendency to follow others and informational implications of observing the activities of other individuals (Becker & Murphy, 2009; Bernheim, 1994).

Bayesian learning models do not consider the influence of social impact in a complete manner (Bernheim, 1994). Meanwhile, practical herding actions might be the consequence of interactions between rational and irrational individuals as well as a replication of psychological and cognitive factors that developed due to uncertain circumstances (Baddeley, 2010). Furthermore, if the choice to herd is connected with the time of choosing this behaviour and individual variances, then this would provide support to the theories of behaviour.

Behavioural theories highlighted interactions with irrational individuals at the time of making financial decisions. When individuals receive inspiration from societal evidence, it may replicate an interface concerning a purposeful education process and a more instinctive, productive, emotional reaction. Therefore, socially guided herding dispositions may have progressed as a learning heuristic "or simple rule-of-thumb" assisting us in attaining essential information regarding the potential price of our purchases.

2.3 Underpinning Theories

Discussions on the occurrence of herding behaviour in the stock market and approaches to reduce herding behaviour among individual investors require the understanding of the theoretical aspects which act as the fundamental in understanding herding behaviour. According to Curi (2012), a theory is a set of propositions and assumptions that help understand the possible relationship between

any phenomena. Thus, a theory should create a direction and sense among the facts that are going to be observed, although it may appear disorderly and separated.

Many other researchers such as Galichon and Henry (2012) and Haggarty *et al.* (2010) explain that ideally, a good theory should create predictive and descriptive values simultaneously. In an ideal world, a theory must recognise relevant variables and the association between these variables. Then, empirically testable hypotheses have to be established and tested (Sekaran & Bougie, 2016). Theories can also play a critical role in simplifying the relationship between explained variables (Ott, 2013). Therefore, this research has chosen two theories i.e. the Prospect Theory and Social Learning Theory which act as the foundation for the subjects being studied.

2.3.1 Prospect Theory

The Prospect Theory by Kahneman and Tversky (1979) is one of the most prominent theories to discuss investors' behaviour. Basically, this theory focuses on the behaviour of investors when they make decisions in uncertain and risky situations (Altman, 2010). It is based on what people actually do and observe (Ackert, 2014). This theory provides a better understanding of human decision making and it is used to measure what humans believe to be the degree of inaccuracy in judgment. This theory is capable of explaining the cognitive biases and false beliefs in human behaviour where biases are the results of heuristic used.

The Prospect Theory is the base for various descriptive hypotheses related to irrational decision making under risk and uncertainty (Altman, 2010). The introduction of emotional factors as a determinant of investment behaviour is also

another great important component of the Prospect Theory (Kahneman & Tversky, 2013). The Prospect Theory is one of the most dominant behavioural theories in economic research following the Expected Utility Theory, although the influence of Prospect Theory has a prominent place among economists (Shiller, 1999).

The key contribution of the Prospect Theory is its capability in explaining and predicting average choice behaviour in the financial market more clearly than traditional theories. This capability lies upon three unique features as shown below:

1. Decision-making is based on a subjective reference point without considering absolute outcomes.

2. Subjective reference points of a prospect affect the behaviour of individuals.

3. Individuals make decisions by applying value functions to subtasks and give more weight to loss than gain.
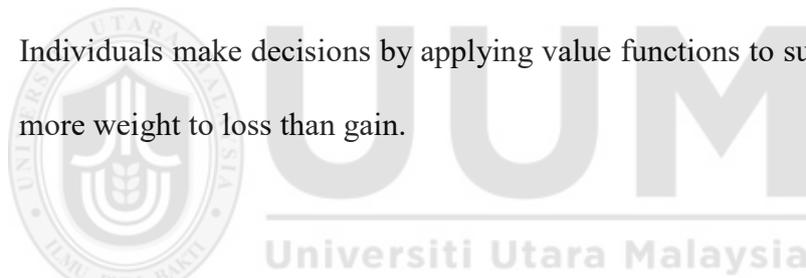
2.3.1.1 Assumptions of the Prospect Theory

The biases and cognitive false belief approach to investment behaviour by Kahneman and Tversky (1979) has now become conventional knowledge among a great number of behavioural economists. This theory assumes that an individual is risk averse. There are three basic features of observed decision making that provide the basics for this theory.

1) Exhibiting of risk taking or risk aversion depends on the prospect's nature. The Prospect Theory explains the variations in risk taking behaviour that depends on the nature of the prospect. On the positive domain it demonstrates risk aversion people and on the negative domain the risk taking people, which means the value

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function is concave in the positive domain and convex in the negative domain. The value function is drawn to reflect changes in the states of wealth from some subjective reference point and serves to frame the decision parameter (Altman, 2010). Thus, profits and losses do not equally affect the behaviour of individuals; hence, both situations are treated differently. When both the situations combine, an S-shaped function is obtained as displayed below:
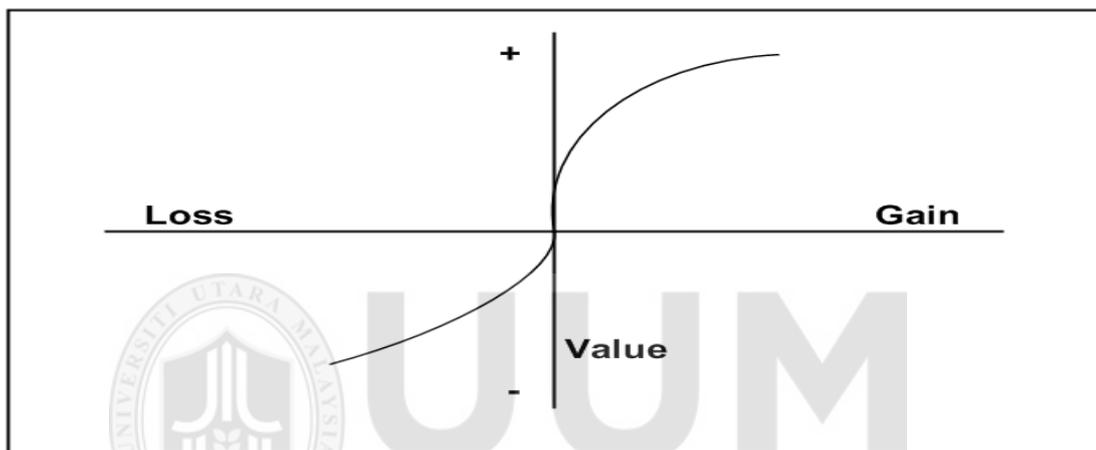
Figure 2.1
A Hypothetical Value Function of Prospect Theory
Source: (Kahneman & Tversky, 1979)

2) The appraisal of a prospect depends on the profits and losses relative to a reference point. The profits and losses of the prospect are used as a criterion at the time of decision making, which means that wealth does not matter, but change does. This illustrates that risk taking attitude does not remain constant in situations of gains and losses; rather, it depends on changes in wealth and that evaluation is based on a reference point.

3) Individuals are opposed to losses more than gains. Investors feel displeasure after losses, so the curve is extra vertical for losses as compared to gains. The term loss aversion is used to illustrate the preciseness that most individuals oppose losses more than feeling pleasure after gains. Fisher and Dellinger (2015) said that the Prospect Theory amounts to investors feeling the pain of loss about two and a half times more than they appreciate an equivalent gain. The loss is more painful, thus it feels more real (Fisher & Dellinger, 2015). Kahneman and Tversky (1979) discovered the reaction towards goods news should be different from the reaction towards bad news. This pattern demonstrates that the response tendencies towards gains and losses are different and that they depend on the risk taking behaviour.

Loss aversion is the bias where humans are more intent on avoiding loss than making gains. Or in short, they fear losing more than enjoy winning (Mallouk, 2014). Loss aversion comes in all forms; perhaps it causes more damage among investors than any other groups. The main reason why investors keep cash despite knowing very well that they are purposely losing their purchasing power is that they are afraid of losing. The average money market returns have been well below the inflation rate for years. Despite that, investors are willingly losing a little each day to avoid potential losses with real investments (Mallouk, 2014).

Loss aversion is another reason why investors keep their losing stock; they do not wish to acknowledge the loss which requires them to no longer deny that they had made a mistake. They think it is better for them to wait until it recovers. People give more weight to the possibility of loss recovery. The positive domain is normally risk

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aversion, when there is quite a low possibility to recover the loss, and this normally moves to risk taking. Risk taking/seeking is normally in the negative domain, when there is quite a low probability of a loss, and this generally shifts to risk aversion.

In the context of the current study, this theory is selected because of the following reasons. The Prospect Theory focuses on the investors' risk taking behaviour and it explains that investors exhibit risk averse and risk seeking behaviours according to the nature of the prospect which acts as a subjective reference point upon which the investors will act upon. They act based on the profit and loss of their investment and not on the wealth. Therefore, emotions, fear, pleasure and surprise influence investors' decision making that leads towards herding behaviour.

According to the Prospect Theory, the pain of experiencing losses is more impactful than the joy of gaining profits. Investors who suffered loss in their investment will hesitate to make investment decisions based on their own information. Therefore, they follow the advice and information provided by financial advisors, friends and colleagues. Finally, the justification for using the Prospect Theory for this study is the integral understanding that it explains the behaviour of investors when they make investment decisions.

2.3.2 Social Learning Theory (SLT)

The Social Learning Theory by Bandura and Walters (1977) explains that the interaction between the environment and personal factors including faiths and cognitive capabilities is established and changed due to the influence of social circle; meanwhile, the cognitive factors influence the relation between individuals and their

behaviour. It also explains the connection between the environmental factors and their behaviour i.e. that the environmental factors affect the behaviour of individuals. All of these components are illustrated as follows:
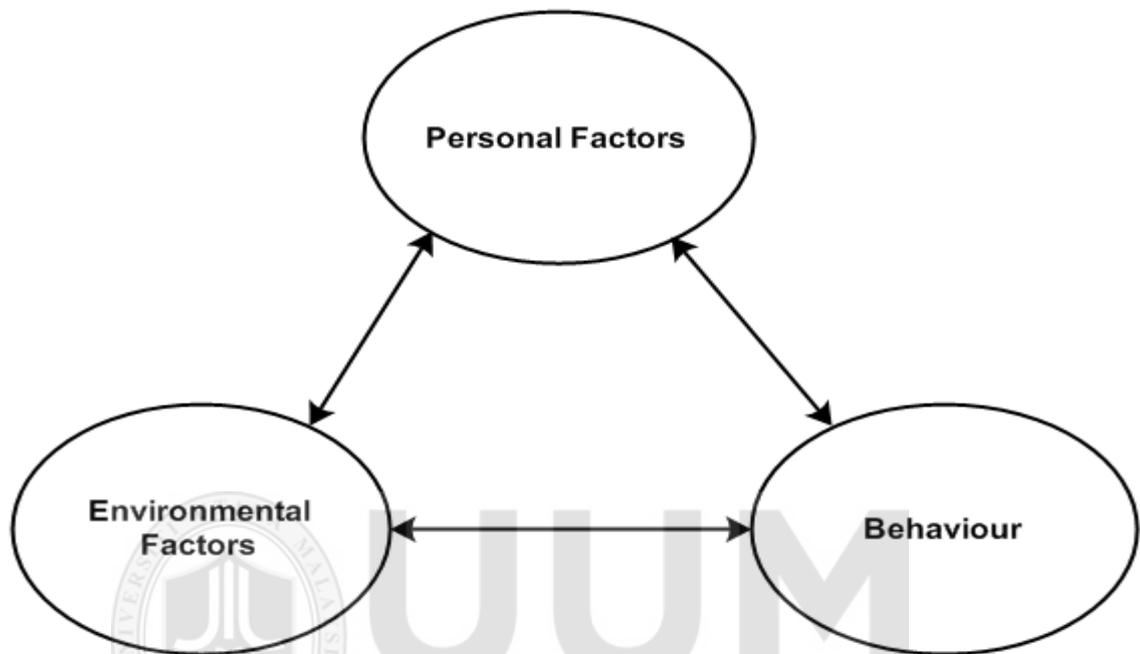
Figure 2.2
Social Learning Theory
Source: Bandura and Walters (1977)

Learning takes place while being part of society and living in a specific environment that is based on various distinguishable elements of culture related to society. Observational learning or word of mouth such as communication is important in information collection from a specific society for social interaction (Banerjee, 1992; Bikhchandani *et al.*, 1998). The decision to invest in stocks is influenced by various factors, but it is mainly due to social interaction.

In simple words, it may be convenient for an individual to convince a friend to open a mutual fund or brokerage account instead of other mechanisms. Discussion among

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friends about investing in stock markets may encourage the other participants to invest in stocks while observing the attained benefits and progress of their friends and colleagues. For instance, individuals may follow the same habits of consumption of their social group; in the same manner, it is highly possible that due to the influence of society and friends, those other participants may invest in stocks after observing or learning from them.

Individuals' behaviour is affected by cognitive factors however, current study emphasized on cognitive profile of investors that consists of illusion of control, self-attribution and overconfidence. These are cognitive factors that ultimately affect investment behaviour of investors. Cognitive factors have an ability to motivate or discourage individuals' executing behaviour (Fernández *et al.*, 2011). Environmental factors affect cognitions that ultimately have an influence on the behaviour of individuals. In the context of stock exchange, rumours circulate in the market and create an uncertain environment in the market. Resultantly, uncertain and risky environment affect investors' cognitive profile that, in turn, influence their behaviour.

Moreover, Bandura and Walters (1977) argue that individuals learn from their bad and good experiences. When any action is rewarded regularly, it will most likely be persist; conversely, if a specific action is constantly punished, it will most likely discontinue. In the context of current study, SLT explain the relationship of past investment experience with herding behaviour of individual investors in stock market. Investors having bad investment experience most likely to follow the decision of others in their investment decision making.

The Social Learning Theory is selected for the current study because this theory explains that cognitive profile and past investment experience affect the behaviour of individuals. Evidence shows that illusion of control, self-attribution, overconfidence, and past investment experience influence the behaviour of individuals when making investment decisions in the stock market.

2.4 Investment Decision Making

Investment decisions under uncertain and risky situations, specifically in stock markets, are difficult processes as these represent the selection of stocks among various alternatives based on the information gathered and analysed by the investor (Pak & Mahmood, 2015). Orasanu and Connolly (1993) argued that decision making is a series of cognitive processes executed deliberately. Cognitive processes are affected by faith and risk-taking attitudes. On the other hand, Narayan and Corcoran-Perry (1997) argued that decision making is the connection between a resolvable problem and an individual who wants to address it within a particular environment.

Investment decision-making could also be defined as a complicated multi-step process in selecting a specific alternative from numerous existing substitutes. This procedure is affected by various cognitive, technical and situational elements. Making investment decisions is the most crucial challenge faced by investors particularly in situations of uncertainty, which is a common characteristic of modern day stock market. Investment decisions are often made in uncertain and risky environments (Nga & Ken Yien, 2013) and investors' risk taking behaviour may differ from each other.

Bosner and Lakehal-Ayat (2008) argued that investors' behaviour depends on sentiments, perceptions and emotions. Investors, on the other hand, have limited information processing capabilities. Therefore, they rely mostly on the opinions and judgement of other investors. In such situations, investors are influenced by their emotions and other cognitive biases, which could lead them to irrational investment decision making. In other situations, investors may over or under react to certain new information or event, which is also a form of irrational response. There is ample evidence indicating such irrational responses of the investors in the stock market (Duncan *et al.*, 2012; Zafar & Hassan, 2016). Thus, Zafar and Hassan (2016) and Prieto and Perote (2017) suggested that these irrational behaviours of the investors are worth investigating on empirical grounds.

2.4.1 Human Behaviour and Investment Decision Making

Behaviour is not set on stone, pre-programmed, predetermined or follows any law, but rather in its entirety, it is anarchic and ever changing. Human behaviour is very complex and difficult to understand especially in investment matters (Triana, 2009). The neoclassical economics work very well in some areas but in the markets, neoclassical economics has failed miserably (Triana, 2009). Systematic deviation from rationality in individual's decision-making is the main reason for this according to psychologists.

However, Simon (1997) argued that rationality represents an approach of behaviour that is proper to achieve a given goal within the limits imposed by the given situations and limitations. A simple observation shows that human decisions often fail to follow the spotless logic of rationality, as imagined and put on paper by economists. Fromlet

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(2001) argued that in the world of financial market today, EMH has become increasingly unrealistic.

The market moves irrationally and investors do not follow their reason, but rather their behaviour and emotions. Similarly, Duncan *et al.* (2012) claimed that individuals indulge in irrational behaviour when they make investment decisions. Individuals come in abundance with their own way of thinking and are mostly influenced by their emotions when they make investment decisions.

It is very challenging for investors to acquire complete information about the market and process it like a super computer. Individuals usually do not behave fully rational and this behaviour is suboptimal and may even result in unexpected good returns. Yazdipour and Howard (2010) believe that it is very challenging to avoid behavioural biases across the spectrum of making decision.

Investors are influenced by their emotions and by what they see and hear. They believe in the experts and information gathered from their peers and colleagues when making decisions. Shiller (2006) noted that individual investors depict irrational behaviours repeatedly in their investment and economic decision making. Subash (2012) also supported these notions as he empirically found that investors rely on their emotions and display irrational behaviours when making investment decisions.

2.4.2 Empirical Review on Herding Behaviour

Previous research suggests that numerous psychological and behavioural elements affect the investment decisions of investors in stock markets. These elements are

denoted as "behavioural biases" or "fallacies". Investors indulge in these biases due to feelings, intuition, and emotions (Banerjee, 1992; Hoffmann, Post, & Pennings, 2013; Hon-Snir, Kudryavtsev, & Cohen, 2012). Investors may not be able to collect all relevant information or have spurious information when they make investment decisions. In such a situation, they notice the decisions of others and herd the actions of other investors (Avery & Zemsky, 1998). Such imitation sometimes moves the stock market in a specific direction where everyone is herding someone else and thus creates a trend in the stock market.

Herding behaviour exists in retail investors' trading patterns in stock markets (Banerjee, 1992; Hirshleifer & Teoh, 2003). According to Bikhchandani *et al.* (1998), herding behaviour or the imitation of peers' behaviour is a natural phenomenon. This behaviour may happen when prospective investors notice unexpected returns in the investments of others. Considering the observation of others' investment activity, investors update their beliefs and develop cognitive biases. Thus, the surveillance of the high performance of other investors also affects the behaviour of prospective investors and provokes imitation of the behaviour of others.

The presence of herding in the behaviour of stock market investors is similar with the assumption of information cascades (Banerjee, 1992; Bikhchandani *et al.*, 1992) where investors examine the trading activities of other investors to obtain information. Specifically, if the assumption of information cascades retain, individuals who have stocks in small amounts would demonstrate stronger herding in contrast to individuals who have stocks in large amounts because information is noisier in small stocks (Sias, 2004).

2.4.2.1 Types of Herding

Lindhe (2012) in his study agreed that herding could be categorised into two types as presented in the Figure 2.3:
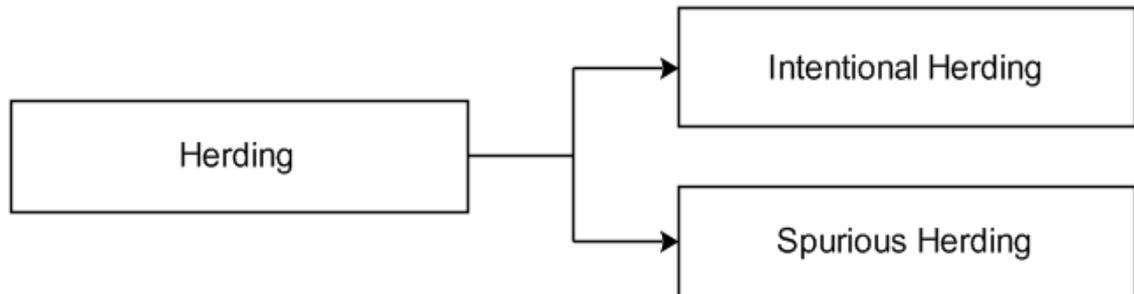
Figure 2.3
Forms of Herding
Source: (Lindhe, 2012)

According to the study of Choe, Kho, and Stulz (1999), market risk increased in the Korean capital market due to the herding behaviour of market participants. Similarly, Park and Sabourian (2009) found that market risk increased due to the herding behaviour and it was the main reason for the creation of instability in the financial market. Rannou (2010) found that there was a correlation between the intensity of the herding with the size of the bubbles in European financial markets. The researcher also suggests a model to examine the presence of speculative bubbles where investors herd the decision of other individuals and push the prices of assets. Moreover, Caparrelli *et al*. (2004) argued that the occurrence of herding in stock markets is a sign of inefficient markets that often leads to irrational decision making.

2.4.2.2 Herding Behaviour and Financial Decision Making

Observation of others' decisions could always be a supportive element while making decisions. It is true that ideal behaviour often needs careful examination of the

behaviour of others. Kutchukian, Eid , and Dana (2014) examined herding by using the data of Brazilian financial and capital market entities association from 1st January 2005 to 30th June 2009. The study found that the intensity of herding was not homogenous throughout the research period. The year 2007 showed the strongest herd behaviour during the research period.

Menkhoff, Schmidt, and Brozynski (2006) found that senior investors herd even more strongly than junior investors. Suto and Toshino (2005) found that herding among Japanese investors occur because they follow the trend and use the same published information. Nofsinger (2005) concluded that the problem with moving the herd is that it magnifies the psychological biases where making decision is based on "feel" and not on rigor of formal analysis. Generally, herding means investors give over-weight to other people's opinions more than their own and attempt to emulate their investment behaviour.

2.5 Herding Behaviour in the Context of Pakistan Stock Exchange

Pakistan stock exchange (PSX) is a very unpredictable volatile and illiquid market that is classified as an emerging market (S. Ahmad, 2017). The volatility of PSX creates an uncertain environment in the stock market. Resultantly, investors of PSX indulge in irrational behaviour at the time of making an investment decision. Yousaf, Ali, and Shah (2018) investigated the herding behaviour of investors in Pakistan stock exchange under different market situations by using data from 2004 to 2014. Researchers concluded that herding behaviour exists in the stock market during the low trading period.

Akbar, Oad Rajput, and Bhutto (2019) examined the role of herding behaviour on investment decisions among investors of Pakistan stock exchange and found that herding exists in the behaviour of individual investors at the time of making investment decisions. They argued that the existence of herding behaviour among investors leads to the mispricing of assets that is a cause of market inefficiency. Conversely, Javaira and Hassan (2015) argued that herding behaviour does not exist among investors of Pakistan stock exchange.

Hassan, Bagh, and Razzaq (2017) conducted a study to investigate the relationship of herding behaviour and overconfidence with the perceived investment performance of Pakistan stock market investors and found that herding has a significant influence on the perceived investment performance of individual investors in Pakistan stock exchange. Mahmood *et al.* (2016) also found a significant and positive effect of herding behaviour on individual investors' investment decisions in Pakistan stock exchange. Anum (2017) conducted a study on individual investors to examine the effect of behavioural factors on individual investors' investment decision making and found that herding behaviour significantly affects investment decision making and performance of their investment.

From the above discussion, it is concluded that herding behaviour exists among individual investors in Pakistan stock exchange and this behaviour has a significant influence on their investment decisions. Furthermore, most of the previous studies only investigate the presence of herding behaviour and its impact on their investment decision, However, the researcher cannot come across a single research study that

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formally documented the determinants of herding behaviour and ways to mitigate this irrational behaviour especially in the context of Pakistan Stock exchange.

2.6 Empirical Review on Illusion of Control and Herding Behaviour

Illusion of Control (IOC) means the tendency of individuals to falsely believe that they can influence, control and change the outcome of any activity when in fact they cannot (Langer, 1975; Pompian, 2011). Illusion of control occurs when people overweight their skills which they believe can enhance their performance in any circumstances; they ignore the role of luck while luck plays an essential role (Cornell, 2009).

Furthermore, investors affected by illusion of control give very low weightage to risk because they consider their decision making abilities superior to others and that these abilities can defeat bad outcomes. They are excessively optimistic when estimating performance (Duhaime & Schwenk, 1985; Schwenk, 1984). Fellner (2004) conducted a study on factors that affect the behaviour of individuals at the time of portfolio selection and concluded that illusion of control significantly influences portfolio diversification. This study also concluded that illusion of control negatively affects portfolio diversification.

Optimistic estimates regarding risk might lead investors to make risky decisions such as acquiring stocks with poor historical performance (Duhaime & Schwenk, 1985). Boyd and Vozikis (1994) found that illusion of control has a significant relation with risk taking attitude. Moreover, they argued that individuals with illusion of control make more risky decisions regarding investment.

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Literature shows that illusion of control has a significant relationship with the herding behaviour of investors. For instance, Metilda (2015) studied the behaviour of Indian investors to examine the association between the herding behaviour of investors and illusion of control. The findings of this research indicated that illusion of control is a precursor of the herding behaviour of investors and that it positively affects their herding behaviour. Similarly Lambert, Bessière, and Goala (2012) also concluded that illusion of control has a significant relationship with valuation of assets and investment decision. Moreover, they argued that the influence of illusion of control might be overcome through experience.

Qadri and Shabbir (2014) examined the influence of illusion of control on the behaviour of investors that participated in the Islamabad Stock Exchange. The results of this study exhibited that illusion of control has a significant positive relation with investors' decisions. Additionally, Bashir *et al.* (2014) examined the effect of cognitive biases on the investment decision making process of investors in the Pakistan Stock Exchange. This study concluded that illusion of control and decision making of investors positively correlate with each other.

Moreover, Bakar and Yi (2016) also found that there is a significant association between illusion of control and the behaviour of Pakistani investors. Similarly, Fernández *et al.* (2011) also found that illusion of control significantly affects the herding behaviour of investors. In short, illusion of control is a predictor of the herding behaviour of individual investors.

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2.7 Empirical Review on Self-Attribution and Herding Behaviour

Self-attribution (SA) is a concept in psychology study that means individuals who give credit of successes to their personal abilities and failures to uncontrollable elements (Feather & Simon, 1971; Hoffmann & Post, 2014; Miller & Ross, 1975). Self-attribution is also defined as an intellectual situation in which individuals think that their achievements are due to their intelligence and innate qualities whilst their failures are due to situational elements. Individuals would take acknowledgment of their achievements and make external factors responsible for their failures (Bradley, 1978; Dorn & Huberman, 2005; Mishra & Metilda, 2015).

According to Daniel, Hirshleifer, and Subrahmanyam (1998), self-attribution influences the behaviour of investors. Investors possessing self-attribution believe that the growth in the value of their investment is due to their personal skill, but blame bad luck when the value of investment is decreased. Doukas and Petmezas (2007) found the relationship between self-attribution and the behaviour of stock market investors. This study concluded that self-attribution has a negative relationship with risk taking attitude and that it leads towards excessive trading.

Seppälä (2009) investigated the association between self-attribution and the investment choice of investors. The respondents of this study were divided into three main groups namely financial professionals, employees of engineering companies and university students. The finding of the study shows that the behaviour of the respondents in all three groups was affected by self-attribution, but its effect varies from one individual to another due to their experience and other characteristics. Similarly, Choi and Lou (2010) studied Self-Attribution Bias in stock market

investors. They found that stock market investors attribute success to their own abilities whereas poor performance in investment is attributed to uncontrollable elements.

Moreover, Hoffmann and Post (2014) conducted an empirical study to examine the effect of self-attribution on financial decision making. This study found that investors with higher returns in the preceding period agree that their current performance reflects their investment skills and vice-versa. Moreover, they found that individual returns affect the behaviour of investors and market returns do not have any impact on individuals' behaviour regarding self-attribution.

According to Nguyen and Schuessler (2012), self- attribution affects the behaviour of German investors and it has a relation with their herding behaviour. Similarly, Fernández *et al.* (2011) conducted a research study to examine the relationship between self-attribution and the herding behaviour of investors and found a significant inverse association between both.

2.8 Empirical Review on Over-Confidence and Herding Behaviour

Overconfidence is defined as investors who overstate their knowledge and overlook the risk connected with investment (Glaser *et al.*, 2003; Koehler & Harvey, 2008; Tan *et al.*, 2012). Overconfidence could also be defined as "an inappropriate belief towards a witnessed reasoning, judgment and the person's cognitive abilities". Sometimes, individual investors show overconfidence in forecasting, which is identified as "Predication Overconfidence", whereas some investors consider

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themselves definite in the assessment which is known as "Certainty Overconfidence" (Sadi *et al.*, 2011).

Overconfidence is related to judgment (DeBondt *et al.*, 2010). Overconfident investors assign higher probability to the wrong information rather than on the correct one. It indicates that those investors are inclined to overrate the chance of accuracy of their information, their capabilities and their success. Literature also shows that overconfidence has a significant positive influence on information gathering (Mallouk, 2014; Merkle & Weber, 2011). Nofsinger (2017) argued that overconfident investors misinterpret information and overstate their abilities and skills when analysing investment information and make wrong judgments regarding the returns.

Merkle and Weber (2011) conducted a study to differentiate the effects of overconfidence and rational information processing. The participants were required to appraise their comparative position by affirming their ample belief distribution. They found that people hold beliefs about their capabilities in dissimilar areas and are irrational in processing information. They concluded that overconfidence is not a direct occurrence but rather the effect of a psychological bias. Fisher and Dellinger (2015) argued that overconfident investors strongly believe in their own estimation of a stock and give less weightage to the judgement and beliefs of others.

Literature proves that most individual investors do not have sufficient information for investment decision making which leads them towards herding behaviour (Choi 2016). Overconfidence is the result of chronic pride accumulation i.e. believing that every right decision is proof of their superior skill while ignoring the possibility of

being lucky (Fisher & Dellinger, 2015). Chuang and Lee (2006) studied the behaviour of investors participating in the New York Stock Exchange (NYSE) and found that overconfident investors generally exhibit confidence on their own skills and analysis in ambiguous investment and do not believe on the analysis of others. Those investors that exhibit overconfidence normally use their own private information and analysis for making investment decisions (Bernardo & Welch, 2001).

Ko and Huang (2007) argued that overconfidence affects information acquisition that ultimately influences the prices of stock. Overconfidence is a psychological bias that leads towards mispricing, eventually, mispricing of assets negatively affects the behaviour of investors. Similarly, Li and Yang (2018) discussed that overconfidence bias affects information acquisition process. In some circumstances, overconfident investors incur heavy cost on the information searching process; resultantly that affects investment decisions of investors. They concluded that overconfidence affect the performance of individual investors and their profits.

Additionally, Fernández *et al.* (2011) found a positive relationship between overconfidence and the herding behaviour of Spanish investors. Similarly, Gill *et al.* (2018) conducted a study on the investors of Lahore stock exchange and found that overconfidence have positive and significant effect on investment decision making behaviour. Conversely, Michailova, Mačiulis, and Tvaronavičienė (2017) found negative relationship between overconfidence and investment decisions. Whereas, Jain *et al*. (2015) argued that there is no significant association between overconfidence and investment decision. Finally, from the above discussion, it could

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be concluded that overconfidence of investors have a relationship with herding behaviour of investors.

2.9 Empirical Review on Past Investment Experience and Herding Behaviour

Memory is about the perception of physical and emotional experience and not as much as factual recording of events (Nofsinger 2005). The brain records events through a process and stores different features of the experience. These stored features are the basis for subsequent recall. This is in line with notion of the Prospect Theory where the response of individuals depends on prospect. According to heuristic theory, it is in familiarity and representativeness that investors look for traits and behaviour. Our memory deals with two areas i.e. happiness and sadness. This is applicable to investments as well. According to Nofsinger (2005), people feel better when experiences bring them satisfaction. Using the outcome of a previous investment as a parameter for the evaluation of a current investment is known as past investment experience consideration (Nofsinger, 2017). According to Thaler (2010), past investment losses (snake bite effect) and past investment gains (past success affect) influence the behaviour of investors when making investment decisions.

After facing loss in investment, investors will be risk averse and become very careful with their next investment so that they will not repeat the same mistake. By doing so, they may be adding losses in their future endeavour (Bauchner *et al.*, 2000). This truly reflects that losing is painful as demonstrated by Prospect Theory. Nofsinger (2005) argued that after facing financial loss in investment, investors avoid making risky investment decisions. After facing loss, investors feel a sense of unhappiness and

unluckiness, that lead towards avoiding risky decisions; therefore, they herd the decision of others (Nofsinger 2005).

The ability and skills of investors are always a big question and Nofsinger (2017) agreed that investors learn through past successes and losses. He stressed that if a decision turns out to be good, it was attributed to their skills and ability. If the investment turns out bad, then they blame it on luck. In evaluating risky decisions, investors take into consideration past outcomes as a measurement scale. Investors are more willing to take risks after making gains and become risk averse after experiencing loss (Nofsinger, 2017).

According to Raeva and van Dijk (2009), the behaviour of investors is similar to the consumer who had lost the chance to purchase a product at a large discount rendering them to be less willing to purchase the same product at a small discount in future. Strahilevitz, Odean, and Barber (2011) argued that investors avoid purchasing stocks that they sold at a loss due to regret and loss aversion and that they are more willing to purchase stocks that they sold on gain. Gupta and Sharma (2011) studied the role of experience on investment decision and found that experience plays an important role in decision making. Investors who faced loss in their past investment become risk averse and prefer to follow the recommendations from brokers and colleagues.

Mallouk (2014) found that investors' past performance affects their behaviour and decision making process in the stock market. According to Merli and Roger (2013), after facing loss, investors are not willing to take risks and thus decide to herd the decision of others. Conversely, Chen, Yang, and Lin (2012) found that the tendency

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of herding is stronger in past winners than past losers. From the above discussion, it could be described that past investment experience has a significant relationship with the herding behaviour of individual investors.

2.10 Empirical Review on Information Availability and Herding Behaviour

Availability of information is a base for investors' financial decision making. It has significant influence on the behaviour of investors (Abreu & Mendes, 2012). Investors who invest their time and cost on searching for information receive accurate signals regarding investment opportunities and trade more frequently (Peress, 2003). After obtaining the necessary information, the investors invest in risky assets and earn abnormal profits that compensate information acquisition cost.

Epstein and Schneider (2008) argued that availability of quality information has a significant influence on the behaviour of investors. The quality of information depends on the source of information. Information received from reliable sources leads investors to rational investment decision making as compared to information received from less trustworthy sources (Epstein & Schneider, 2008). Fischer and Gerhardt (2007) claimed that investment information received from financial advisers significantly affects the trading behaviour of investors and that investors make better analysis of their own investment capabilities in light of information collected from financial advisers.

Conversely, Ivković and Weisbenner (2007) found that the source of information had no impact on investment behaviour. Peress (2003) concluded that investors who have risk-averse attitude attain very small assistance from the information because they

avoid taking risks even if they have very exact information. Abreu and Mendes (2012) conducted a study on the investors in the Portuguese Securities Market Commission to investigate the relationship between information availability and investment behaviour. They concluded that information availability has a strong positive relationship with the behaviour of investors.

Similarly, Tauni, Fang, and Yousaf (2015) investigated the relationship between information acquisition, investors' personality, and the behaviour of individual Chinese investors. This study also found that information acquisition has a positive relation with trading behaviour. Finally, from the above discussion, it is concluded that information availability has a relationship with the behaviour of investors. Thus, it also has a relationship with the herding behaviour of investors.

2.11 Empirical Review on Financial Literacy

Financial literacy is described as the capability to make appropriate financial analysis, economic decisions and money management choices (Widdowson & Hailwood, 2007). Giesler and Veresiu (2014) defined financial literacy as the capability to understand the means to invest in a proper way. It is not merely a process of recording accounting transactions and making financial statements. It is a combination of knowledge and skills required to make financial decisions in practical scenarios because every decision depends on the scenario (Bay, Catasús, & Johed, 2014).

Deficiency of financial knowledge negatively affects the performance of investors when they make investment decisions (Yoong, 2011). Risk taking behaviour of investors depends on their level of financial knowledge (Dulebohn, 2002). Investors

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who have low or zero financial knowledge exhibit a higher tendency to indulge in irrational behaviour (Disney & Gathergood, 2013). According to Lusardi and Mitchell (2011), financial literacy significantly and positively influence to the planning of retirement and it was very helpful to explain difference in the behaviour of households toward wealth accumulation. Moreover, A. Lusardi (2003) argued that financial literacy affect the planning of wealth accumulation and who accumulate wealth before retirement have more tendency to invest in shares.

Al-Tamimi and Kalli (2009) conducted a research on 343 individual UAE investors to find out the influence of financial literacy on their behaviour and found that financial knowledge is one of the most influential elements for the investment behaviour of investors. This study also observed that individuals with high investment knowledge prefer appropriate techniques as compared to those with less financial knowledge. On the other hand, Shafi (2014) conducted a survey on factors that influence individual investors' behaviour in the Pakistan stock market. It was concluded that financial knowledge was negatively associated with risky investment decisions.

Bottazzi, Jappelli, and Padula (2011) also found a significant association between the financial knowledge and risk taking behaviour of investors. Oberlechner and Hocking (2004) argued that investors receive investment related information through different information sources such as financial journals, financial reports and traders and they process the information based on their financial knowledge. Investors, having insufficient financial knowledge, give more weight to market knowledge. Thus, financial literacy negatively affects the herding behaviour of investors in the study. Similarly, Rekik and Boujelbene (2013) investigated the behaviour of Tunisian

investors in uncertain and risky situations and found that financial knowledge inversely affects the risk taking attitude of investors when they make investment decisions. According to the result of the study, investors who have less investment knowledge demonstrate hesitations and risk adverse behaviour when they make investment decisions.

2.11.1 Moderating effect of Financial Literacy

Finance literature has emphasised on the implications of behavioural finance in economic and financial decision making. Financial literacy affects the financial decisions of individual investors (Jappelli & Padula, 2013). Investors who have financial knowledge exhibit more risky behaviour than those with less financial literacy (Borden *et al.*, 2008). Therefore, their behaviour in the stock market is quite dissimilar with regards to investment decision. Investors escape negative information and take into consideration only preceding positive results (Jain *et al*., 2015).

The level of financial literacy determines the risk taking attitude of investors. Hayat and Anwar (2016) argued that investors' risk taking capacity is based on his financial knowledge regarding the investment principle. A higher level of financial knowledge decreases the risk adverse tendency of individuals because financial education gives multiple methods to handle the uncertain and risky situation (Almenberg & Dreber, 2015). A low level of financial knowledge leads investors towards behavioural biases such as confusion when making financial decisions (Disney & Gathergood, 2013).

To sum up the above discussion, financial literacy enables investors to enhance their decision making ability by processing and analysing information in proper ways

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(Hayat & Anwar, 2016). Therefore, it can be further described as there is a link between investors' behaviour and financial knowledge. Financially educated investors use different procedures and methods when making an investment decision compared to investors with low financial literacy.

2.12 Chapter Summary

This chapter presented comprehensive literature review on herding behaviour, information availability, illusion of control, self-attribution, overconfidence, information availability and past investment experience with respect to the behaviour of investors in the stock market. Additionally, the relationships between all the variables were examined based on review of literatures from previous studies. Finally, this chapter discussed the Prospect Theory and Social Learning Theory as the underpinning theories for the current research.
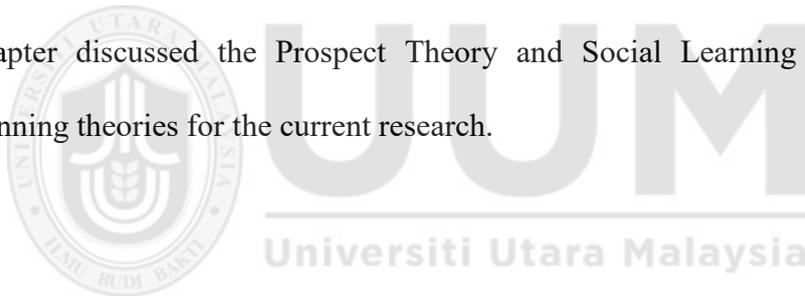
CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Based on the problem statement, the objectives, the reviews on the related theories, past research models and the discussions on the empirical research findings from the extant literatures, this chapter presents the research methodology of this study. This chapter comprises discussions on the development of the research framework, hypotheses development and the data analysis techniques used in this study.

The first section of this chapter presents a detailed discussion on the chosen framework adapted in this study. The second section presents the operational definitions of all the variables and instrumentation. The third section discusses in detail about the research design, data collection method, data sources, study population and the sampling design.

3.2 The Research Framework Development

The discussions on previous studies in Chapter Two provide the foundation for developing the research framework of this study. This study adapts the research framework of Fernández *et al.* (2011) as shown in Figure 3.1.
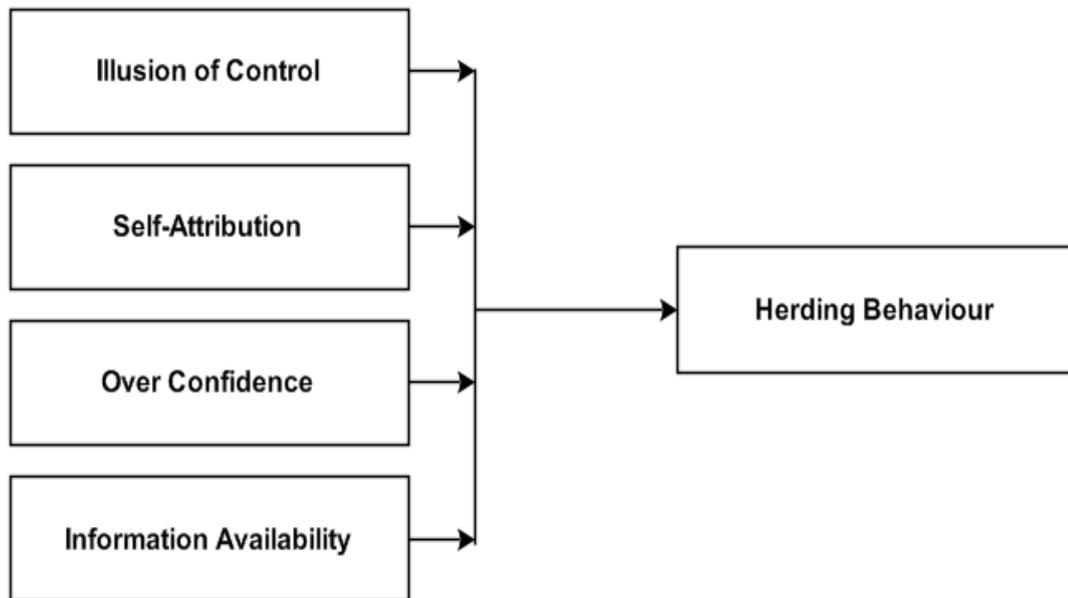
Figure 3.1
The partial Research Framework of this study showing the Cognitive Factors
Source: (Fernández *et al.*, 2011)

According to Fernández *et al.* (2011), herding behaviour is one of the major issues in investment and that there are four factors behind it. The first factor is illusion of control followed by self-attribution, overconfidence and information availability. Herding affects the rationality of investors' behaviour which plays an important role in investment decision making. Many psychological factors induce herding behaviour in stock markets which in turn affects stock market performance and leads to inefficiency and extreme instability (Ibnrubbian, 2012). While Fernández *et al.* (2011) focused only on cognitive factors, this study argues that past investment experience, and financial literacy also contribute to the herding behaviour of Pakistani investors. To address this issue, this study adapted the framework of Fernández *et al.* (2011) with the inclusion of financial literacy and past investment experience which are believed to have a strong impact on herding behaviour of stock market investors.

These factors had been investigated in various studies (Ateş *et al.*, 2016; Awais *et al.*, 2016).

Stock market investors indulge in herding behaviour to protect themselves from risky and uncertain situations. Herding behaviour does not depend only on the uncertain situation of the market, but also on the investors' risk taking attitude and perception of uncertainty. Therefore, investors who are less confident and more insecure regarding their sources of information have greater tendency to rely on the decision of other investors (Tauni *et al.*, 2015).

The feeling of uncertainty of each investor depends on their risk taking attitudes, level of confidence, level of acceptance of ambiguity and illusion of control (IOL). These factors are interconnected and constitute the cognitive profile of individuals (Fernández *et al.*, 2011). Therefore, the cognitive profiles of investors play an important role in illuminating the situations in which investors overlook their own information and instead copy the decisions of others.

In the presence of illusion of control, investors assume that they can affect and control the outcome of random events (Langer, 1975; Metilda, 2015) and that other individuals are affected in the same way (Mark *et al.*, 2000). Therefore, in uncertain situations, these investors conclude that other investors make decisions after considering all relevant information and if they make an alternative decision, it will be a clearly mistaken choice (Metilda, 2015). Therefore, individuals who have a higher degree of illusion of control are motivated to imitate the decision of other investors (Quiamzade & L'Huillier, 2009). Thus, the illusion of control encourages herding.

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According to Nofsinger (2017), people feel better when experiences bring them a higher satisfaction. Investors sometimes evaluate their previous estimations and decisions and are generally affected by self-attribution bias. Self-attribution bias exists when investors attribute good results to their own skills and bad outcomes to other uncontrollable factors. In this situation, the individual attributes successful events to his own ability whilst unsuccessful events are attributed to external factors (Mishra & Metilda, 2015). Thus, self-attribution can encourage the imitation of others' decision.

According to Fernández *et al*. (2011), investors use herding behaviour in the financial market when they are not confident of their own information. Investors are unable to take full information or are incapable of processing available information and turning it into financial knowledge. In uncertain and risky situations, investors do not believe in their own information. Meanwhile, according to Merkle and Weber (2011), overconfident investors give more weightage to their own information as compared to that of others; therefore, overconfidence could affect the herding behaviour of investors.

Past investment success and failure could lead the investors towards herding behaviour. Most investors use the outcome of past investments as a parameter for evaluating the current uncertain situation which is known as "considering the past". According to Merli and Roger (2013), a bad past performance will lead to herding while Bikhchandani and Sharma (2000) indicated that the evidence of the trend of herding into past winners was stronger than herding into past losers.

According to Abreu and Mendes (2012), individuals' investment decision depends upon the availability of quality information. In uncertain situations, most investors think that other investors have more reliable and quality information; therefore, they take note of the decisions of others. Many researchers argue that most investors act on public information rather than on their own private information which they believe do not reflect the actual market condition (Froot, Scharfstein, & Stein, 1992). Thus, the tendency of herding depends on the certainty of information and how the investors pose their information (Hirshleifer, 2001).

Different studies showed different results with regards to the impact of information availability and investors' cognitive profile on the behaviour of investors. It is evident from literature that there is inconsistency between the relationship of investors' cognitive profile, information availability and investment behaviour. For instance, Fernández *et al.* (2011) found that illusion of control had a positive correlation with herding behaviour whereas Mark *et al.* (2000) argues that illusion of control negatively affects risk taking attitude. Chuang and Lee (2006) argued that overconfidence leads to the understatement of risk and overstatement of knowledge in investors. Overconfidence affects the estimation of stock prices and leads towards excessive trading which can ultimately affect the behaviour of investors (Chuang & Lee, 2006). In contrast, Jain *et al.* (2015) argued that there is no significant influence between overconfidence and investment behaviour of investors.

Zaidi and Tauni (2012) argued that past investment experience negatively affects investment behavioural biases. According to Merli and Roger (2013), bad investment experience leads towards herding. Meanwhile, Chen *et al.* (2012) concluded that past

investment experience has no significant association with the herding behaviour of investors. Studies of Huber *et al.* (2008) and Abreu and Mendes (2012) showed that availability of information had a positive effect on the investment and trading behaviour of investors.

Zhang (2006) and Hirshleifer and Teoh (2003) argued that the tendency of herding depends on how investors use available information. However, Fernández *et al.* (2011) argued that availability of information had a negative impact on herding behaviour. Hence, extant literatures show inconsistent results regarding the relationship between investors' cognitive profile and the herding behaviour of investors. Therefore in a situation like this, Baron and Kenny (1986) suggested a contingency model in which another variable called a moderator is used to moderate the relationship between the independent and dependent variables for a better explanation of their relationship.

Various studies acknowledged that moderators improve the predictive validity of different models beyond the original specifications (Venkatesh *et al.*, 2003). Therefore, variation in any relationship could be handled through the introduction of the moderator. A moderator affects the direction or strength of the relationship between the independent variables and the dependent variable (Wilken, Jacob, & Prime, 2013; Zakuan *et al.*, 2012). A moderator is a variable that changes the relationship between the independent and dependent variable (Sekaran & Bougie, 2016). It may changes the strength of a relationship, or changes the direction of the relationship. Therefore, the inclusion of financial literacy as the moderator in the research framework is assumed to have the ability to improve the relationship

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between the investors' cognitive profile, information availability and past investment experience with herding behaviour of individual investors of PSX.

Financial literacy could affect financial and economic decisions of investors. Generally, investors are unable to analyse previous investment performances and forecast future benefits regarding investment without having financial knowledge and awareness (Müller & Weber, 2010). They often fail to optimize their investment decision due to the lack of financial knowledge (Hastings & Tejeda-Ashton, 2008; Lusardi & Mitchell, 2008). This argument shows that several investors have a deficiency in understanding the core economic and financial concepts and abilities that are compulsory to make financial analysis.

Investors get confuse when they make investment decisions and are unable to process the information due to lack of financial knowledge (Disney & Gathergood, 2013). As a result, investors may make wrong investment decisions. Financial literacy plays a significant role in financial decision making (Fernandes *et al*., 2014). It improves the investors' abilities in processing and analysing information regarding investment (Fernandes *et al.*, 2014).

Improvement in analysing ability leads to improvement in decision-making skills which will automatically mitigate the herding behaviour of investors. However, the influence of financial literacy on the herding behaviour of stock market investors received very little attention in literature. Hence, the current study intends to investigate the moderating role of financial literacy on the impact of investors' cognitive profile information availability and past investment experience on the

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herding behaviour of investors. The proposed research framework of the study with the inclusion of financial literacy as the moderator is shown in Figure 3.2.
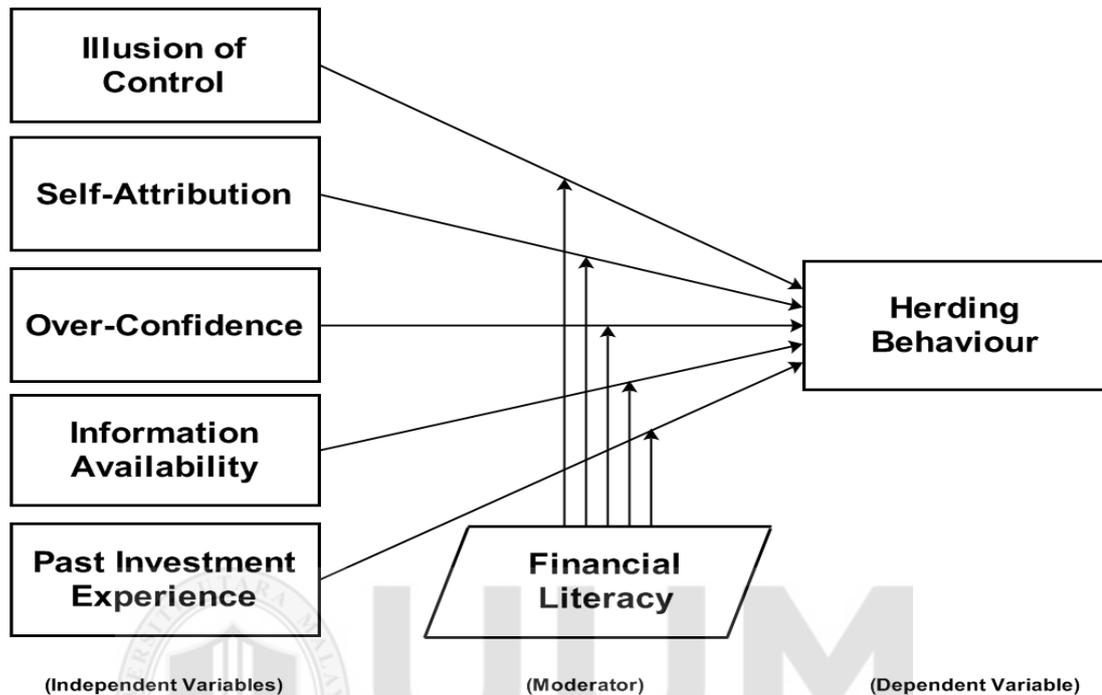
Figure 3.2
Proposed framework of current study with the inclusion of Financial Literacy as the moderating variable

3.3 Hypotheses Development

This research study focuses on the influence of investors' cognitive profile, information availability and past investment experience on the herding behaviour of individual investors and the moderating role of financial literacy on the association between investors' cognitive profile, information availability and past investment experience with the herding behaviour of individual investors. According to prior studies, it is observed that information availability, illusion of control, self-attribution, overconfidence and past investment experience affect the herding behaviour of investors whilst financial literacy moderates the relationship between investors'

cognitive profile, information availability and past investment experience with the herding behaviour of individual investors.

Illusion of control is a tendency in which an individual believes that he can influence or control the outcomes of random events. In illusion of control, investors overestimate their skills and underestimate the role of chance (Langer, 1975; Metilda, 2015). In uncertain environments where social communication and interactions are less operative and the lack of sharing of experience is evident, general perception develops affecting every investor (Pompian, 2011). Therefore, investors receive information from various resources including other investors' decisions. Meanwhile, they assume that decisions made by them are based on the right and relevant information and thus they avoid random or uncertain decisions. In illusion of control, investors try to predict the behaviour of others (Quiamzade & L'Huillier, 2009). Therefore, the study hypothesized that:

> **H₁:** Illusion of control has a significant relationship with the herding behaviour of individual investors in PSX.

Investors' past success or failure affect their behaviour at the time of making investment decision (Strahilevitz *et al*., 2011). When investors look on their previous performance and evaluate their judgements and decisions, they are usually affected by self-attribution (Jain *et al*., 2015). Self-attribution is a cognitive phenomenon by which individuals tend to attribute success to their own skills, and attribute failures to situational factors (Mishra & Metilda, 2015). Thus, individuals affected by self-attribution with a long run of poor decisions could herd the decision of others. Thus, the study hypothesized that:

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H₂: Self-attribution has a significant relationship with the herding behaviour of individual investors in PSX.

Overconfidence can lead investors to give excessive weight on their own private information or inadequate weight on other available information (Chuang & Lee, 2006) which would affect their risk taking behaviour (Nofsinger, 2005). They make investment decisions on their own private indications and overlook cascades (Bernardo & Welch, 2001). Overconfident investors assign higher probability to their own judgment as compared to the judgements of others. They are inclined to overrate the chance of accuracy of their information, capabilities and success (DeBondt *et al*., 2010). Overconfidence is generally stronger in more diffused tasks in which outcome is slow as compared to more systematic tasks that deliver instant results (Fernández *et al*., 2011). Thus, the study hypothesized that:

H₃: Overconfidence has a significant relationship with the herding behaviour of individual investors in PSX.

Investors' past investment experiences affect their behaviour at the time of making investment decision (Strahilevitz *et al*., 2011). According to the Prospect Theory, investors give more weightage to loss rather than gain. Investors are more eager to acquire stocks that were previously sold on profit as compared to the ones which were previously sold on loss (Strahilevitz *et al*., 2011). Consistently, investors repeat the behaviour that is previously connected with pleasure and prevent those that are associated with pain (Barber *et al*., 2007). In short, investors behave in accordance with the old saying "once bitten, twice shy". This behaviour which is known as the "snakebite effect" becomes one of the psychological biases in investors' decision-

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making (Ghelichi, Nakhjavan, & Gharehdaghi, 2016). According to Merli and Roger (2013), poor stock performance will lead to herding. Therefore, this study hypothesized that:

H4: Past investment experience has a significant relationship with the herding behaviour of individual investors in PSX.

Availability of information plays an important role in decision making. Investors' own information and public information is equally important for the prediction of the asset's intrinsic value (Fernández *et al.*, 2011). If public and private information are equally accessible for investors then they will give equal weight to both types of information. However, when investors believe that other individuals observe the public decision and get better outcomes in investment as compared to the average market participant, then they give more weightage to the information of others rather than their own (Allen, Morris, & Shin, 2006). The use of information in decision making depends on how the information is presented (Hirshleifer, 2001). In most situations, individuals' decisions are influenced by the decisions of others even if their own information indicate against it (Camerer, Loewenstein, & Weber, 1989). In short, availability of information depends on the reliability of source of information and how the information is presented. Thus, the fifth hypothesis is:

H5: Information availability has a significant relationship with the herding behaviour of individual investors in PSX.

Financial literacy is a combination of knowledge and skills that assist an investor in making investment decisions (Giesler & Veresiu, 2014). The level of financial knowledge determines the risk taking attitude of investors (Dulebohn, 2002).

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Individuals who exhibit a low level of financial literacy have more tendency to indulge in irrational behaviour (Disney & Gathergood, 2013). Investors with high knowledge of investment prefer appropriate techniques as compared to those with less financial knowledge (Al-Tamimi & Kalli, 2009). Hayat and Anwar (2016) argue that financial knowledge and risk adverse attitude have a positive relationship because financial know-how leads to multiple approaches for handling risky situations (Almenberg & Dreber, 2015). Hayat and Anwar (2016) argue that financial literacy enables investors to enhance their decision making ability by processing and analysing information in a proper way. Therefore, it is hypothesized that:

H₆: Financial Literacy significantly moderates the relationship between investors' cognitive profile, past investment experience and information availability with herding behaviour of individual investors in PSX.

H₆ₐ: Financial literacy significantly moderates the relationship between illusion of control with the herding behaviour of individual investors in PSX.

H₆ᵦ: Financial literacy significantly moderates the relationship between self-attribution with the herding behaviour of individual investors in PSX.

H₆꜀: Financial literacy significantly moderates the relationship between overconfidence with the herding behaviour of individual investors in PSX.

H₆�: Financial literacy significantly moderates the relationship between past investment experience with the herding behaviour of individual investors in PSX.

H₆ₑ: Financial literacy significantly moderates the relationship between information availability with the herding behaviour of individual investors in PSX.

3.4 Research Design

The current study used the survey method to collect data and applied a quantitative research method. Random sampling method was applied and data was collected by using survey questionnaires. The sample respondents in this study comprise of individual investors that are taking part in the Pakistan stock exchange through different brokerage houses.

3.4.1 Population of the Study

The population is considered as the most important component in any research. It focuses on individuals or objects with related characteristics. There are two types of population namely research target population and accessible population (Marreiros *et al.,* 2009). The target population represents individuals and objects where the research is carried out. The accessible population are those approached by the researcher while conducting the survey.

The population of this current study comprise of individual investors of the Pakistan Stock Exchange (PSX). There were 250,000 individual investors participating in the stock market as at 14th December 2016[1]. Therefore, the population size of this study was 250,000 individual investors. The reasons behind the selection of PSX are, firstly, because it is an emerging, small, and illiquid market and no other sample can

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[1] "THE ASSET" Magazine

represent it truly and faithfully (Lischewski & Voronkova, 2012). The second reason is that the most of investors in PSX are lacking in financial literacy, with confusions in investing concepts (Arif, 2015b; Awais *et al*., 2016).

3.4.2 Unit of Analysis

The unit of analysis for the current study is individual level. It consists of all local individual investors participating in the "Pakistan Stock Exchange" (PSX) directly or through different brokerage houses in various areas of Pakistan.

3.4.3 Sampling Technique

Trading in the stock market is facilitated by stockbrokers. Individual investors have to open an account with a registered broker, who trades on behalf of their client: the investor. The researcher obtained a list of registered brokers from the official website of the Pakistan Stock Exchange. After obtaining the list, the researcher selected the best brokers from the list. CFA (Chartered Financial Analyst) society Pakistan recognized the best brokerage houses of Pakistan annually. In 2018, nine brokers were granted excellence awards.

Researcher chooses these brokers because individual investors tend to prefer big brokers having better performance as such brokers provide more services and are presumed to provide better advice on stock trading. The researcher visited offices of these brokers and requested them to grant access to the list of their clients and relative contact information. Brokers were reluctant to provide contact information and other details of clients. However, they agreed to show the lists of their clients, so that researcher may choose their sample randomly. Further, they did not allow the

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researcher to obtain a copy of the lists because of confidentiality issues. From the shown lists, the researcher selected a total of 540 respondents (60 from each broker) from the lists based on the random sampling technique. All the questionnaires were distributed by the researcher and respondents were personally approached with the help of brokerage houses′ employees.

3.4.4 Sample Size

The sample size in this study was determined based on Krejcie and Morgan (1970) table, which states that if the total population is equal to or more than one hundred thousand, then the sample size should not be less than 384 from the total population. In the context of the current study, the total population was 250,000 individual investors of PSX; the suitable sample size was 384. Furthermore, this study also employed G*Power version 3.1 software to confirm the sufficiency of sample size.

A prior power analysis of G*Power was used to estimate the appropriate sample sizes based on some statistical parameters (Faul *et al*., 2007). Using six predictors, medium effect size convention of 0.15, and a significance level of 5%, this study obtained a sample size of 138 at the statistical power of 0.95 (refer Appendix 3). The researcher disseminated more questionnaires to anticipate a low response rate, which is very common exercise in the social sciences. As suggested by Salkind (1997), the over sampling method that increases the sample size by 40 to 50% is to address the problem of unusable responses and low response rate. To address the issues of usable cases and low response rate, the number of questionnaires for distribution was

increased by 40% of the sample size. Thus, the researcher distributed 540 questionnaires.

3.5 Operational Definitions

Operational definition entails the description of variables i.e. how a research intends to define and measure the concerned variables. In the current study, the measurement of the different variables is adapted from prior studies. Eight variables namely herding behaviour, illusion of control, self-attribution, overconfidence, past investment experience, information availability and financial literacy are described in the following subsections.

3.5.1 Herding Behaviour (HB)

In the current study context, herding behaviour is defined as investors imitating the actions of others and making their investment decisions based on the information of others instead of using their own. Thus, their investment decisions are a result of following their peers, colleagues and friend's recommendations or market trends. This variable in the current research study is based on Lin (2011) and Prosad, Kapoor, and Sengupta (2015).

3.5.2 Illusion of Control (IOL)

Illusion of control refers to the situation when investors think that they can control the outcome of an investment. Illusion of control increases the confidence of investors in decision making as they think that they can easily achieve their objectives and goals. This variable in the current research study is based on Lambert *et al*. (2012).

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3.5.3 Self-Attribution (SA)

Self-Attribution refers to the situation when investors attribute their success to their own skills and abilities, and failures to external factors. Investors would take credit for profit and blame loss to factors that are beyond their control. This variable in the current research study is based on Mishra and Metilda (2015).

3.5.4 Overconfidence (OC)

Overconfidence refers to the situation when investors overestimate their own information and investment opinions against the opinions of financial analysts, friends and colleagues. Overconfident investors believe that their investments are performing better than other investors'. They also overstate the accuracy of their personal opinions, or understate the variance of risky processes. This variable in the current research study is based on Abdallah and Hilu (2015).

3.5.5 Past Investment Experience (PIE)

Past investment experience includes the past successes (gains) and failures (losses) in investment. Investors use past outcomes as a factor to evaluate current uncertainties because they feel better when prior experiences bring them a higher satisfaction, but become risk averse after facing loss in a prior investment. This variable in the current research study is based on Mouna and Anis (2015).

3.5.6 Information Availability (IA)

Information availability is described as how frequently investors get information and from which source they get information about the stock market. Investors use different sources of information to update their knowledge regarding stock prices and

market index. This variable in the current research study is based on Abreu and Mendes (2012).

3.5.7 Financial Literacy (FL)

Financial literacy refers to the ability to make effective financial decisions by processing economic information. It is a skill for understanding the financial product like stocks and bonds, and making analysis about which assets give more returns and demonstrate the highest fluctuations. Financial literacy is the capability to make informed assessments and decisions regarding the management and usage of money. This variable in this study is based on Rooij *et al.* (2007) and Rooij, Lusardi, and Alessie (2011). Financial literacy is a moderator in this study and researcher measured it through an objective measurement scale as Wu and Zumbo (2008) recommended that moderator should be a variable with relatively stable traits having unchangeable characteristics. Further, one might be overconfident about his/her level of financial knowledge (Kramer, 2014; Porto & Xiao, 2016). Therefore, the subjective measurement of financial literacy was not considered in the study. Furthermore, this measurement scheme is consistent with the most notable studies on financial literacy i.e Lusardi and Mitchell (2014), Rooij *et al.* (2011), Osman, Madzlan, and Ing (2018).

3.6 Instrumentations

The current research study used a questionnaire survey to collect primary data. The research questionnaire was adapted from different studies. Items for the dependent variable (herding behaviour) were adapted from Prosad *et al.* (2015). The scale items for illusion of control were adapted from Lambert *et al.* (2012), self-attribution adapted from Mishra and Metilda (2015), overconfidence adapted from Abdallah and

Hilu (2015), past investment experience adapted from Mouna and Anis (2015), and information availability adapted from Abreu and Mendes (2012). The items for the moderator variable (financial literacy) were adapted from Rooij *et al*. (2007).

3.6.1 Questionnaire Descriptions

This research used a survey questionnaire for the collection of primary data in examining the moderating role of financial literacy in the relationship between investors' cognitive profile, past investment experience, and information availability with the herding behaviour of individual investors. This subsection described the structure of the survey questionnaire. Generally, the survey questionnaire consists of fourty-two (42) close-ended questions. The questions utilized rated or ranked scales. These scales have five-point ordered response categories from 'strongly disagree' to 'strongly agree' for independent and dependent variables. All the questions in the survey questionnaire were grouped into three sections. Section A consists of questions regarding the demographic attributes of the respondents including their age, education level, level of income, marital status, and occupation. Section B consists of questions related to herding behaviour, illusion of control, self-attribution, overconfidence, past investment experience, and information availability. Finally, Section C consists of questions on the moderating variable i.e. financial literacy. The researcher measured financial literacy using a knowledge based test designed by Rooij *et al*. (2007). This measurement results in test scores between the range of 0 to 10 making it a ratio scale of measurement. This method of measuring is consistently used in previous research on financial literacy i.e. Al-Tamimi and Kalli (2009), Rooij *et al*. (2011), and Osman *et al.* (2018).

3.6.1.1 Herding Behaviour (DV)

Herding behaviour was measured by the investors' tendency to follow the current investment trend in the stock market i.e. the tendency to ignore their own information and imitate the decision of other market participants. Four items were selected to measure the herding behaviour of stock market investors. These items were adapted from the study of Lin (2011). The study of Kumar and Goyal (2016) also used this scale to measure the herding behaviour of individual investors. Table 3.1 shows the four items of herding behaviour scale.

Table 3.1
Herding behaviour Measures

I invest in financial products (Stocks and bonds) by following my friend's investment decisions.
I buy the securities whose prices have risen for a period.
I buy financial products that are highly sought by other investors.
I follow the market trends to trade in stock market.

Source: Lin (2011)

3.6.1.2 Illusion of Control (IV)

Illusion of Control was measured by the tendency of investors to think that they can control the outcome of investments and future events. To measure illusion of control, five indicators were selected. These indicators are related to the investor's faith regarding the control of investment risk, valuation of investment, achievement of investment goal and control of random investment events. These items were adapted from the study of Lambert *et al*. (2012). The five measurement items of illusion of control are shown in the Table 3.2.

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Table 3.2
Illusion of Control Measures

I believe I can anticipate investment risk.
My valuations are highly accurate regarding stock investment.
It is easy for me to focuses on my investment objectives.
Whatever happens in my stock investment, I believe I could handle it.
I feel that I am able to exert control over my stock investments.

Source: Lambert *et al*. (2012)

3.6.1.3 Self-Attribution (IV)

Self-Attribution was measured by how investors attribute success to their own skills and abilities, and attribute failures to uncontrollable factors. For the measurement of self-attribution, five items were selected from the study of Mishra and Metilda (2015). Table 3.3 exhibits the five items of self-attribution scale.

Table 3.3
Self-Attribution Measures

I used to seek information related to my stock investment in order to help me in confirming that my investment decision was right.
When I made a profitable stock investment, I believe that it is due to my investment skills.
The proceeds from my previous profitable investment will be used immediately for the next investment.
I think external uncontrollable factors are reasons of my less successful investment.
My unsuccessful investments are due to external uncontrollable factors.

Source: Mishra and Metilda (2015)

3.6.1.4 Overconfidence (IV)

To measure overconfidence, six indicators were selected. These indicators are related to the investor's overconfidence in relation to investment performance, knowledge and own investment opinions. There are six items to measure this variable adapted

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from Abdallah and Hilu (2015). The measurement items of overconfidence scale are

shown in the Table 3.4.

Table 3.4
Overconfidence Measures

I am an experienced investor.
I feel that on average my investments perform better than the other investors.
I expect my investments to perform better continuously.
Knowledge and information that I have are enough to assist me in my investment decision.
I feel more confident in my own investment opinions over opinions of financial analysts.
My knowledge and investment opinions are better compared to my friends and colleagues.

Source: Abdallah and Hilu (2015)

3.6.1.5 Past Investment Experience (IV)

Past investment experience was measured by considering the past performance of an

investment for the evaluation of the current uncertainty. Past investment experience

entails past successes (gains) and failures (losses) in investment. The scale items for

past investment experience were adapted from Mouna and Anis (2015). Six items

were selected as presented in Table 3.5.

Table 3.5
Past Investment Experience Measures

I tried to avoid investing in companies with a history of poor earnings.
I rely on past investment performance to buy stocks because I believe that good performance will continue.
Good stocks are firms with past consistent earnings growth.
The past performance record of a company's stock will be well considered before any decision to include the stock in my investment portfolio could be made.
I am more concerned about a huge loss in my stock than missing a substantial gain (profits).

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I am more concern on capital loss rather than investment returns as a whole.

Source: Mouna and Anis (2015)

3.6.1.6 Information Availability (IV)

Information availability was measured by how frequently the investor acquires information regarding the investment and which source of information was used to get the information. The scale items for information availability were adapted from Abreu and Mendes (2012). The studies of Sabir *et al.* (2018) and Tauni *et al.* (2017) also used this sale for the measurement of information availability. Six items were selected as presented in Table 3.6.

Table 3.6
Information Availability Measures

I get information frequently regarding the evaluation of stock market indexes and stock prices.
I acquire investment related information from specific reports e.g. specialized press and the stock exchange bulletin.
Friends or family are among the main source of information for my investment activities.
I acquire investment related information from other newspapers, television, radio and online feeds (Social media).
I do not have much problem in obtaining any information related to my investment portfolio.
I expect investment related information to be on timely basis.

Source: Abreu and Mendes (2012)

3.6.1.7 Financial Literacy (Moderator)

Financial literacy was measured on the basis of basic and advanced knowledge of finance. The questions for basic financial literacy entailed the knowledge of simple and compounding interest, nominal and real values, and inflation. Meanwhile, questions for advanced financial literacy entailed knowledge of financial products like

shares and bonds. The ten items for financial literacy were adapted from Rooij *et al.*
(2011). Lusardi and Mitchell (2011) also used this scale for the measurement of
financial literacy. Measurement scale items of financial literacy are presented in Table
3.7.

Table 3.7
Financial Literacy Measures

1	Suppose you had Rs.100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?	More than Rs.102	Exactly Rs.102	less than Rs.102	Do not know	Lack of information for me to decide
2	Suppose you had Rs.100 in a savings account and the interest rate is 20% per year and you never withdraw your money or any interest incomes. How much would you have on this account in total after 5 years?	More than Rs.200	Exactly Rs.200	less than Rs.200	Do not know	Lack of information for me to decide
3	Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?	More than today	Exactly the same	Less than today	Do not know	Lack of information for me to decide
4	Assume a friend inherits Rs.10,000 today and his sibling inherits Rs.10,000, 3 years from now. Who is richer because of the inheritance?	My friend	His sibling	They are equally rich	Do not know	Lack of information for me to decide
5	Suppose that in the year 2010, your income has doubled and prices of all goods have doubled too. In 2010, how much will you be able to buy with your income?	More than today	The same	Less than today	Do not know	Lack of information for me to decide

6	Which of the following statements describes the main function of the stock market? 1. The stock market helps to predict stock earnings 2. The stock market results in an increase in the price of stocks 3. The stock market brings people who want to buy and sell stocks together. 4. None of the above 5. Do not know
7	Which of the following statements is correct? If somebody buys the stock of firm B in the stock market: 1. He owns a part of firm B 2. He has lent money to firm B 3. He is liable for firm B's debts 4. None of the above 5. Do not know
8	Considering a long time holding period (for example 10 or 20 years), which financial asset normally gives the highest return during normal economic conditions? 1. Savings certificates 2. Bonds 3. Stocks 4. Do not know 5. Lack of information for me to decide
9	Normally, which of the financial assets displays the highest returns fluctuations over time? 1. Savings certificates 2. Bonds 3. Stocks 4. Do not know 5. Lack of information for me to decide
10	When an investor allocate his/her money among different assets, the risk of losing money ------------- 1. increases 2. decreases 3. remain unchanged 4. do not know 5. Lack of information for me to decide

Source: Rooij *et al.* (2007)

3.6.2 Data Collection Procedure

The data was collected from the stock market investors in Pakistan. The stock market

investors were approached with the help of employees working in different brokerage

houses. All the questions and study purpose were explained to the respondents. After that, the questionnaires were distributed among the respondents from April 28th, 2018 to September 30th, 2018.

3.6.3 Pilot Study

To investigate the reliability and validity of the measures, a pilot study was conducted (Flynn *et al*., 1990). A pilot study is vital because it provides an opportunity for the researcher to improve the research instrument (Neuman, 2013) and address flaws in the design and instrumentation (Cooper & Schindler, 2011) before the actual study is carried out.

According to Emory and Cooper (1991), an appropriate number of respondents for a pilot study should be in the range of 25-100. In the current study, data was collected from the city of Lahore between Jan 05, 2018 to Feb 15, 2018. A total of 50 questionnaires were distributed among the stock market investors and 42 questionnaires were returned. Out of the 42 questionnaires, 1 questionnaire was incomplete and excluded from the study; hence, the overall response rate was 82%. Thereby, 41 questionnaires were used to conduct the pilot study.

Smart-PLS 3 was used to measure the reliability of the constructs and validity of the variables. Cronbach's Alpha was estimated to check the reliability of the instrument. Table 3.1 shows the results of the reliability test. Hair *et al*. (2010) recommended that the composite reliability value should be more than 0.6. According to Sekaran and Bougie (2016), a reliability value of less than 0.6 is considered to be poor, 0.7 as acceptable and 0.8 as good. Table 3.8 shows that information availability, illusion of

control, self-attribution, overconfidence, past investment experience and herding behaviour each has a reliability value of between "0.892 to 0.967" which is good.

Table 3.8
Reliability Result

Construct	Items	Cronbach's Alpha
Illusion of control	**5**	0.771
Self-Attribution	**5**	0.879
Overconfidence	**6**	0.813
Past Investment Experience	**6**	0.909
Information Availability	**6**	0.916
Herding Behaviour	**4**	0.826

To examine validity, the "average variance extracted" (AVE) was measured. Straub, Boudreau, and Gefen (2004) recommended that the factor loading for all the indicators should be more than 0.4 and items having less than 0.4 factor loading should be deleted to enhance the average variance extracted (AVE). This recommendation is also supported by Hair *et al*. (2010). Table 3.2 shows that all the items have a factor loading of more than the acceptable level (0.5). Composite reliability is also greater than the acceptable level (0.7) as recommended by Straub *et al*. (2004). Finally, the average variance extracted (AVE) is also greater than the accepted value (0.5) as shown in Table 3.9.

Table 3.9
Internal Consistency, Convergent Validity and Average Variance Extracted (AVE)

Construct	Indicators	Loadings	Composite Reliability	AVE
Illusion of control (IOL)	IOC1	0.623	0.830	0.523
	IOC2	0.720		
	IOC3	0.774		
	IOC4	0.686		
	IOC5	0.795		
Self-Attribution (SA)	SA1	0.791	0.911	0.674
	SA2	0.863		
	SA3	0.744		
	SA4	0.881		
	SA5	0.816		
Overconfidence (OC)	OC1	0.715	0.864	0.773
	OC2	0.830		
	OC3	0.699		
	OC4	0.726		
	OC5	0.770		
	OC6	0.705		
Past Investment Experience (PIE)	PIE1	0.768	0.929	0.688
	PIE2	0.660		
	PIE3	0.840		
	PIE4	0.903		
	PIE5	0.897		
	PIE6	0.879		

Information Availability (IA)	IA1	0.946	0.923	0.840
	IA2	0.898		
	IA3	0.944		
	IA4	0.928		
	IA5	0.936		
	IA6	0.843		
Herding Behaviour (HB)	HB1	0.950	0.898	0.837
	HB2	0.889		
	HB3	0.946		
	HB4	0.842		

3.7 Data Analysis Techniques

The data was analysed using SPSS software and Smart-PLS statistical software. Descriptive statistics were assessed using the "Statistical Package for the Social Sciences" (SPSS), while Smart-PLS i.e. a Partial Least Square statistical tool was used for inferential statistics estimation. The descriptive data analysis was estimated as a preliminary test for the cleaning of data. This analysis technique covers mean, median, standard deviation and frequency. The standard deviation, mean and frequency will be used to summarize the profile of the respondents.

Smart-PLS was used to analyse the data. PLS is one of the most appropriate tools for the Structural Equation Modeling (SEM) (Hair *et al.*, 2014). Partial least squares (PLS) regression has been used in several research areas especially in social sciences. The current study also used PLS to estimate the association and strength of relationship between the different variables.

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3.7.1 Descriptive Analysis Technique

Descriptive statistics was widely used as an introductory analysis which is essential before testing the hypothesis. This process entails methods that convert the complete data into information that is easily understandable and interpretable as illustrated by Sekaran and Bougie (2016). Descriptive analysis is also helpful in understanding the features of the respondents, as well as the level of the variable prevailing in the concerned organization. The respondents are different from each other in terms of age, education level, marital status, income level and profession which are all important to investigate.

3.7.2 Partial Least Square (PLS)

Smart PLS is one of the statistical software designed to analyse data for researchers, especially in social sciences. Smart PLS was first introduced by the Swedish statistician, Herman World. An alternative term for Smart-PLS is projection to latent structures; however, the term partial least squares (PLS) is more prominently used. In social sciences, original applications are meant to be used; however, the PLS regression fix is also widely used in many disciplines and research areas including anthropology and neuroscience. The use of PLS path modelling is common in econometrics, strategic, marketing and social sciences.

Partial least squares (PLS) regression has been used in several research areas as well as disciplines such as psychology, economics, chemistry, medicine and pharmaceutical science. In these disciplines, predictive linear modelling is necessary, especially with a large number of predictors. In the current study, PLS was used to check the relationship and strength between the different variables.

Structural equation modeling (SEM) is more applicable in the current research due to some of its features such as measurement error reduction through confirmatory factor analysis (CFA), attractive interface with more visuals, and capability to manage challenging data (Alavifar, Karimimalayer, & Anuar, 2012). According to the instructions of Hair *et al*. (2016), Smart-PLS is one of the best tools to test more than one theory in one study, and it is not suitable for testing only one theory. The current study is based on three theories which is the reason why Smart-PLS was selected. Moreover, SEM is a suitable method to test or extend a theory (Alavifar *et al*., 2012). SEM is easier to use, provides high-quality statistical analysis as compared to other statistical tools, is able to estimate the model's fit, able to make any modifications and can arrive at a final valid model (Alavifar *et al*., 2012).

3.7.2.1 Measurement Model Assessment

Partial Least Square (PLS)-Structural Equation Modeling (SEM) is based on a two-step process. These steps include: 1) measurement model assessment, and 2) structural model assessment. Measurement model assessment is based on the confirmatory factor analysis (CFA) which observes validity and reliability. It includes internal item reliability or internal consistency and external constancy. Internal item reliability is based on the factor loadings whilst external consistency is based on the average variance extracted (AVE). Therefore, measurement model assessment is majorly based on factor loadings, convergent validity and discriminant validity.

3.7.2.1.1 Factor Loading

The Smart PLS method is one of the methods used to examine the factor loading of each scale item. The accepted minimum loading value for each item is 0.5 (Hair & F,

2010). According to the suggestion of Hair *et al.* (2014), composite reliability should be equal or more than 0.7. Meanwhile, factor loadings of scale items that are less than 0.5 must be excluded from the analysis. The average variance extracted (AVE) should be above 0.5 (Fornell & Larcker, 1981). To achieve a satisfactory level of average variance extracted (AVE), items having less than 0.5-factor loading should be excluded.

3.7.2.1.2 Convergent Validity

Convergent validity entails the degree to which all measurement items of the constructs correlate with each other (Hair *et al*., 2016). There are various methods to examine convergent validity. In the current study, it is assessed using average variance extracted (AVE). For convergent validity, the value of average variance extracted (AVE) must be higher than 0.5 as recommended by Chin (1998).

3.7.2.1.3 The Discriminant Validity

To examine the correlation among the constructs and to test the construct validity, Smart-PLS discriminant validity was used to endorse the validity of the constructs and to investigate the correlation between the constructs. In the outer model, it is important to examine the discriminant validity for the confirmation of construct validity. This measures the distinctions of the construct (Hair *et al*., 2014) which is an important step before proceeding with the hypothesis testing. It shows that all the items used in the study in the different constructs are not overlapping. The recommendations by Fornell and Larcker (1981) were followed in measuring the discriminant validity in the current study. The square roots of the average variance

extracted (AVE) for each variable were compared with the correlations among the latent variables.

3.7.2.2 Structural Model Assessment

The assessment of the structural model is the second key phase in the Partial Least Square (PLS)-Structural Equation Modeling (SEM). It is based on the hypotheses testing. Primarily, it investigates the path coefficient, determinant of coefficient (R^2), effect size assessment (f^2) and predictive relevance (Q2).

3.7.2.2.1 Path Coefficient

The Smart PLS technique is one of the techniques used to examine the relationship between the independent and dependent variables. The p-value and t-value were used to observe the analysis results for all the hypotheses. This provides the justification for the acceptance as well as rejection of the hypothesis. A minimum t-statistics score of 1.96 or above is required for the acceptance of the current study's hypothesis. Otherwise, it will not be supported.

It also provides the overall effect of analysis which consists of the mean, t-value and standard deviation. The t-statistic was also used to determine the moderator's effect i.e. whether the placement of financial literacy as a moderator has a significant effect on the relationship between the cognitive profile, past investment experience and information availability with herding behaviour.

3.7.2.2.2 Coefficient of Determination (R^2)

The Smart-PLS procedure was also applied to examine the coefficient of determinations (R^2). The coefficient of determinations (R^2) investigates the strength of relationship with the dependent variable. R^2 was determined for both individual as well as overall basis. In the case of individual analysis, Smart PLS R^2 was used to examine the strength between each independent variable with the dependent variable. The Smart PLS R^2 was used to compare the strength of the relationship between the independent variables and the dependent variable.

3.7.2.2.3 Assessment of Effect Size (f^2)

Effect size (f^2) was used to measure the change in the dependent variable due to each independent variable. It examines whether the independent variable has a considerable effect on the dependent variable or not (Götz, Liehr-Gobbers, & Krafft, 2010). Effect size (f^2) is exemplified in three levels. A value of $0.15 > f^2 > 0.02$ is considered as a small effect, a value of $0.35 > f^2 > 0.15$ is considered as a moderate effect whilst a value of $f^2 > 0.35$ denotes a strong effect (Cohen, 1988). This study also followed these reconditions in investigating the effect size (f^2) of each variable.

3.7.2.2.4 Predictive Relevance (Q^2)

The Stone-Geisser test of predictive relevance (Q^2) is generally applied as a supplementary assessment of goodness-of-fit (Duarte & Raposo, 2010). By using PLS, the blindfolding procedure was applied (Sattler *et al.,* 2010). It explains the quality of the model. According to Reinartz, Haenlein, and Henseler (2009), in a research model, if the value of Q^2 is found greater than zero, the model is hence considered to have a predictive relevance (Q^2).

3.8 Chapter Summary

This chapter discusses the research framework and the analysis method used in this study. The study data and other related information were gathered through the survey questionnaires from the selected respondents. The responses gathered were then analysed using the Smart-PLS software.

CHAPTER FOUR

DATA ANALYSIS AND RESULTS

4.1 Introduction

This chapter begins with the discussion on the response rate, data coding, data entering, data screening and cleaning. The next section presents the data analysis results. The first section of this current chapter presents the discussion on the response rate, data entering and screening of data. Different tests were applied for data screening such as multicollinearity test, missing value analysis and normality test. This part also discusses the respondents' profile and descriptive statistics results of all the latent variables.

The second section of the current chapter presents the hypotheses testing results of the study. This section is divided further into two parts for attaining the results of the study. The first part covers the reliability and validity of data whilst the second part discusses the results of the Structural model assessment containing the R-squared values and the path coefficients of the relationships. This part also presents the hypothesis testing results of the direct relationship between the independent and dependent variables. Finally, this chapter presents the test results of the moderating role of financial literacy in the relationship between the cognitive factors, past investment experience and information availability with herding behaviour.

4.2 Data Validation and Verification

The following sections discuss the response rate, data coding and entering, and data screening and cleaning prior to the statistical analysis.

4.2.1 Response Rate

A total of 540 questionnaires were distributed among investors participating in the Pakistan stock exchange through different brokerage houses. Out of the 540 questionnaires distributed, 321 were returned. However, 17 questionnaires were found to be incomplete and excluded from the analysis. Thus, 304 questionnaires which denoted a valid response rate of 56% were used to conduct the analysis. According to Johnson and Owens (2003), the standard response rate recommended by the American Association for Opinion Research (AAPOR) in social science studies is 32.6%. Therefore, the response rate of 56% achieved in this study is considered good. The details on the response rate are presented in Table 4.1.

Table 4.1
Response Rate

	Total	Rate
Questionnaires Distributed	540	100%
Returned	321	59.44
Usable	304	56.29
Unusable	17	3

4.2.2 Data Coding and Entering

Items in the questionnaire were coded using easily identifiable codes based on the variables once the questionnaires were retrieved. The items in the research questionnaire were grouped based on their categories and types of variables. For instance, all the descriptive type questions were grouped into one single category to

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separate these questions from other questions that were designed to measure the variables.

This was followed by the coding of each of the questions using several letters and a particular number as a marker of the variable they are measuring. For example, the first question measuring Illusion of Control was coded as IOC, while the questions relating to Self-Attribution were coded as SA. This data coding ensures that the questionnaires can be easily referred to and at the same time may prevent the researcher from making mistakes while keying the data into the computer. Upon completion of the above process, all the retrieved questionnaires were now ready for the data entering process. The data was entered accordingly by the researcher into the Statistical Package for Social Sciences (SPSS) software.

4.2.3 Data Screening and Preliminary Analysis

Preliminary analysis for data cleaning and screening is one of the most important analyses in every research study. This analysis is vital to explore possible violations of the main assumptions concerning the application of data analysis methods (Hair *et al.*, 2014). Furthermore, it assists the researcher in developing better understanding about the analysis.

The cleaning and screening of data includes locating and rectifying errors that occurred during data collection (Pallant, 2007) such as outliers or missing values. Outlier problems occur when some values fall outside of the possible range. For example, in a 5-point Likert scale, the minimum value is 01 and the maximum value

is 05; if any value falls outside of the said range, it is considered as an outlier which needs correction.

Before the cleaning and screening of data, the data from all the 304 questionnaires was entered into the SPSS sheet. A missing value analysis is then carried out to identify any missing values. Next, a normality test was applied to check the normality of data. Multicollinearity was also checked by performing multicollinearity analysis (Hair *et al.*, 2010; Tabachnick & Fidell, 2007).

4.2.3.1 Missing Value Analysis

The missing value analysis was applied using the SPSS statistical software to check the missing values in the data set; resultantly, 13 missing values were found randomly. Specifically, Herding Behaviour had 2 missing value whereas Illusion of Control had 2, Self-Attribution 1, Overconfidence 2, Information Availability 4 and Past Investment Experience 2. There is no standard or rule of thumb for analysing missing values (Umrani, 2016) but Schafer (1999) suggested that missing values of 5% or less are not problematic for statistical inference. Furthermore, if the total percentage of missing value is 5% of the data or less, then the mean of nearby points should be used for the computation of the missing values (Little & Rubin, 2014; Raymond, 1986). Since the missing values in the current study is less than 5%, the mean of nearby points is hence used for the computation of the missing values (Tabachnick & Fidell, 2007). Table 4.2 provides in detail the description of the randomly missing values.

Table 4.2
Total Number of Missing values

Constructs	Missing Values
Herding Behaviour	2
Illusion of Control	2
Self-Attribution	1
Overconfidence	2
Information Availability	4
Past Investment Experience	2
Financial Literacy	0
Total	**13**

4.2.3.2 Treatment of Outliers

An outlier is an observation or subset of observations that lies at unnecessary abnormal distance from the other value in the entered data set. In the presence of an outlier in the data, regression results are unreliable (Verardi & Croux, 2009). Thus, it is necessary to identify the outliers and make appropriate corrections to produce reliable regression results. This study used the Mahalanobis test through SPSS to detect outliers; the initial checking indicates that the data is free from any case of outliers.

4.2.3.3 Test of Normality

According to the literature (Gopi & Ramayah, 2007; Reinartz et al., 2009; Wetzels, Odekerken-Schröder, & Van Oppen, 2009), PLS SEM has the ability to produce reliable model estimation in the case of non-normal data because data normality is not a prerequisite for PLS-SEM. On the contrary, Hair *et al.* (2012) suggest that data normality should be ensured through a normality test before inferential statistics is carried out.

Similarly, Coaks and Steed (2001) recommend a normal distribution of data to produce reliable results. Histogram of the residual is the most commonly used technique to ensure data normality (Norusis, 1997). Some studies (Hair *et al.*, 2006) also used a normal probability plot in addition to histogram to observe the normality of the data.

Moreover, for normal distribution of data, it is compulsory for the value of skewness and kurtosis to be between -2 and +2 respectively (Chua, 2006). Therefore, this study used Histogram, skewness and kurtosis to examine the normality of data. The value of skewness and kurtosis indicate a normal distribution of data because all the values are within the acceptable range. However, the histogram shows some variance which is nevertheless negligible. The table of skewness and kurtosis as well as histogram is shown in Figure 4.1.
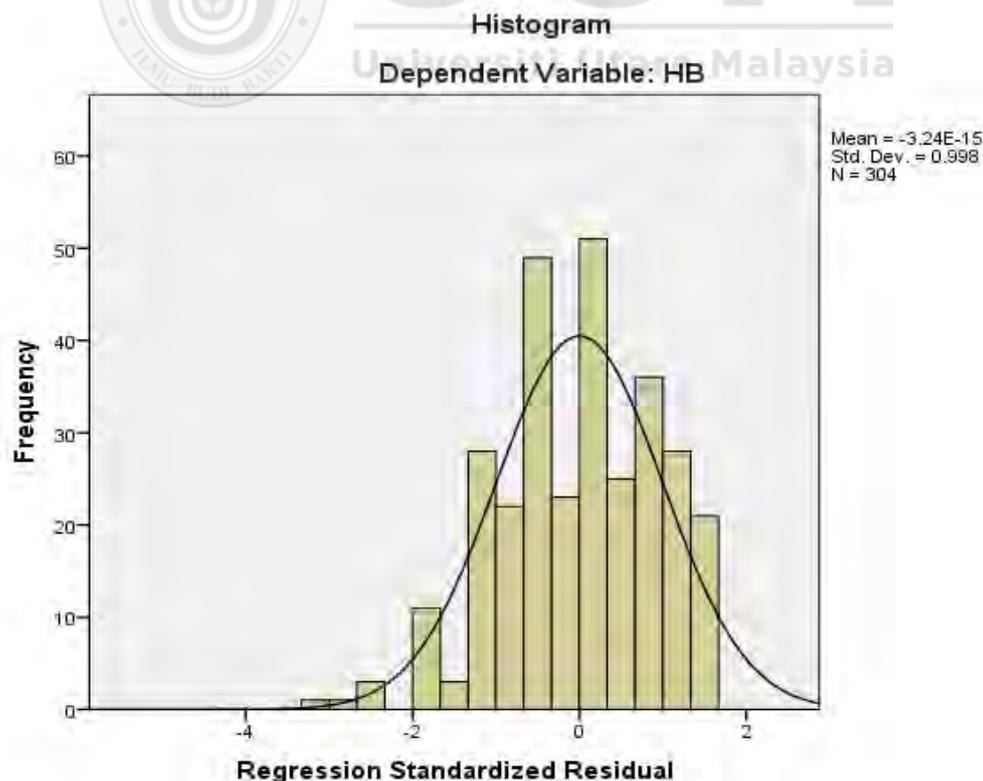
Figure 4.1
Histogram of Herding Behaviour (Dependent Variable)

4.2.3.4 Multicollinearity Test

"Multicollinearity" test calculates the strength of correlation within the variables in the model. It also indicates the degree of relationship that exists among the independent constructs (Hair *et al.*, 2010). The high "multicollinearity" among the independent variables overestimates the regression coefficients and produces exaggerated statistical impact of the coefficients and unreliable regression results (Field, 2009). For the calculation of the true influence of the independent variables on the dependent variable, it is necessary that no independent variable has a perfect linear relationship with another independent variable (Stevens, 2012). Multicollinearity arises when one or more independent constructs are highly associated with each other.

The existence of "multicollinearity" among the variables of a model is a cause to producing spurious results for the significance of relationship as well as regression coefficients results (Chatterjee & Yilmaz, 1992; Hair Jr, 2006). There are two methods that are generally used to check multicollinearity among the independent variables (Peng & Lai, 2012; Stevens, 2012). The correlation matrix of the exogenous constructs is checked in the first stage; if the correlation coefficient among the variables is equal to or above 0.90, then multicollinearity exists between the independent latent constructs (Hair *et al.*, 2010). In the second stage, the Variance Inflation Factor (VIF) method is used to calculate the multicollinearity between the different variables. If the VIF value is less than 5.0, then no multicollinearity exists but if the VIF value is greater than 5.0, then multicollinearity among the variables is problematic and should be removed appropriately (Hair *et al.*, 2010). Table 4.3 presents the results of the multicollinearity test; it shows that there is no

multicollinearity among the independent variables because the VIF values for all the variables are lower than 5.0 and the tolerance value is lower than 1.

Table 4.3
Multicollinearity Test

Independent Variable	Collinearity Statistics	
	Tolerance	VIF
OC	.460	2.172
IOC	.715	1.400
SA	.691	1.447
PIE	.820	1.219
IA	.426	2.349

4.3 Descriptive Analysis

The study used two data analysis techniques in analysing the gathered data namely descriptive technique and Smart-PLS. The discussion on the descriptive analysis technique and its findings are presented in the following section.

4.3.1 Descriptive Technique

The descriptive data analysis technique was used in analysing the respondents' non-quantified data which are descriptive in nature. This analysis technique covers the descriptive analysis of the respondents' profile, educational background, income and investment practices.

4.3.2 Descriptive Analysis Result

The descriptive analysis was conducted using the SPSS to summarize the particulars of the respondents. The results of the descriptive analysis are shown in Table 4.4 and Table 4.5.

4.3.3 Demographic Profile of the Respondents

This section describes the demographic profile of the respondents. The demographic characteristics that are observed in this study are gender, age, education level, monthly income, marital status and occupation. Table 4.4 presents a detailed view of these demographics. It shows that 242 males (79.6%) and 62 females (20.4%) had participated in this study. In terms of age, the results indicate that 14.0% of the male respondents and 16.13% of the female respondents are below 25 years old, 14.6% males and 56.4% females are between 26 to 35, 24.38% males and 14.51% females are between 36 to 45, 5.8% males and 8.06% females are between 46 to 55, and the remaining 11.16% males and 4.83% females are over 55. Similarly, 2.5% of the male respondents and 4.84% of the female respondents have a matric degree, 8.3% males and 20.96% females have an intermediate degree, 32.2% males and 16.1% females have a Bachelor's degree, 47.5% males and 48.4% females have a Master's degree, and only 0.8% males and 1.6% females have a PhD degree.

The results of the monthly income category indicate that 19.8% of the male respondents and 35.5% of the female respondents make less than Rs.50,000 in monthly income,51.7% males and 41.9% females make between Rs.50,000-100,000 in monthly income, 12.8% males and 11.3% females make between Rs.100,001-150,000 in monthly income, and 15.7% males and 11.3% females make above

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Rs.150,000 in monthly income. The results of marital status indicate that 43.8% of the male respondents and 46.8% of the female respondents are single, 57.7% males and 48.8% females are married, and the remaining 2.5% males and 4.8% females are divorced. The results of occupation indicate that 44.2% of the male respondents and 40.3% of the female respondents are working in the finance sector, while 55.8% males and 59.7% females have other occupations.

Table 4.4
Descriptive Analysis of *the Respondents' Background*

Respondent Demographics	Frequency	%
Gender (N = 330)		
Male	242	79.6
Female	62	20.4
Age (N = 330)		
Up-to 25	44	14.5
26-35	146	48.0
36-45	70	23.0
46-55	30	9.9
Over 55	14	4.6
Educational Level (N = 330)		
Matriculation	8	2.6
Intermediate	34	11.2
Bachelor	88	28.9
Master	145	47.7
PhD	3	1.0

Other	26	8.6

Monthly Income (N = 330)

Below Rs.50,000	70	23.0
Rs.50,000-100,000	151	49.7
Rs.100,001-150,000	38	12.5
Above Rs.150,000	45	14.8

Marital Status (N = 330)

Single	135	135
Married	160	160
Divorced	9	9

Occupation (N = 330)

Finance-Related	132	43.4
Others	172	56.6

Table 4.5
Demographic Profile of the Respondent In Depth

		Male	Female	Total
Gender(330)		242	62	304
		79.6%	20.4	100%
Age (330)	Up-to 25	34	10	44
		14.0%	16.13%	14.47%
	26-35	108	35	143
		44.6%	56.45%	47.03%
	36-45	59	9	68
		24.38%	14.51%	22.36%

	46-55	14	5	19
		5.8%	8.06%	6.25%
	Over 55	27	3	30
		11.16%	4.83%	9.86%
Education level (330)	Matriculation	6	3	9
		2.5%	4.84%	2.96%
	Intermediate	20	13	33
		8.3%	20.96%	10.85%
	Bachelor	78	10	88
		32.2%	16.1%	28.9%
	Master	115	30	145
		47.5%	48.4%	47.7%
	PhD	2	1	3
		0.8%	1.6%	1.0%
	Other	21	5	26
		8.7%	8.1%	8.6%
Monthly Income (330)	Below Rs.50,000	48	22	70
		19.8%	35.5%	23.0%
	Rs.50,000-100,000	125	26	151
		51.7%	41.9%	49.7%
	Rs.100,001-150,000	31	7	38
		12.8%	11.3%	12.5%
	Above Rs.150,000	38	7	45
		15.7%	11.3%	14.8%
Marital Status (330)	Single	106	29	135

		43.8%	46.8%	44.4%
	Married	130	30	160
		53.7%	48.4%	52.6%
	Divorced	6	3	9
		2.5%	4.8%	3.0%
Occupation (330)	Finance-Related	107	25	132
		44.2%	40.3%	43.4%
	Others	135	37	172
		55.8%	59.7%	56.6%

4.4 Analysis of Data

The following sections discuss the analysis results of the data using the Smart-PLS software. This section covers a brief introduction of the Smart-PLS analysis techniques. Then, the analysis discusses the factor analysis, followed by the hypotheses testing results of the direct relationship between the independent variables and the dependent variable. Finally, this section discusses the moderating effect of financial literacy on the relationship between the independent variables and the dependent variable. The statistical testing results of the above analysis are presented accordingly in the tables and figures.

4.4.1 Factor Analysis

Factor analysis was carried out to check the construct validity of the items as well as to see whether each item in the research framework was able to measure what they intend to measure. Therefore, a validity test was performed using the Partial Least

Squares (PLS) software, Smart-PLS. Consequently, all the respondents' responses that were previously keyed into the SPSS software were transferred to the Smart-PLS software for factor analysis to test the model fitness and construct validity.

4.4.2 Assessment of PLS-SEM Path Model Results

A two-stage process is adopted to estimate and report the PLS-SEM results of the current study (Henseler, Ringle, & Sinkovics, 2009; Ringle *et al.*, 2018). There is a need to explain why this study used a two-stage process instead of the goodness-of-fit (GoF) index. Many researchers have indicated that the GoF index is not suitable for the validation of a model (Hair *et al.*, 2014; Henseler & Sarstedt, 2013) because it is unable to differentiate between the valid and invalid models (Hair, Ringle, & Sarstedt, 2013).

Therefore, the current study applied the two-stage method for assessing and reporting the results of the PLS-SEM. Henseler *et al.* (2009) also indicated that the two-stage method is more appropriate for the assessment and reporting of the results of the PLS-SEM path models. Moreover, PLS-SEM is most appropriate for dealing with collected data. The two-stage method includes the following two key steps:

1. Assessment of Measurement Model
2. Assessment of Structural Model

The estimation of the measurement model involves several steps such as examining the reliability and validity of the constructs. The estimation of structural model entails the estimation of the association between the independent constructs and the dependent constructs in which the hypothesis testing is conducted. The structural

model is evaluated using the PLS-SEM bootstrapping method (Chin, 2010). To assist in the evaluation of the structural model of PLS, the following criteria were used: "significance of path coefficients", "the effect size (f^2)", "coefficient of determination (R^2)" and "predictive relevance (Q^2)". The complete process of the estimations of the measurement model and structural model are presented in Figure 4.2. These steps are recommended by Hair *et al.* (2014) and Henseler *et al.* (2009).
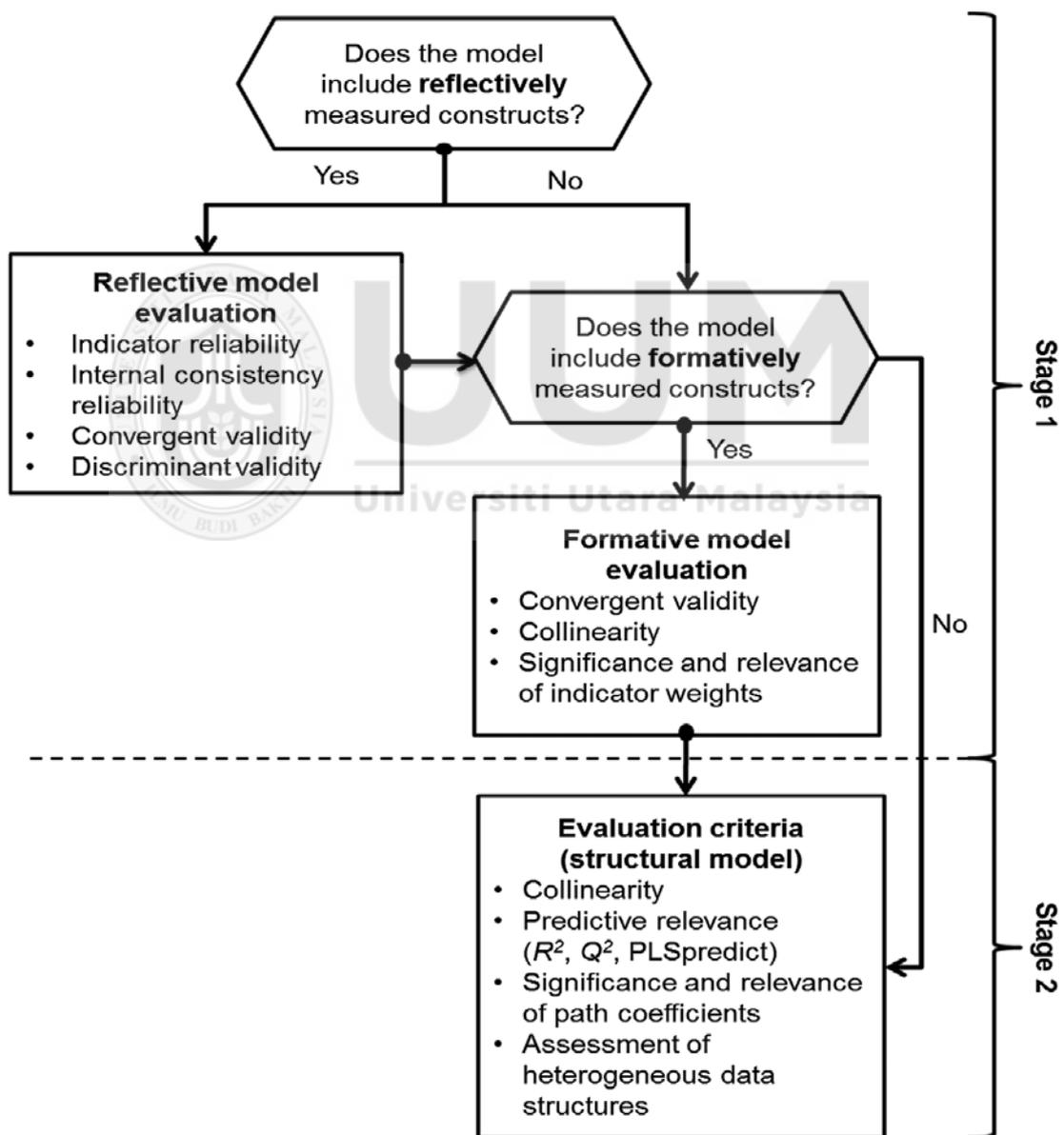
Figure 4.2
PLS Path Modeling Assessment (Two Step Process)
Source: Henseler *et al.* (2009)

4.4.3 Measurement Model Assessment

This study applied the PLS-SEM method for the testing of theory. In the assessment model procedure, the first step is to attain the acceptable level of validity and reliability through the measurement model. Therefore, to attain a satisfactory level, Smart-PLS is used for the appraisal of the measurement model (Ringle *et al.*, 2018).

In the PLS path modeling assessment, composite reliability (CR) was utilized to evaluate the reliability of the variables. The Measurement model is used for the valuation of the validity and internal consistency of the scale items (Hair *et al.*, 2014). Composite reliability (CR) is used to evaluate the internal consistency of the construct. CR is also used to emphasize on the valuation of the construct reliability. CR is based on the individual reliability of the indicators of the estimated model which assumes that all the items have different factor loadings whereas Cronbach's alpha shows the composite reliability of the construct (J. Hair *et al.*, 2014; Henseler *et al.*, 2009).

In a nutshell, the measurement model provides the factor loading of the scale items, composite reliability of every construct, average variance extracted (AVE) for every construct, and discriminant validity. The results of the Measurement model are shown in Figure 4.3 and the results for the Factor Loading, Composite Reliability, and Average Variance Extracted (AVE) are shown in Table 4.6.
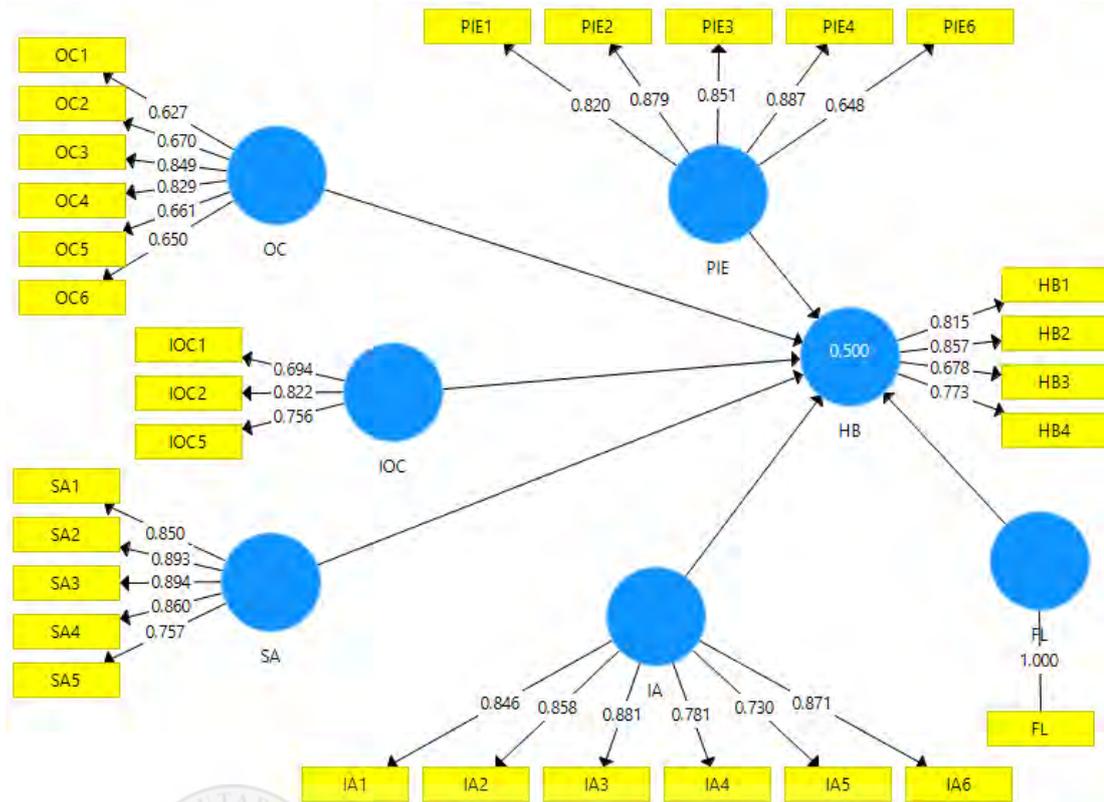
Figure 4.3
Measurement Model Assessment

4.4.3.1 Individual Item Reliability

According to the suggestions of previous researchers, each element of the outer loading factor for every construct indicates the distinct item reliability (Hair *et al.*, 2014; Hair *et al.*, 2012). Consequently, each item was considered for loading factor. As explained by Hair *et al.* (2014), researchers recommended to retain items with loadings of 0.5 which may be considered a rule of thumb. Items with 0.4 loading factor would be excluded (Hair *et al.,* 2010).

In the context of this research, out of the 42 items, 3 items have a loading of less than 0.5 and have been excluded from the study. Thus, for analysis, a total of 39 items were retained after excluding 7.14% of the allowed scale. Overall, 2 item was

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excluded from illusion of control and 1 items from past investment experience. Table 4.6 shows the measurement model assessment results.

4.4.3.2 Internal Consistency Reliability

Bijttebier *et al.* (2000) and Sun *et al.* (2007) defined internal consistency reliability as the degree to which when same concept is measured by all items including in a study of a given scale. For the measurement of internal consistency reliability composite reliability coefficients are the most widely used estimator recommended by previous researchers (J. Hair *et al.*, 2014; McCrae *et al.*, 2011; Peterson & Kim, 2013). Thus, both are assessed by this study for the measurement of internal consistency.

Bagozzi and Yi (1988) and Hair *et al*. (2013) indicated the boundary for deciding the value of "composite reliability; " > 0.9- Excellent, > 0.8- Good, > 0.7- Acceptable". However, 0.7 is the lowest acceptable threshold limit. These researches indicate that the coefficient of composite reliability should be 0.7 or more. In this study, Self-Attribution (SA) has a composite reliability value of 0.930, Illusion of Control (IOL) 0.802, Overconfidence (OC) 0.864, Past Investment Experience (PIE) 0.911, Information Availability (IA) 0.929 and Herding Behaviour (HB) 0.863. Thus, all the values of composite reliability are above the acceptable range, as shown in Table 4.6.

4.4.3.3 Convergent Validity

Convergent validity is described by Hair *et al.* (2006) as the extent to which the items of a construct not only represent the proposed latent variable, but also correlate with the other measures of the same latent variable (Hair *et al.*, 2006). Average Variance Extracted (AVE) is determined to assess convergent validity. The acceptable

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threshold value for the AVE must be higher than 0.5 or equal to 0.5 (Fornell & Larcker, 1981) to attain the convergent validity (Chin, Gopal, & Salisbury, 1997). This threshold value is also supported by Hair *et al.* (2010).

In the this study, as shown in Table 4.6, Illusion of Control (IOC) has an AVE value of 0.576, Self-Attribution (SA) 0.727, Overconfidence (OC) 0.518, Past Investment Experience (PIE) 0.675, Information Availability (IA) 0.688 and Herding Behaviour (HB) 0.614. Thus, all the constructs have achieved a satisfactory level to attain convergent validity.

Table 4.6
Factor Loading, Cronbach Alpha, Composite Reliability, Average Variance Extracted

Construct	Indicators	Loadings	Composite Reliability	AVE
Herding Behaviour (HB)	HB1	0.815	0.863	0.614
	HB2	0.857		
	HB3	0.678		
	HB4	0.773		
Self-Attribution (SA)	SA1	0.850	0.930	0.727
	SA2	0.893		
	SA3	0.894		
	SA4	0.860		
	SA5	0.757		
Illusion of control (IOC)	IOC1	0.694	0.802	0.576
	IOC2	0.822		
	IOC5	0.756		

Overconfidence (OC)	OC1	0.627	0.864	0.518
	OC2	0.670		
	OC3	0.849		
	OC4	0.829		
	OC5	0.661		
	OC6	0.650		
Past Investment Experience (PIE)	PIE1	0.820	0.911	0.675
	PIE2	0.879		
	PIE3	0.851		
	PIE4	0.887		
	PIE6	0.648		
Information Availability (IA)	IA1	0.846	0.929	0.688
	IA2	0.858		
	IA3	0.881		
	IA4	0.781		
	IA5	0.730		
	IA6	0.871		

4.4.3.4 Discriminant Validity

Discriminant validity is defined as "the degree to which extent latent construct with its own indicators than with other latent construct in the structural model" (Duarte & Raposo, 2010). In this study, two methods were adopted to realize the discriminant validity namely Fornell and Larcker (1981) AVE and the cross loadings method suggested by Chin *et al.* (1997).

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Primarily, according to the instructions of Fornell and Larcker (1981), a comparison was made among the square roots of the AVE for each variable and the correlations of the latent constructs. In this situation, the rule of thumb provided by Fornell and Larcker (1981) indicates an acceptable AVE value of 0.5 or above. Table 4.6 demonstrates all the constructs that have an AVE value greater than 0.5. Later, a comparison was made among the square roots of the AVE and the correlations of the latent variables. The square root of the AVE must be greater than the correlations of the latent variables to get the discriminant validity. In the current study, the square root of the AVE is more than the correlations among the latent variables; hence, the discriminant validity has been achieved as shown in Table 4.7.

Table 4.7
Latent Variable Correlations and Square roots of Average Variance Extracted

	FL	HB	IA	IOC	OC	PIE	SA
FL	**1.000**						
HB	-0.065	**0.784**					
IA	0.188	-0.379	**0.830**				
IOC	-0.040	0.274	-0.140	**0.759**			
OC	-0.122	0.659	-0.389	0.313	**0.720**		
PIE	-0.171	0.579	-0.407	0.300	0.651	**0.822**	
SA	-0.019	0.467	-0.248	-0.040	0.485	0.581	**0.852**

4.4.4 Assessment of Significance of the Structural Model (Direct Relationship)

By applying PLS-SEM algorithm and bootstrapping, the evaluation of the structural model was performed (Chin, 2010). In this procedure, PLS bootstrapping was

conducted with 500 bootstraps and 304 cases to determine the significance of the structural model. This procedure followed the instructions of various previous studies (Hair *et al.*, 2014; Hair *et al.*, 2012; Henseler *et al.*, 2009).

Figure 4.4 shows the structural model assessment in which all the direct hypotheses were tested. The t-value of 1.96 was considered as the threshold level to accept or reject the hypotheses. The β-value was considered to examine the direction of the relationships. Figure 4.4 below shows the effect of the five independent variables (illusion of control, self-attribution, overconfidence, past investment experience and information availability) on dependent variable (herding behaviour).
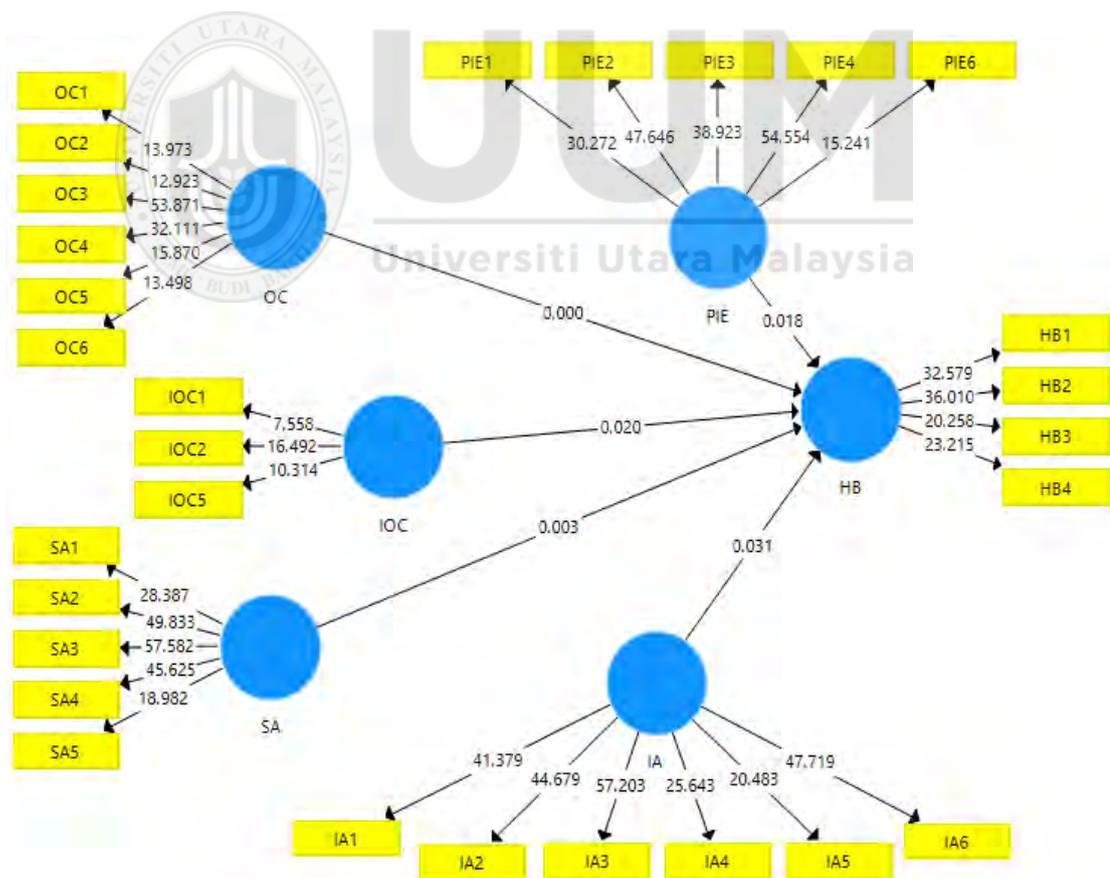
Figure 4.4
Assessment of Structural Model (Direct relationship)

Table 4.8 describes the relationship between the exogenous constructs and the endogenous constructs. The results indicate that a significant positive relationship has been established between Illusion of Control (HB) and Herding Behaviour (HB) (β = 0.091; t-Statistics = 2.338); Self Attribution (SA) and Herding Behaviour (HB) (β = 0.157; t-Statistics = 2.948); Overconfidence (OC) and Herding Behaviour (β = 0.420; t-Statistics = 7.161); as well as Past Investment Experience (PIE) and Herding behaviour (β = 0.144; t-Statistics = 2.368) However, a significant negative relationship has been established between Information Availability and Herding Behaviour (β = -0.106; t-Statistics = 2.164). Table 4.8 shows all these results.

Table 4.8
Structural Model Assessment (Direct relationship hypotheses results)

Hypotheses	Relationship	Path Coefficients	Std. Error	t-Value	P-Value	Decision
H_1	IOC -> HB	0.091	0.039	2.338	0.020	Supported
H_2	SA -> HB	0.157	0.053	2.948	0.003	Supported
H_3	OC -> HB	0.420	0.059	7.161	0.000	Supported
H_4	PIE -> HB	0.144	0.061	2.368	0.018	Supported
H_5	IA -> HB	-0.106	0.049	2.164	0.031	Supported

IOC = Illusion of Control = SA = Self Attribution, OC = Herding Behaviour, PIE = Past Investment Experience, IA = Information Availability, HB= Herding Behaviour

4.4.5 Assessment of Significance of the Structural Model (Moderation Effect)

The moderation effect of Financial Literacy (FL) was also assessed using PLS bootstrapping which was performed with 500 bootstraps and 304 cases as shown in Figure 4.5. The t-value of 1.96 was considered as the threshold level to accept or

reject the moderation hypothesis. Further details of the moderation effect testing results are shown in Table 4.9. Figure 4.5 also gives additional information on the moderating effects of FL on the relationship between the independent variables (Illusion of Control, Self-Attribution, Overconfidence, Past Investment Experience and Information Availability) and the dependent variable (Herding Behaviour).
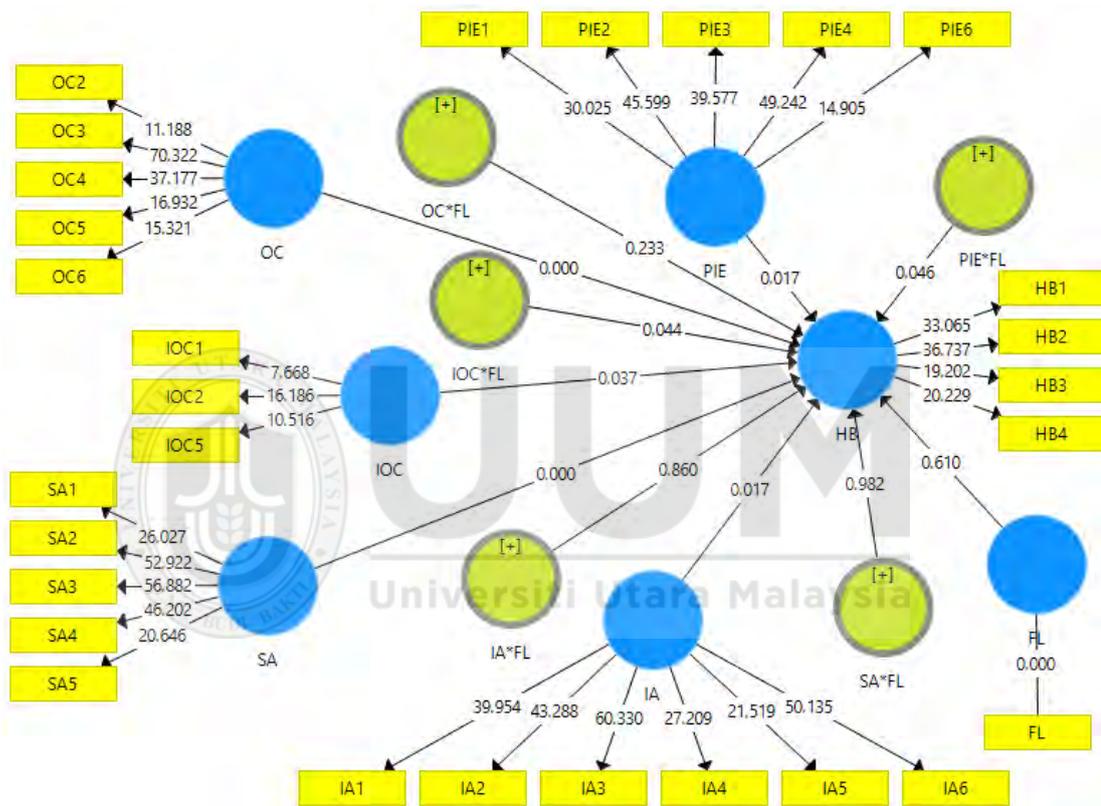
Figure 4.5
Structural Model Assessment (Moderation Effect)

Table 4.9 indicates the moderating results. The findings indicate that Financial Literacy significantly moderates the relationship between Illusion of Control (IOC) and Herding Behaviour (β = 0.086; t-Statistics = 2.015). However, results illustrate that Financial Literacy has no moderating role on the relationship between Self-Attribution (SA) and Herding Behaviour (HB) (β = 0.001; t-Statistics = 0.022).

Financial Literacy does not moderates the relationship between Overconfidence (OC) and Herding Behaviour (HB) (β = 0.074; t-Statistics = 0.233). Conversely, Financial Literacy also significantly moderates the relationship between Past Investment Experience (PIE) and Herding Behaviour (β = -0.111; t-Statistics = 0.046). Further results show that Financial Literacy does not moderate the relationship between Information Availability (IA) and Herding Behaviour (β = -0.009; t-Statistics = 0.176).

Table 4.9
Structural Model Assessment (Moderation results)

Hypoth eses	Relationship	Path Coefficients	Std. Error	t-Value	P-Value	Decision
H$_{6a}$	IOC*FL -> HB	0.086	0.042	2.015	0.044	Supported
H$_{6b}$	SA*FL -> HB	0.001	0.056	0.022	0.982	Not Supported
H$_{6c}$	OC*FL -> HB	0.074	0.062	1.195	0.233	Not Supported
H$_{6d}$	PIE*FL -> HB	-0.111	0.056	2.001	0.046	Supported
H$_{6e}$	IA*FL -> HB	-0.009	0.049	0.176	0.860	Not Supported

4.5 Assessment of Variance Explained in the Endogenous Latent Variable

The PLS-SEM structural model provides another important measure which is R-Squared (R^2). R^2 is also known as "coefficient of determination" as mentioned in different studies (Hair *et al.*, 2013; Hair *et al.*, 2012; Henseler *et al.*, 2009). The value of R-squared represents the ratio of variation explained in the dependent variable that can be explained by one or more different predictors (independent variables) (Hair & F, 2010; Hair Jr, 2006).

The standard level of R^2 value is based on the situation and environment in which the study is performed (Hair & F, 2010). Falk and Miller (1992) mentioned that an R^2 of 0.10 is the acceptable level. According to the recommendations of Chin *et al.* (1997), an R^2 value of 0.60 can be considered as substantial, 0.33 as moderate and 0.19 as weak. In the current study, the R^2 value is 0.490 which is moderate as explained by Chin *et al.* (1997). This indicates that all the exogenous latent variables are expected to explain 49% variance in the endogenous latent variable. Thus, the level of variance explained by the proposed model is moderate.

Table 4.10
Variance Explained in the Endogenous Latent Variable

Latent variable	Variance explained (R^2)
Herding Behaviour (HB)	49%

4.6 Assessment of Effect Size (f^2)

The variation in the value of R^2 due to a specific exogenous latent construct (independent variable) on an endogenous latent construct or constructs (dependent variable) is called f^2 (Chin, 1998). The value of f^2 is usually calculated on the bases of variation in the R^2 value of the latent construct to which the path is associated; relative to the proportion of the unexplained variance of the latent construct as argued by Chin (1998). In the literature, a specific formula is used to calculate the value of f^2 (Cohen, 2013; Ringle *et al.*, 2018; Ringle, Wende, & Will, 2005). The said formula is as follows:

$$\text{Effect Size } (f^2) = \frac{R^2 \text{ Included} - R^2 \text{ Excluded}}{1-R^2 \text{ Included}}$$

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The value of f^2 is also calculated directly using Smart-PLS 3. The different values of f^2 indicate the different effect sizes i.e. an f^2 value of 0.02 represents a small effect, 0.15 represents a medium or moderate effect while 0.35 signifies a strong effect of the particular latent construct on the endogenous latent construct (Cohen, 2013).

Based on the findings of the current study, the effect size of Illusion of Control is 0.013, Self-Attribution 0.027, Overconfidence 0.182, Past Investment Experience 0.020 and Information Availability 0.020. All the exogenous latest variables have a small f^2 on the endogenous latent variable (Herding Behaviour) except overconfidence. The values of f^2 of all the variables are given in Table 4.11.

Table 4.11
Effect Size (f^2) of the Latent Variables

R-Squared	f^2	Effect
Illusion of Control (IOC)	0.013	None
Self-Attribution (SA)	0.027	Small
Overconfidence (OC)	0.182	Medium
Past Investment Experience (PIE)	0.020	Small
Information Availability (IA)	0.020	Small

4.7 Assessment of Predictive Relevance (Q^2)

The value of the "Stone-Geisser's Q^2" was employed to assess the criterion of the goodness-of-fit or accuracy of projection (Geisser, 1974; Hair *et al*., 2016). The blindfolding process was implemented to estimate the Q^2 value. Usually, two different approaches are used for the estimation of the Q^2 value namely "cross-validated

communality" and "cross-validated redundancy". The cross-validated communality method shows only the scores of constructs assessed for the target endogenous variable (excluding the information about structural model) to anticipate the removed data points.

Meanwhile, the cross-validated redundancy (Q^2) procedure indicates the predictive relevance (Q^2) of both the measurement model (target endogenous construct) and the structural model (scores of the predictors constructs) of data prediction. Hence, this study consists of all the endogenous latent constructs in a reflective format; therefore, the method of blindfolding was applied specifically to the endogenous latent constructs.

A cross-validated redundancy assessment was employed to assess the predictive relevance (Q^2) (Chin, 2010; Hair *et al.*, 2013; Hair *et al.*, 2012; J. F. Hair *et al.*, 2012). According to Hair *et al.* (2014), the value of Q^2 is calculated by employing the blindfolding "to assess the parameter estimates". The Q^2 elucidates the quality of the overall model. A value of Q^2 higher than zero shows that the model has a predictive relevance (Henseler & Chin, 2010). Chin (1998) also recommended that the value of Q^2 should be higher than zero. In the context of the current study, the value of Q^2 is 0.267 i.e. greater than zero which shows that the model has a predictive relevance. The value of Q^2 is shown in Table 4.12.

Table 4.12
Construct Cross-Validated Redundancy (Predictive Relevance)

	SSO	SSE	$Q^2 = (1-SSE/SSO)$
Herding Behaviour	1,216.000	890.885	0.267

4.8 Testing Moderation Effect

This study examined the moderating effect of financial literacy by employing the Partial Least Squares (PLS) Structural Equation Modelling (SEM). The product indicator approach was applied through PLS-SEM for estimating and identifying the strength of financial literacy (Moderating Variable) on the relationship between self-attribution, illusion of control, overconfidence, past investment experience and information availability with herding behaviour (Chin *et al.*, 1997; Henseler & Sarstedt, 2013).

The product indicator approach was applied because it generates product indicators by producing all potential products from the two sets of indicators. These product terms are used to reflect the latent interaction variable (Rigdon, Schumacker, & Wothke, 1998). Moreover, "results of the product term approach are usually equal or superior to those of group comparison approach, we recommend always using the product term approach" (Henseler & Fassott, 2010) (p. 721).

Following the suggestion of Henseler and Fassott (2010), this study applied the product indicator method to estimate the moderating effects of financial literacy on the relationship between self-attribution, illusion of control, overconfidence, past investment experience and information availability with herding behaviour. For this purpose, there was a need to create product terms among the indicators of the moderating variable and the indicators of the independent variables, after which these terms were used as indicators of the interaction term within the inner model (Kenny & Judd, 1984).

Hypothesis 6a (H_{6a}) states that financial literacy moderates the relationship between illusion of control and the herding behaviour of individual investors. The finding of the analysis indicated that financial literacy significantly moderates the relationship between illusion of control and herding behaviour; thus, H_{6a} was accepted. As shown in Table 4.16 and Figure 4.11, the interaction terms representing illusion of control x financial literacy β = 0.086, t = 2.015 (t > 1.96), p = 0.044 (p < 0.05) is significant.

However, there is a need to investigate the moderating effect on the relationship between illusion of control and herding behaviour. According to West, Aiken, and Todd (1993), path coefficients were used for plotting the moderating effect of financial literacy on the relationship between illusion of control and herding behaviour. Consequently, this plotting showed that the moderating role of financial literacy strengthens the positive relationship between illusion of control and the herding behaviour of stock market investors. It also showed that financial literacy is one of the variables that can moderate the relationship between illusion of control and herding behaviour. This moderating effect is shown in Figure 4.6.
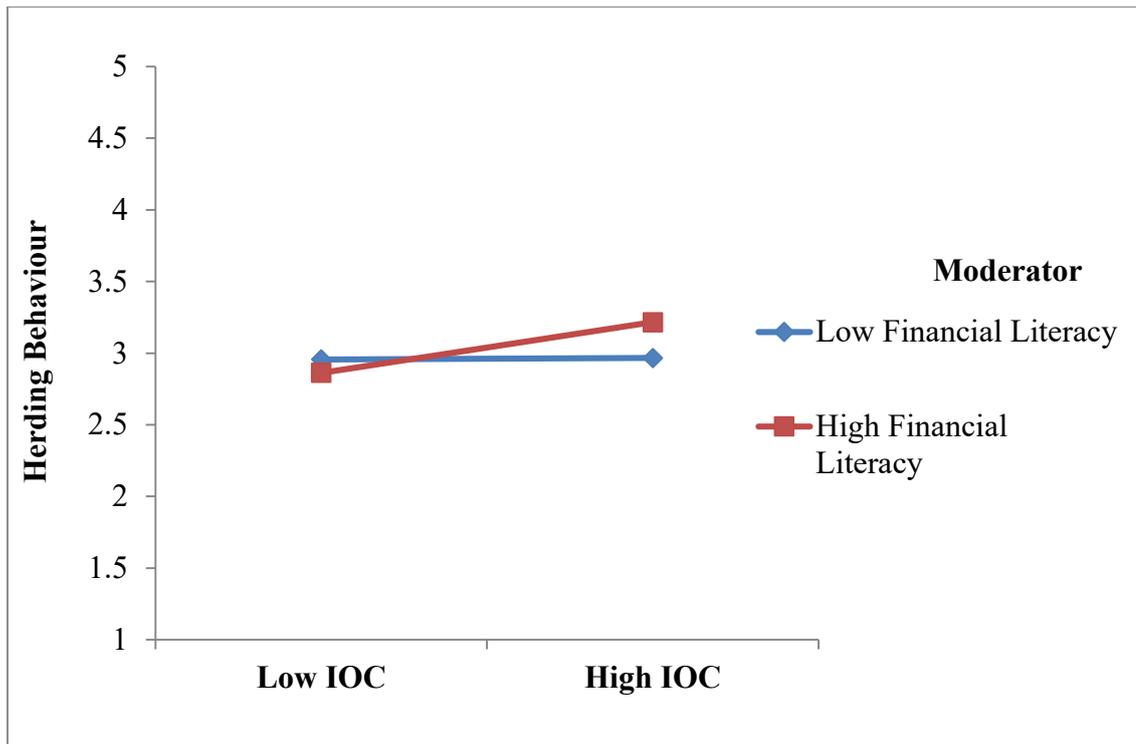
Figure 4.6
Interaction Effect of Illusion of Control (IOC) and Financial Literacy (FL) on Herding Behaviour (HB)

Hypothesis 6d (H6d) states that financial literacy moderates the relationship between past investment experience and the herding behaviour of individual investors. The result shows that financial literacy significantly moderates the relationship between past investment experience and herding behaviour. Additionally, $\beta = -0.111$, $t = 2.001$ ($t > 1.96$), $p = 0.046$ ($p < 0.05$) indicates that H6d was accepted. According to West *et al*. (1993), path coefficients were used for plotting the moderating effect of financial literacy on the relationship between past investment experience and herding behaviour. Subsequently, this plotting showed that the moderating role of financial literacy weakens the effect of past investment experience on the herding behaviour of stock market investors. This moderating effect is shown in Figure 4.7.
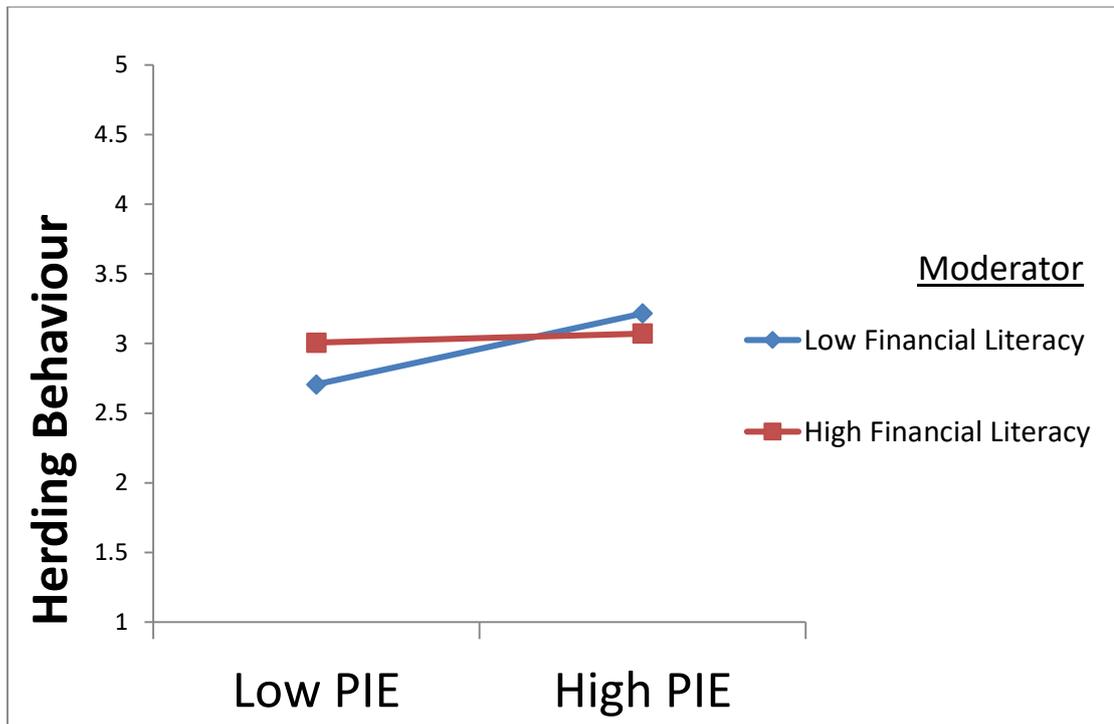
Figure 4.7
Interaction Effect of Past Investment Experience (PIE) and Financial Literacy (FL) on Herding Behaviour (HB)

4.9 Chapter Summary

The summary of findings presented the entire results with all the independent variables' effects and moderating effects. The summary of the entire results of all the tested hypotheses is reproduced in Table 4.13 below.

Table 4.13
Summary of All Tested Hypotheses

Sr. No.	Hypotheses Description	Decision
H_1	Illusion of control has a significant relationship with herding behaviour of individual investors.	Supported
H_2	Self-Attribution has a significant relationship with herding behaviour of individual investors.	Supported
H_3	Overconfidence has significant relationship with	Supported

	herding behaviour of individual investors.	
H$_4$	Past Investment Experience has significant relationship with herding behaviour of individual investors.	Supported
H$_5$	Information Availability has a significant relationship with herding behaviour of individual investors.	Supported
H$_{6a}$	Financial Literacy moderates the relationship of illusion of control with herding behaviour of individual investors.	Supported
H$_{6b}$	Financial Literacy moderates the relationship of self-attribution with herding behaviour of individual investors.	Not Supported
H$_{6c}$	Financial Literacy moderates the relationship of overconfidence with herding behaviour of individual investors.	Not Supported
H$_{6d}$	Financial Literacy moderates the relationship of past investment experience with herding behaviour of individual investors.	Supported
H$_{6e}$	Financial Literacy moderates the relationship of information availability with herding behaviour of individual investors.	Not Supported

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CHAPTER FIVE

DISCUSSION AND CONCLUSIONS

5.1 Introduction

This chapter provides the discussion on the results of the data analysis. The first section of this chapter presents a recap of the objectives and relates these to the findings. The second section desribes the disussion on findings. The subsequent section describes the implications of this study by taking into consideration the theoretical, methodological and practical perspectives. The fourth section reviews the limitations of this study and suggests potential directions for future similar research. Finally, it concludes the study by summarizing the obtained results.

5.2 Review of the Key Findings of the Study

This study examined role of investors' cognitive factors, past inestment experience and information availability on the herding behaviour of individual investors participating in the Pakistan stock market. Cognitive factors included illusion of control, self-attribution and overconfidence. This study also aimed at assessing the moderating role of financial literacy on the relationship between cognitive factors, past inestment experience and information availability with the herding behaviour of individual investors in the Pakistan stock market. The study attempted to fulfil six objectives. The first was to examine whether illusion of control affected the herding behaviour of individual investors in PSX. The second was to examine whether self-attribution influenced the herding behaviour of individual investors in PSX. Third was to examine the influence of overconfidence on herding behaviour of individual investors in PSX, followed by the fourth objective which was to investigate whether

past investment experience affected the herding behaviour of individual investors in PSX.

The fifth objective was to investigate whether information availability affected the herding behaviour of individual investors in PSX or not followed by the sixth objective which was to examine whether financial literacy moderated the relationship between investors' cognitive profile, past inestment experience and information availability with the herding behaviour of individual investors in PSX.

To achieve these objectives, six major hypotheses were formulated: (1) Illusion of control has a significant association with the herding behaviour of individual investors; (2) Self-attribution has a significant relationship with the herding behaviour of individual investors; (3) Overconfidence has a significant association with the herding behaviour of individual investors; (4) Past investment experience has a significant association with the herding behaviour of individual investors; (5) Information availability has a significant effect on the herding behaviour of individual investors; and (6) Financial Literacy moderates the relationship between investors' cognitive profile, past inestment experience and availability of information with the herding behaviour of individual investors.

The data was collected from individual investors participating in the Pakistan stock exchange for the assessment of the hypotheses of this study. A total of 540 questionnaires were distributed, but only 304 (56.29%) were used in the analysis. PLS-SEM was used to examine the data. The significance level of 0.05 was used as the critical level to accept or reject the hypotheses of the study. The results of the

partial least square (PLS) path modeling showed that illusions of control, self-attribution, overconfidence and past investment experience were significantly related to herding behaviour. Additionally, it was indicated that information availability was also significantly related to herding behaviour. Furthermore, illusions of control, self-attribution, overconfidence and past investment experience had positive associations with herding behaviour whilst information availability had negative associations with herding behaviour. The findings strongly supported the Social Learning Theory (SLT), which suggested that cognitive factors and culture affect the behaviour of investors.

Subsequently, the moderating role of financial literacy was investigated to determine the relationship between the cognitive factors, past investment experience and information availability with the herding behaviour of individual investors in the Pakistan stock market. The results indicated that financial literacy moderated the impact of illusion of control and past investment experience on herding behaviour, whereby the moderation was positive for illusion of control and negative for past investment experience. However, financial literacy did not moderate the relationship between self-attribution, overconfidence and information availability with herding behaviour.

5.3 Discussions

This section draws a discussion on the major findings of this study linked to the underpinning theories as well as conclusions from previous investigations. Moreover, this section discusses the results in more detail i.e. the direct relationship between illusions of control, self-attribution, overconfidence, past investment experience, and

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information availability with herding behaviour, while the next part is dedicated to discussions relating to the moderation results.

5.3.1 The Relationship between Illusion of Control and Herding Behaviour

The first objective of this study is to investigate whether illusion of control affects the herding behaviour of individual investors in PSX or not. This objective covers the first hypothesis (H_1) of the study. The results show that H_1 is accepted with a t-value of 2.338, p-value of 0.020 and β-value of 0.091 implying that illusion of control had a significant positive relationship with herding behaviour. An increase in illusion of control enhanced the level of herding behaviour among the individual investors. Thus, this study confirms that illusion of control is a significant predictor of herding behaviour among individual investors in PSX.

This result is in line with the prior study of Fernández *et al.* (2011). Thus, investors affected by illusion of control overstate their abilities and understate the role of luck (Langer, 1975; Metilda, 2015). Investors in the stock market collect information from various sources, where decisions of other investors are also a source of information (Holm & Rikhardsson, 2008). They assume that others are making rational decisions and that those decisions are based on the right and relevant information. This situation motivates them to herd the decisions of other investors. Bashir *et al.* (2014) also found that illusion of control affect the decision making ability of investors. Metilda (2015) and Lambert *et al.* (2012) also concluded that illusion of control promote herding behaviour among investors.

5.3.2 The Relationship between Self-Attribution and Herding Behaviour

The second objective of this study is to examine whether self-attribution influences the herding behaviour of individual investors in PSX or not. The findings of this study indicate that self-attribution has a significant positive influence on herding behaviour with a t-value of 2.948, p-value of 0.003 and β-value of 0.157 indicating that H_2 was accepted. An increase in self-attribution boosted herding behaviour among individual investors in the Pakistan stock exchange. This result is similar to the result of Nguyen and Schuessler (2012) and Mishra and Metilda (2015) who concluded that self-attribution causes changes in the confidence of investors that affect the behaviour of individual investors. Continuous poor decisions due to self-attribution lead to herding behaviour in the stock market (Galariotis, Rong, & Spyrou, 2015). Investors affected by self-attribution attribute success to their own actions and failure to other factors. Ultimately, losses of past investments also affect behaviour of individuals and lead them to herd the decision of others (Strahilevitz *et al.*, 2011). According to Choi and Lou (2010) and Doukas and Petmezas (2007), self-attribution affect the behaviour of investors more during bullish trends in the market. Investors affected by self-attribution follow market trends because they consider rising stock prices as their personal success. During peak time, these investors buy more because they are over optimistic (Nguyen & Schuessler, 2012).

5.3.3 The Relationship between Overconfidence and Herding Behaviour

The third objective of this study is to examine whether overconfidence affects the herding behaviour of individual investors in PSX or not. The results show that H_3 is also accepted with a t-value of 7.161, p-value of 0.000 and β-value of 0.420. This result indicates that overconfidence has a positive significant relationship with

herding behaviour in the context of individual investors participating in the Pakistan stock exchange. It was found that overconfidence played a significant role in enhancing herding behaviour among individual investors.

It also indicates that overconfidence is a precursor of herding behaviour in the context of the Pakistan stock market. This result is also in line with the study of Fernández *et al.* (2011) and provides additional evidence that overconfidence stimulates and enhances the herding behaviour of individual investors in stock markets in developing countries. Glaser and Weber (2007) and Barber and Odean (2013) argued that overconfidence is the key driver of the trading behaviour of investors. Overconfident investors have greater trust on the correctness of their assumptions, and these assumptions lead them towards irrational behaviour (Ricciardi & Simon, 2000).

The literature provided that most of individual investors do not have sufficient information for investment decision making, which leads them towards herding behaviour (Choi 2016). Literature also showed that overconfidence has a significant positive influence on information gathering from others (Mallouk, 2014; Merkle & Weber, 2011). Overconfident investors might behave surprisingly in the context of low-uncertainity. In this situation, investors assume that all other investors search for information in a rational manner for decision making purposes; consequently, they observe the behaviour of others when making investment decisions. This situation is usually observed in stock markets during bubbles (Fernández *et al.*, 2011).

5.3.4 The Relationship between Past Investment Experience and Herding Behaviour

The fourth objective of the current study is to investigate whether past investment experience affects the herding behaviour of individual investors in PSX or not. The results indicate that past investment experience has a significant relationship with herding behaviour with a t-value of 2.368, p-value of 0.018 and β-value of 0.144. These findings indicate that H_4 is accepted. It shows that past investment experience positively influences the herding behaviour of investors participating in the Pakistan stock exchange. It indicates that experienced investors are more prone to herding behaviour. Thaler (2010) argued that investors affected by past unsuccessful investments behave very carefully when they make their next investment decision because they do not want to repeat their mistake (Bauchner *et al.*, 2000).

According to Nofsinger (2005), investors become risk averse after facing financial loss in their previous investments. Consequently, they avoid risky investments and resort to herding the decisions of other investors (Nofsinger 2005). The findings of this study are in line with Gupta and Sharma (2011), who found that experience plays a significant role in investment decision making. Investors who faced losses in their past investment become risk averse and prefer to follow the guidelines of brokers and their colleagues. Mallouk (2014) also found that investors' past performance affect their behaviour and process of decision making in the stock market.

5.3.5 The Relationship between Information Availability and Herding Behaviour

The fifth objective of this study is to investigate whether information availability affects the herding behaviour of individual investors in PSX or not. The findings show that H_5 is also accepted with a t-value of 2.164, p-value of 0.031 and β-value of -

0.106. These results show that information availability has a significant relationship with the herding behaviour of individual investors participating in the Pakistan stock exchange. It showed that information availability negtively affecte herding behaviour of investors in the context of Pakistan stock exchange. These findings indicated that H_5 was accepted.

According to Epstein and Schneider (2008), the influence of availability of information on the behaviour of individual investors depends on the quality of information which in turn relies on the source of the information. Therefore, information received from trustworthy sources leads investors to rational investment decision making (Epstein & Schneider, 2008). Zeckhauser, Patel, and Hendricks (1991) argued that acquestion of less informationis a cause of herding the decision of others. Investors who less constrate on the acquestion of information have more tendency to follow the decision of others in their make investment decisions. Particularly, in the context of the Pakistan stock exchange, many rumours circulate in the market and in such a situation, investors may follow the prevailing market trend instated of collecting relevent information for investment decision making (Javaira & Hassan, 2015).

5.3.6 Moderation Effect of Financial Literacy

Finally, the last objective of the current study is to examine whether financial literacy moderates the relationship between investors' cognitive profile (illusion of control, self-attribution, overconfidence), information availability and past investment experience with the herding behaviour of individual investors in PSX. One main hypothesis and five sub-hypotheses were developed. In the case of illusion of control,

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financial literacy significantly moderates the relationship between illusion of control and the herding behaviour of individual investors with a t-value of 2.015, p-value of 0.044 and β-value of 0.086. Thus, H$_{6a}$ is accepted. Moreover, financial literacy weakens the positive relationship between illusion of control and the herding behaviour of individual investors. The findings indicate that individual investors affected by illusion of control consider the role of financial knowledge in making investment decisions.

The results are similar with Rooij *et al*. (2011) who argued that an individual's risk taking attitude depends on his level of knowledge about the rules and regulations of investment. Financial literacy significantly affect investment behaviour of investors (Volpe, Kotel, & Chen, 2002). Individuals with low financial literacy are more likely to demonstrate misperceptions over financial concepts and have more tendency to indulge in behavioural biases at the time of making investment decisions (Disney & Gathergood, 2013). Investors with substantial financial literacy exhibit rational behaviour and choose investment option after making proper analysis (Hayat & Anwar, 2016).

In the case of self-attribution, financial literacy does not moderate the relationship between self-attribution and the herding behaviour of individual investors. Moreover, there is no significant moderation effect of financial literacy between Overconfidence and herding behaviour. Therefore, H$_{6b}$ and H$_{6c}$ are not supported. The findings indicate that individual investors affected by self-attribution and overconfidence do not consider the important role of financial literacy in making investment decisions. This indicates that the influence of self-attribution and overconfidence are more

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crucial than that of financial literacy in influencing herding behaviour. Mishra and Metilda (2015) and Metilda (2015) argued that self-attribution increase with the increase of education level.

Furthermore, financial literacy moderates the relationship between past investment experience and herding behaviour with a t-value of 2.001, p-value of 0.046 and β-value of -0.111. Thus, H_{6d} is accepted. This indicates that financial literacy significantly moderates the relationship between past investment experience and herding behaviour. However, financial literacy weakens the positive relationship between past investment experience with the herding behaviour of individual investors.

According to Yoong (2011), the lack of financial knowledge has a negative impact on the performance of individuals in making financial decisions. Financial education provides numerous ways of handling the uncertain and risky situations in investment (Almenberg & Dreber, 2015). Al-Tamimi and Kalli (2009) also concluded that financial literacy is one of the most influential factors for investment decision making. Moreover, investors with higher financial knowledge prefer appropriate techniques for investment and have fewer tendencies to indulge in behaviour biases. In the case of information availability, financial literacy does not moderate the relationship between information availability and the herding behaviour of individual investors in the Pakistan stock exchange. Therefore, H6e is not supported.

5.4 Contributions of the Study

This study has significant theoretical, methodological and practical implications as discussed below.

5.4.1 Contributions to the Body of Knowledge

As discussed in Chapter 1, the contribution of this study lies in identifying multiple ways through which cognitive factors, past investment experience and information availability affect the herding behaviour of individual investors. Generally, this research study established the relevance of the prospect theory in illuminating the interaction between cognitive factors, past investment experience, information availability, financial literacy and the herding behaviour of individual investors in a single model. Indirectly, this study offers a new direction in research on the predictors of herding behaviour in the context of the Pakistan stock exchange.

The Prospect theory explains the behaviour of investors under uncertain and risky market situations (Altman, 2010). It explains that the behavioural biases affect the behaviour of investors in uncertain market situation (Ackert, 2014). This study found evidence of the application of the theory in the stock market of a developing country, whereby much of the work on the prospect theory and its implications have been conducted in the stock markets of developed countries which have greater information flow and better market mechanisms.

Implications of financial literacy on herding behaviour are also a less attended area in the literature. Further, its implications on a developing economy are less understood and lowly rated. This study showed that financial literacy could also limit irrational behaviour in the stock markets. This avenue further opens the directions for further

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research in the domains of behavioural finance, investment behaviours and financial decision making.

This study also found evidence in support of the social learning theory, which proposes a strong effect of cognition and past investment experience of individuals their behaviours, which on the other hand explains their investment behaviour in the market. This study has an important contribution in this regard. The role of past investment experience in the framework of the social learning theory is a relatively less studied avenue in the area of investment behaviour and rationality. This study provided empirical evidence in this regard for a developing country i.e. Pakistan.

This study also extends the notions of social learning theory, which proposes a shared sense of cognition among members of a society (Banerjee, 1992; Bikhchandani *et al.*, 1998). Individual irrationalities scale up to the macro level and disrupt the market functioning (Crockett, 1996; Mauboussin, 2002). The uncertain environment of the stock market affects cognition which ultimately explains behaviours in the stock market. Thus, this study contributes to a broad stream of theoretical spectrums including the prospects theory and social learning theory, and subsequently relates these theories of behavioural sciences to financial decision making.

Finally, the current study employed PLS path modeling to examine the psychometric properties of each of the latent variables. Most of the previous studies assessed only the traditional validation of the instrument such as the coefficient of Cronbach's alpha and factor analysis for the examination of reliability. But these analyses are unsatisfactory for achieving the existing needs of increasingly complicated analysis.

Therefore, PLS-SEM path modeling was applied to measure the discriminant and convergent validity. The reliability of every item, composite reliability and average variance extracted were examined to ensure convergent validity. Discriminant validity was determined through the comparison between the correlations of latent variables and the square root of AVE. Furthermore, this study applied the PLS-SEM path modeling to assess the association between the variables.

5.4.2 Practical Contribution

There are several implications of the current study for the Pakistan Stock Exchange (PSX), Securities and Exchange Commission of Pakistan (SECP), administrators, professionals and educators. Policymakers of PSX and SECP may also benefit from the findings of the current study. Some of the important implications are given below. Firstly, the findings indicate that cognitive factors are the most important elements for shaping the investment behaviour of individual investors. Investors indulge in irrational herding behaviour due to the influence of cognitive factors such as illusion of control, self-attribution and overconfidence. Moreover, availability of information is a crucial factor to shape investment behaviour of individual investors especially in the context of stock market. Low availability of information is a cause of indulging in irrational herding behaviour.

Practically, investors rely too much on technical analysis which is based on trends and relative predications. Influence of psychological and behavioural factors such as illusion of control, self-attribution and overconfidence is largely ignored. This study documents that psychological and behavioural factors play an important role in decisions pertaining to stock market investments. These factors not only hinder

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relational decision making of individual investors but also can be used to predict herd behaviour in the stock market. Appropriate investment strategies could be devised to use aggregate psychological behaviour of stock market participants to make money on irrationalities of other investors. Moreover, this study found a negative impact of information availability on herding behaviour of individual investors. Policymakers of Pakistan stock market should use the results of this study to improve information dissemination mechanism in stock market.

Secondly, the findings of this study suggested that financial literacy is one of the most important factors for investment decision making. Financial literacy can reduce the positive effect of illusion of control on the herding behaviour of individual investors and it can turn the positive effect of past investment experience into a negative effect. Therefore, as financial literacy is an important factor for investment decision making, it should be considered equally.

Thirdly, this study is equally important for PSX and SECP. It highlights that investors' cognitive profile contributes to irrational herding behaviour. Further, availability of information and financial literacy is also mandatory for rational investment decision making. PSX and SECP can spread awareness among investors regarding the significance of cognitive factors, past investment behaviour, information availability and financial literacy for investment decisions and its impact on their investments. They could offer training and counselling sessions on financial literacy particularly on the concepts of risk diversification, time value of money and portfolio management. This will provide protection to investors from irrational herding behaviour and will enable them to make proper analysis and adequate

investment decisions. Focus on financial literacy within the perspective of investment decision making is one of the effective ways to help investors reduce the risk of bearing losses due to herding behaviour. This can be attained by employing financial knowledge when making investment decisions. These efforts will definitely upgrade the level of financial literacy among the investors in Pakistan, which will help them in making better investment decisions.

The study has implications at the micro and macro level for individuals, policymakers, and the government. Poor financial literacy, low level of information availability, and cognitive factors may limit the capability of individuals to handle complex financial transactions which may obstruct the functioning and development of stock markets.

5.5 Limitations of the Study

The findings of the current study have some limitations that could be taken into consideration in future studies.

(i)   This study used a cross-sectional design approach because of the constraints of time and cost, causality cannot be inferred from the population.

(ii)   This study used a quantitative method. Therefore, responses given by the respondents may be biased. Moreover, results may be limited in a quantitative method as it provides numerical descriptions rather than detailed narrative.

(iii)   This study used self-reported measures for all the constructs. Self-reported measures may affect the feelings, behaviours, and attitudes of the respondents that were randomly selected. Thus, there is a probability of social desirability (Dodaj, 2012; Podsakoff *et al*., 2003). Although this study attempted to mitigate this issue by confirming anonymity and cleansing the scale items (Podsakoff *et al*., 2003), the probability of this problem to occur still exists.

(iv)   The findings of this study may not be generalized especially on individual investors outside of Pakistan. The characteristics of Pakistan individual investors may be unique and posed significant demographic differences compared to individual investors in other countries. Thus, any attempt to generalize the findings is considered to be less applicable.

5.6 Future Research Directions

(i)   Future researches may use a longitudinal design to test the theoretical body of the constructs over a longer period for responsive validation of the hypothesized associations of this study. Longitudinal research could add more worth to recognize the complex associations and the deviations that arise within a specified period of time.

(ii)   Researchers who wish to develop in-depth understanding of individuals' investment behaviour should consider a mixed research approach wherein quantitative and qualitative methods are used. Thus, in future research,

researchers may use a mixed method approach instead of quantitative approach to develop in-depth understanding.

(iii)   Future studies may benefit from the use of other approaches to examine the relationship between the cognitive factors, past investment experience and information availability with herding behaviour. Future studies may consider other moderator variables such as personality traits, social influence and risk perception besides financial literacy for better understanding of investors' behaviour.

(iv)   Future studies on herding behaviour could be conducted in various countries other than Pakistan. The data gathered from various countries will considerably help towards producing more generalizable findings. Therefore, this will significantly contribute towards the generalization of the findings.
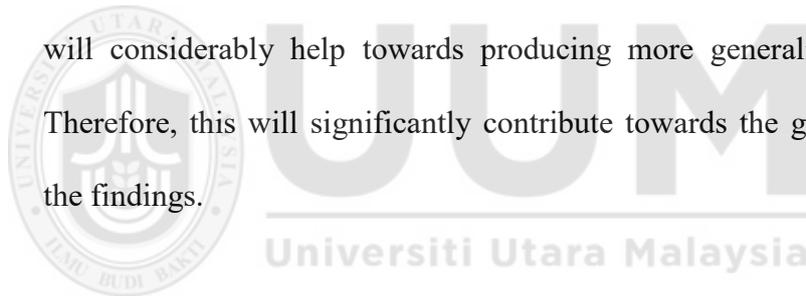
5.7 Conclusion

This study examined the relationship between cognitive factors (Illusion of control, self-attribution, overconfidence), past investment experience and information availability with the herding behaviour of individual investors participating in the Pakistan stock exchange. It also investigated the moderating role of financial literacy. Prospect theory and social learning theory were used as the basis to understand the theoretical relationships.

The research model of this current study had received much empirical support as all the research questions and objectives of this study had been successfully achieved and

a majority of the hypotheses were supported. Illusion of control, self-attribution, overconfidence and past investment experience were found to enhance herding behaviour among individual investors in the Pakistan stock exchange, while information availability lessens the herding behaviour among individual investors in the Pakistan stock exchange. Moreover, financial literacy moderated the relationship between illusion of control and past investment experience with herding behaviour.

The current study also provided some critical practical implications for the Pakistan Stock Exchange and the Security and Exchange Commission of Pakistan. Additionally, numerous future research directions were suggested by drawing upon the limitations of the study.

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APPENDIX 1

Questionnaire

SCHOOL OF Economics, Finance and Banking
College of Business (COB)
UNIVERSITI UTARA MALAYSIA

Dear Respondent,

I am a PhD student from University Utara Malaysia, conducting a research entitled **"Determinants of Herding Behaviour: A Study on Individual Investors of Pakistan Stock Exchange".** The prime objective of this study is to highlight the impact of investors' cognitive profile past investment experience and information availability on herding behaviour and role of financial literacy in Pakistan stock market.

The questionnaire contains questions on financial literacy, investment behaviour and investors' cognitive profile. Although I am not asking you for any sensitive personal information, complete confidentiality is assured with this survey. The information that you provide me will be used in aggregate form only. All information supplied in this Questionnaire will not be used for any other purposes except those of this research project.

Questionnaire should take only 20 to 30 minutes of your valuable time to complete. Please complete this this questionnaire as incomplete questionnaire creates difficulties for data analysis. Your cooperation and participation in this research are greatly appreciated. Every response given is important as it determines the success of this research.

Thank you very much for your kind co-operation and assistance.

Yours sincerely,
Saeed Ahmad Sabir
Universiti Utara Malaysia
E-mail:sasabir422@gmail.com
Ph # +923004474184

Determinants of Herding Behaviour: A Study on Individual Investors of Pakistan Stock Exchange
Questionnaire

A PhD research Survey

> This questionnaire has three sections, A-C. Please answer all the questions. There is no right or wrong answer. Your spontaneous and honest response is important to the success of this research.

> *Section A: Demographic Information*
> The questions below are related to personal data. Please **TICK** one box which is best applicable to you.

Gender ☐ Male ☐ Female

Age (Years old) ☐ Up-to 25 ☐ 26-35 ☐ 36-45

☐ 46-55 ☐ Over 55

Education Level ☐ Matriculation ☐ Intermediate ☐ Bachelor

☐ Master ☐ PhD ☐ Others _____

Monthly Income ☐ Below Rs.50,000 ☐ Rs.50,000-100,000

☐ Rs.100,001-150,000 ☐ Above Rs.150,000

Rate
1USD\$ = 110PKR
2USD\$ = 220PKR

Marital Status ☐ Single ☐ Married ☐ Divorced

Occupation ☐ Finance-Related ☐ Others

Herding Behaviour

1	HB1	I invest in financial products (Stocks and bonds) by following my friend's investment decisions.	1	2	3	4	5
2	HB2	I buy the securities whose prices have risen for a period.	1	2	3	4	5
3	HB3	I buy financial products that are highly sought by other investors.	1	2	3	4	5
4	HB4	I follow the market trends to trade in stock market.	1	2	3	4	5

Illusion of control

5	IOC1	I believe I can anticipate investment risk.	1	2	3	4	5
6	IOC2	My valuations are highly accurate regarding stock investment.	1	2	3	4	5
7	IOC3	It is easy for me to focuses on my investment objectives.	1	2	3	4	5
8	IOC4	Whatever happens in my stock investment, I believe I could handle it.	1	2	3	4	5
9	IOC5	I feel that I am able to exert control over my stock investments.	1	2	3	4	5

Self-Attribution

10	SA1	I used to seek information related to my stock investment in order to help me in confirming that my investment decision was right.	1	2	3	4	5
11	SA2	When I made a profitable stock investment, I believe that it is due to my investment skills.	1	2	3	4	5
12	SA3	The proceeds from my previous profitable investment will be used immediately for the next investment.	1	2	3	4	5
13	SA4	I think external uncontrollable factors are reasons of my less successful investment.	1	2	3	4	5
14	SA5	My unsuccessful investments are due to external uncontrollable factors.	1	2	3	4	5

Overconfidence

15	OC1	I am an experienced investor.	1	2	3	4	5

16	OC2	I feel that on average my investments perform better than the other investors.	1	2	3	4	5
17	OC3	I expect my investments to perform better continuously.	1	2	3	4	5
18	OC4	Knowledge and information that I have are enough to assist me in my investment decision.	1	2	3	4	5
19	OC5	I feel more confident in my own investment opinions over opinions of financial analysts.	1	2	3	4	5
20	OC6	My knowledge and investment opinions are better compared to my friends and colleagues.	1	2	3	4	5

Past Investment Experience

21	PIE1	I tried to avoid investing in companies with a history of poor earnings.	1	2	3	4	5
22	PIE 2	I rely on past investment performance to buy stocks because I believe that good performance will continue.	1	2	3	4	5
23	PIE 3	Good stocks are firms with past consistent earnings growth.	1	2	3	4	5
24	PIE 4	The past performance record of a company's stock will be well considered before any decision to include the stock in my investment portfolio could be made.	1	2	3	4	5
25	PIE 5	I am more concerned about a huge loss in my stock than missing a substantial gain (profits).	1	2	3	4	5
26	PIE 6	I am more concern on capital loss rather than investment returns as a whole.	1	2	3	4	5

Information Availability

27	IA1	I get information frequently regarding the evaluation of stock market indexes and stock prices.	1	2	3	4	5
28	IA2	I acquire investment related information from specific reports e.g. specialized press and the stock exchange bulletin.	1	2	3	4	5
29	IA3	Friends or family are among the main source of information for my investment activities.	1	2	3	4	5
30	IA4	I acquire investment related information from other newspapers, television, radio and	1	2	3	4	5

		online feeds (Social media).					
31	IA5	I do not have much problem in obtaining any information related to my investment portfolio.	1	2	3	4	5
32	IA6	I expect investment related information to be on timely basis.	1	2	3	4	5

Section C

Please tick the appropriate box according to best of your knowledge.

C1: General Financial Literacy (GFL)

GFL1	Suppose you had Rs.100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?	More than Rs.102	Exactly Rs.102	less than Rs.102	Do not know	Lack of information for me to decide
GFL2	Suppose you had Rs.100 in a savings account and the interest rate is 20% per year and you never withdraw your money or any interest incomes. How much would you have on this account in total after 5 years?	More than Rs.200	Exactly Rs.200	less than Rs.200	Do not know	Lack of information for me to decide
GFL3	Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?	More than today	Exactly the same	Less than today	Do not know	Lack of information for me to decide
GFL4	Assume a friend inherits Rs.10,000 today and his sibling inherits Rs.10,000, 3 years from now. Who is richer because of the inheritance?	My friend	His sibling	They are equally rich	Do not know	Lack of information for me to decide
GFL5	Suppose that in the year 2010, your income has	More than today	The same	Less than today	Do not know	Lack of information for me to

doubled and prices of all goods have doubled too. In 2010, how much will you be able to buy with your income?					decide

C2: Stock Investment Knowledge (SIK)

SIK 1. Which of the following statements describes the main function of the stock market?

1. The stock market helps to predict stock earnings

2. The stock market results in an increase in the price of stocks

3. The stock market brings people who want to buy and sell stocks together.

4. None of the above

5. Do not know

SIK 2. Which of the following statements is correct? If somebody buys the stock of firm B in the stock market:

1. He owns a part of firm B

2. He has lent money to firm B

3. He is liable for firm B's debts

4. None of the above

5. Do not know

SIK 3. Considering a long time holding period (for example 10 or 20 years), which financial asset normally gives the highest return during normal economic conditions?

1. Savings certificates

2. Bonds

3. Stocks

4. Do not know

5. Lack of information for me to decide

SIK 4. Normally, which of the financial assets displays the highest returns fluctuations over time?

1. Savings certificates

2. Bonds

3. Stocks

4. Do not know

5. Lack of information for me to decide

SIK 5. When an investor allocate his/her money among different assets, the risk of losing money -------------

1. increases

2. decreases

3. remain unchanged

4. do not know

5. Lack of information for me to decide

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APPENDIX 2

Summary of Literature Review

Previous Studies	Variables	Results
(Fernández *et al.*, 2011), (Kutchukian, Jr & Dana, 2013), (Filip, Pochea, & Pece, 2015), (Kumar & Goyal, 2016), (Zafar & Hassan, 2016)	Herding Behaviour	• Information availability and investors' cognitive profile significant relationship with herding behaviour
(Fellner-Röhling, 2004), (Lambert, Bessière & N'Goala, 2012), (Qadri & Shabbir 2014), (Metilda, 2015), (Bakar & Yi, 2016)	Illusion of Control	• Positive impact on herding behaviour • Negative impact on investment decision making
22(Dorn & Huberman, 2005), (Doukas & Petmezas, 2007), (Choi & Lou, 2010), (Fernández et al., 2011), (Nguyen & Schuessler, 2012), (Hoffmann & Post, 2014), (Mishra & Metilda, 2015)	Self-Attribution	• Negative impact on herding behaviour • Positive impact on investment decision making
(Sadi et al., 2011), (Merkle & Weber, 2011), (Bernardo & Welch, 2001), (Fernández et al., 2011), (Fisher & Dellinger, 2015), (Choi, 2016)	Overconfidence	• Positive impact on herding behaviour • Negative impact on investment decision making.

| (Thaler, 2010), (Nofsinger, 2017), (Strahilevitz, Odean, & Barber, 2011), (Fernández *et al.*, 2011), (Gupta & Sharma, 2011), (Mallouk, 2014)	Past Investment Experience	- Positive impact on herding behaviour - Negative impact on investment decision making.
(Abreu & Mendes, 2012), (Peress, 2003), (Epstein & Schneider, 2008), (Fischer & Gerhardt, 2007), (Ivković & Weisbenner, 2007), (Fernández *et al.*, 2011), (Tauni, Fang & Yousaf, 2015)	Information Availability	- Negative impact on herding behaviour - Positive impact on investment decision making
(Al-Tamimi & Kalli, 2009), (Yoong, 2010), (Giesler & Veresiu, 2014), (Shafi, 2014), (Jain *et al.*, 2015), (Hayat & Anwar, 2016)	Financial Literacy	- Negative impact on herding behaviour - Positive impact on Risk taking behaviour
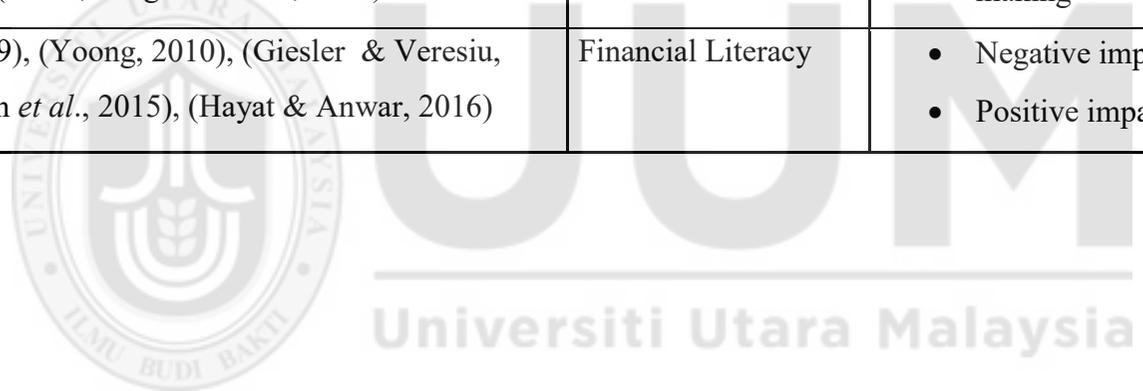
APPENDIX 3

Normality of the Data

Descriptive Statistics									
	N	Min	Max	Mean	Std. Dev	Skewness		Kurtosis	
	Statis	Statis	Statis	Statis	Statis	Statis	Std. Error	Statis	Std. Error
OC	304	1.00	5.00	3.9611	.73299	-.648	.140	.377	.279
IOC	304	1.20	5.00	4.0136	.35060	-.294	.140	-.312	.279
SA	304	1.00	5.00	4.0894	.93318	-.935	.140	.076	.279
IA	304	1.00	5.00	3.9127	.81521	-.678	.140	.182	.279
PIE	304	1.00	2.67	1.7223	.49423	-.213	.140	-1.159	.279
HB	304	1.00	5.00	3.8799	.79076	-.650	.140	.349	.279
FL	304	1.00	10.00	4.4849	2.26595	.444	.140	-.868	.279
Valid N (listwise)	304								

APPENDIX 4

Output of G*Power
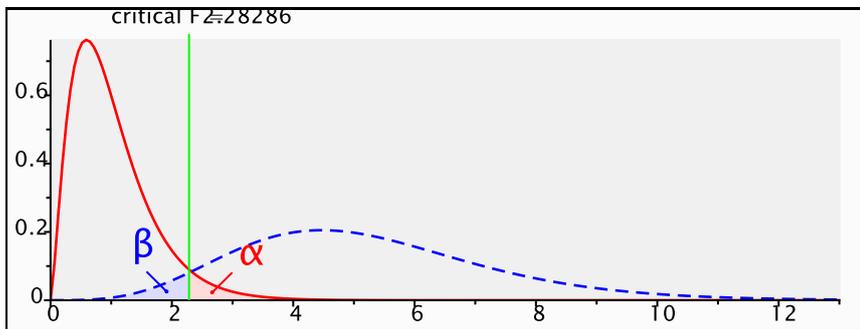
F tests − Linear multiple regression: Fixed model, R^2 deviation from zero

Analysis:	A priori: Compute required sample size		
Input:	Effect size f^2	=	0.15
	α err prob	=	0.05
	Power (1−β err prob)	=	0.95
	Number of predictors	=	6
Output:	Noncentrality parameter λ	=	20.7000000
	Critical F	=	2.2828562
	Numerator df	=	6
	Denominator df	=	132
	Total sample size	=	138
	Actual power	=	0.9507643