Asian Academy of Management Journal, Vol. 28, No. 2, 1–28, 2023

INVESTOR BEHAVIOUR AND INVESTMENT DECISIONS: EVIDENCE FROM PAKISTAN STOCK EXCHANGE

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Published online: 6 December 2023

To cite this article: Ali, M., Ansari, N. H., Chishty, B. A., Puah, C-H., & Ashfaq, M. (2023). Investor behaviour and investment decisions: Evidence from Pakistan Stock Exchange. *Asian Academy of Management Journal*, *28*(2), 1–28. https://doi.org/10.21315/aamj2023.28.2.1

To link to this article: https://doi.org/10.21315/aamj2023.28.2.1

ABSTRACT

This research aims to understand the influence of behavioural factors on investment decisions in the Pakistan Stock Exchange (PSX). This study gathered primary data using a survey-based questionnaire from 318 individual investors. The issue being investigated in this study is how behavioural elements, such as sentiment, overconfidence, over- and under-reaction, and perceived market efficiency, affect investment choices made on the PSX, with a particular emphasis on the limited predictive power of herd behaviour. The sample data were analysed using partial least square-structural equation modelling (PLS-SEM) based approach. Results indicate that financial knowledge, sentiment, overconfidence, over- and under-reaction, and perceived market efficiency significantly affect the investment decision. Interestingly, herd behaviour does not play a significant role in predicting investment decisions. However, we are certain that this study will provide a better understanding of the relationship between behavioural factors and an investor's investment decision in Pakistan.

Keywords: investment decision, sentiment, financial knowledge, perceived market efficiency, Pakistan

INTRODUCTION

The financial markets have observed a sharp increase in the discrete participation of investors (Calvet et al., 2016). Some of the main reasons behind this rise are: first, the flexibility of the financial market instruments means that the investors can quickly liquidate their funds that are already invested in the market; second, the diversity of the market helps investors to find a combination of assets that are suitable for their investment goals; third, the exceptional profitability in the financial markets due to behavioural aspects of investors (Clark-Murphy & Soutar, 2004). In this context, Chun and Ming (2009) and Rubaltelli et al. (2010) highlighted the importance of investment decisions in the stock market. They further argued that investment decisions have always been a debatable topic that demands balanced thinking and a clear understanding of investor behaviour. According to the NATIXIS (2016) survey (which gathered information from 7,100 individual investors about their views and understanding of the financial markets), 32% of investors are unable to understand or recognise their investment objectives and about 30% of investors twisted their views on the advice of their financial experts. The survey also revealed that general investors are misinterpreted, misguided, and disagree with what they expect and what they get. Therefore, it is a compulsory requirement of the time to highlight the factors that an individual can take to make their investment plan in the stock market.

Moreover, investors' investment choices are influenced by their awareness, previous experiences, historical performance, and expectations (Cohen & Kudryavtsev, 2012). Individual investors are more inclined toward behavioural preferences when they trade in the market, and because of these preferences, they make mistakes while trading (Chen et al., 2007). However, the market may react in an unfavourable direction due to incorrect investment choices and leave inefficient or unproductive sentiments for investors. Consequently, the prices in the stock market decline suddenly, and the flow of capital starts moving from the stock market to other investment choices such as real estate. This situation abruptly causes the removal of many investors to consider the effect of behavioural factors on investors' decisions and reactions (Ngoc, 2014).

Earlier studies mainly focused on the methods of investment that maximise the return and minimise the risk for investors in the financial market (Fama, 1965; Lintner, 1965). The findings from past studies suggested that emotional and psychological factors such as fear, financial literacy, sentiments, arrogance or overconfidence, investor perception about the market and greediness also contribute to the investment decision-making process (Al-Tamimi & Kalli, 2009;

Daniel et al., 1998; Lo et al., 2005; Metawa et al., 2019; Shah et al., 2018; Shefrin, 2002; Statman et al., 2006). Moreover, financial experts generally make mistakes because of their behavioural factors and decline in the value of an investment in the market (Baker & Nofsinger, 2002; Muhammad & Maheran, 2009). As a result, markets react inefficiently due to behavioural factors and decision errors, hence the value of investments deviates from its fundamental assumptions (Shefrin, 2006). It is also a noteworthy point that the behavioural factors of an investor, such as over- or under-reaction, perceived market efficiency, heard behaviour, and limited market knowledge, could be the reason behind market inefficiency (Ajmal et al., 2011; Metawa et al., 2019; Shah et al., 2018). These arguments have allowed researchers to explore different behavioural factors that may influence investor decisions while investing in the stock market.

Most of the past studies in behavioural finance mainly focused on the Western perspectives, which cannot be generalised to Asian countries to show the implementation of the results in the Asian markets. This is because of the differences in business, social, and cultural environments. The concentration of most of the studies inclined more towards the well-developed financial market. During our literature search, we found limited empirical that examines the behavioural components of investors in Asian markets. This study helps to fill this knowledge gap in the behavioural finance literature by focusing on how investors' behavioural factors influence investment decisions, particularly in a country like Pakistan. The fundamentals of developing countries like Pakistan are very much different from developed countries. The Pakistan Stock Exchange (PSX) is the preferred choice among investors in Pakistan. The PSX is considered the biggest stock market in stock trading, investment, and profits. It was established in 2016 after the merger of three major stock exchanges in Pakistan: Lahore, Islamabad, and Karachi stock exchanges. The PSX was classified by The Financial Times Stock Exchange (FTSE) as a secondary emerging market, while it was reclassified as an emerging market in Morgan Stanley Capital International (MSCI). Due to the PSX's fame, many foreign and local investors are part of daily stocks trading. Like other stocks markets, PSX also shows bullish and bearish trends according to the market situations. The perception and attitudes of Pakistani investors are also different from developing countries; therefore, this study made its unique contribution to the existing literature on behavioural finance. The goal of the current research is to produce new and insightful knowledge about the elements that influence investor behaviour and the investment decisions they make. The primary focus of this study is to determine how investor attitude, overconfidence, over- and under-reaction, herd behaviour, perceived market efficiency, and financial understanding affect investment choices inside the Pakistan Stock Market. Since the PSX is the backdrop for our study, it is our purpose to examine how these

behavioural characteristics affect investment choices. Therefore, the present study intended to pursue the answer to the following question:

RQ: How well can we predict investment decisions using the behavioural factors of an investor?

Moreover, we feel this study is relevant to the current scenario because the idea of behavioural finance is relatively new as compared to the other finance-related theories. We also considered the concept of behavioural finance as an important domain for developing countries to identify the factors that influence an investor's investment decisions. On the other side, behavioural finance's application in the stock market is very limited in developing financial markets. Therefore, this study is contributed to validating the appropriateness of using behavioural finance for the Asian financial markets. This study will support the investors and financial experts in the stock market because it develops awareness about the contribution of behavioural factors made in the investment decision. This will lead them to consider the behavioural factors that cause irrational decision making, and they can take corrective measures to ensure more rational decision making. Lastly, this study is also beneficial for the regulatory bodies and policymakers in the stock market and assists them in visualising the tools and various behavioural characteristics that impact an investor's decision.

LITERATURE REVIEW

Theoretical Background

This study draws the research phenomenon using two well-established theories: prospect theory and heuristics theory. Kahneman and Tversky (1979) developed the prospect theory and stated that individuals consider final outcomes while making a decision instead based on gains and losses. The theory also posits that people generate reference points to make important decisions. In this regard, people's behaviour varies to value gains and losses due to the value created by the reference point. The prospect theory explains that people allocate different values to gains and losses while making decisions rather than considering the final outcome. On the other side, heuristics theory suggests that people tend to use heuristics in uncertain situations to avoid the risk of losses. In other words, heuristics are the set benchmarks used in uncertain and complex problems by individuals to make decisions (Brabazon, 2000; Ritter, 2003). Heuristics help individuals reduce risk under difficult situations and better forecast future scenarios (Kahneman & Tversky, 1974). The heuristics component also supports people in making quick

decisions on the available information. Waweru et al. (2008) highlight those heuristics become relevant when time is limited and increase the probability of biases [Kahneman & Tversky, 1974, as cited in Waweru et al. (2008)].

Investment decision-making is a complicated process that is based on several behavioural factors. Investors not only evaluated the available resources but also considered market-specific situations (Mathews, 2005). The decision-makers required comprehensive market knowledge to get maximum returns against the investments (Kannadhasan, 2015). There has been an increasing number of literatures on investment decisions in recent years. However, studies conducted by Waweru et al. (2014), Evans (2006), and Kahneman and Tversky (1979) indicate that emotional, psychological, and behavioural factors stimulate financial decision-making. Investors' behaviour dominates the field of behavioural finance. This field also focuses on the psychological aspects of investors in taking financial decisions (Ritter, 2003). Investors initially invested through the support from angel investors like friends, family, and social interactions. Sometimes this social influence leads to irrational decision-making by the investors and results in financial losses (Shiller, 2003). Combrink and Lew (2020) examine the relationship between overconfidence, underdog, and risk propensity. The study found that overconfidence is a common factor generally available among investors. Kathiravan et al. (2021) assess the relationship between investor moods and weather factors. Their results indicate that emotional sentiments play a significant role in investors' decision processes. Finally, Naveed et al. (2020) investigate the information (financial and non-financial) role to predict investors' decisions. Results suggest that information builds a corporate reputation that further influences investors' decision behaviour. Filiz et al. (2019) analyse the role of emotions in the herd behaviour of investors. The findings indicate that a neutral mood of an individual generally favours herd behaviour. Therefore, it is important to explore behavioural factors that cause investment decisions.

Hypotheses Development

Financial knowledge

Financial knowledge is the information related to investment and financial markets gathered from different sources of learning. It can be categorised into two major components: (1) the objective category of financial knowledge, and (2) the subjective category of financial knowledge (Wang, 2009). Knowledge acquisition is related to objective financial knowledge, whereas increasing reliability of the prevailing knowledge is acquired from subjective financial knowledge (Alba & Hutchinson, 2000). This phenomenon can be further explained as the actual

knowledge is related to objective knowledge, while the degree of confidence in the existing knowledge is related to subjective knowledge (Brucks, 1985). In this context, objective knowledge is superior and accurate to subjective knowledge (Wang, 2009). Klapper et al. (2015) explored financial knowledge based on four financial components such as risk diversification, numeracy, compound interest, and inflation. Financial knowledge application increases with the increase of financial products in the financial markets. In past studies, it has been concluded that a lack of financial knowledge ended in high debts and even bankruptcy (Lusardi & Tufano, 2015; Lusardi & Scheresberg, 2013). On the contrary, an investor with more financial knowledge is better in terms of financial assets and portfolio management. They are more inclined toward risk diversification and end with more returns against their financial investments (Abreu & Mendes, 2010; Clark et al., 2014). Based on the past literature, this study formulates the following hypothesis:

H1: Financial knowledge will have a positive influence on investment decisions.

Herd behaviour

Herd behaviour explains an individual act to make decision based on the choice of other individuals or groups. Herd behaviour has both positive and negative outcomes. Sometimes investment managers left their own designed strategy, followed the other's approach, and attained good market returns. Scharfstein and Stein (1990) presented a theoretical framework that the fund managers follow others rather than their investment strategies to mitigate the risk of losses. Bikhchandani and Sharma (2000) introduced the framework of information cascade. They elaborated that investors tend to follow the herd behaviour and rely on other information in adapting trading strategies to avoid future uncertainty due to susceptibility to depend on their own private and public information. Moreover, Hirshleifer's (2001) study also supported the approach that following the others created more sense of comfort for investors. In the PSX context, Anum and Ameer (2017) studied the relationship between performance and decision-making of investors with behavioural factors. They found that behavioural variables of herding, heuristic, market, and prospect positively influence investment decisions. Agarwal et al. (2011) investigated the effect of herd behaviour in the brokerage firm of the Indonesian market. They concluded that both local and foreign investors follow herd behaviour based on empirical evidence. Both individual and institutional traders also follow even herd behaviour. However, Clarke et al. (2014) research found contradictory findings, argued that institutional herd behaviour leads to price destabilisation in the short term. Nofsinger and Sias (1999) examined

the relationship of herding time frame returns on institutional ownership changes based on monthly returns over the sample period from 1975 to 1994. The results concluded that institutional investors are more likely influenced by herd behaviour rather than the firm's returns on investment. Thus, this research hypothesised the following hypothesis:

H2: Herd behaviour will have a positive influence on investment decisions.

Sentiment

Investor sentiment refers to an individual perspective and belief about discount rates and cash flows of financial markets that are against key fundamental concepts (Baker & Wurgler, 2006). In stock trading, a high degree of investor sentiment influences stock prices in the market (Black, 1986). Qiang and Shu-e (2009) examined the relationship between stock price and investor sentiment using noise trading theory proposed by De Long et al. (1990). They concluded that stock price is dependent on investor sentiment. Similarly, investment sentiment is also connected with investors' self-evaluation about the discount rate or future cash flows (Baker & Wurgler, 2006). These self-beliefs are also addressed in the sentiment hypothesis (Black, 1986). Lee et al. (1991) advocated that the investor's investment is an important element in understanding investment behaviour. Ben-Rephael et al. (2012) investigated the relationship between returns and changes in equity funds. They found positive relationships between the variables in the short term. The results also concluded that noise in the aggregate market is dependent on investor sentiments. Brown and Cliff (2004) examined short-term returns with investor sentiment. They focused on market aggregates and survey instruments for getting the respondent's data. The study concluded a positive correlation between investment sentiments and market returns. Similarly, Mian and Sankaraguruswamy (2012) found that the stock price movement is sensitive to investor sentiment. Their study found a positive association between stock price and good earning news. It was also concluded that the period of high sentiment shows more positive signs than the low sentiment period. Kling and Gao (2008) examined the connection between market returns with institutional investor sentiment and found that the behaviour of investors followed positive feedback in a short period. It is also argued that the positivity of the historical market returns created a positive impact on institutional investment. Hence, this study postulates the following hypothesis:

H3: Sentiment will have a positive influence on investment decisions.

Overconfidence

Overconfidence in stock trading explains an individual behaviour that underestimates risk, overestimates investment knowledge and individual skills (Metawa et al., 2019). Most of the studies in behavioural sciences indicated that individuals failed to calculate the risk assessment in making financial investment decisions. Sometimes they overestimate the investment returns and underestimate the chances of losses or failure (Dittrich et al., 2005; Hirshleifer et al., 2012). Alquraan et al. (2016) studied the behavioural factors and found that overconfidence, perception and loss averse have a significant impact on the investor's decision-making in the Saudi stock market. Wang (2009) investigated the relationship between high risk-taking and overconfident investors. The study concluded that overconfident investors made good returns even in the high-risk market. It is also highlighted that pessimistic investors did not get enough returns in the large risk-taking scenario. Hilary and Menzly (2006) found that investors who accurately forecasted the market trend have greater chances of being overconfident and getting more financial returns. Pikulina et al. (2017) explored the phenomenon of overconfident investors and found that investors' overconfidence leads to more investment whereas unconfident investors failed to take huge risks and lead to underinvestment. In the Turkish financial market, Tekçe et al. (2016) examined the factors of familiarity bias, status quo, representativeness heuristic, and overconfidence among Turkish investors. The study provided a significant relationship between familiarity bias and overconfidence behaviour. It was also found that investors with less education and income background and lower portfolio value showed a high level of overconfidence behaviour. Therefore, this research suggests the following hypothesis:

H4: Overconfidence will have a positive influence on investment decisions.

Over- and under-reaction

In financial markets, the over- and under-reaction refers to an investor's behaviour to over-react and under-react to unexpected information. De Bondt and Thaler (1985) explain that unforeseen news in the market systematically encourages investors to over-react and violate market performance. In recent literature, the over- and under-reaction behaviour of the investor has been a centre of debate among researchers (Metawa et al., 2019). Lakonishok (1994) examined the relationships between firms earning growth with book to market equity ratio, cash flow to price ratio and earnings to price ratio. They concluded that market over-reaction due to past growth is also linked with market performance. Hong and Stein (1999) adapted both an over-reaction and under-reaction model. The

study concluded that the stock market under-reacts due to the dissemination of steady information among the investors. Additionally, markets over-react in the long term due to arbitrage attempts by the investor. Kaestner (2006) performed a comparative analysis of current and past earnings shocks of stocks from 1983 to 1999. The findings concluded that investors showed under-reaction behaviour to earnings announcements in a short-term period, while over-reaction behaviour is shown in the long term against highly unexpected earnings. Hence, this study formulates the following hypothesis:

H5: Over- and under-reaction will have a positive influence on investment decisions.

Perceived market efficiency

The concept of market efficiency was proposed by Fama (1970), suggesting that the financial markets are efficient. More precisely, market efficiency explains the concept of stock prices and t he inf ormation associated with the stocks in financial markets (Fuentes, 2011; Malkiel, 2003). The argument is that the markets are efficient and the security prices reflect all available information (Fama, 1998; Lo, 2007). The assumptions made by Fama (1998) are known as the "efficient market hypothesis" (EMH). The EMH framework has three market efficiency forms: (1) weak form of market efficiency (the past stock returns and prices reflect future returns and prices), (2) semi-strong form of market efficiency (security prices reflect both publicly available information and historical information), and (3) semi-strong form of market efficiency (the security prices reflect all available information both public and private). Moreover, the EMH assumes that financial investors and decision-makers act rationally to earn abnormal profits (Ritter, 2003). Similarly, Shiller (2003) suggests that investors use an integrated form of information while making investment decisions. Shah et al. (2018) argued that investors do not entirely hold rational theory assumptions because they are also influenced by certain behavioural factors such as emotions, mood, and beliefs. Additionally, investors cannot remain in a state of being rational for a more extended period and reject the assumptions of the traditional theory of finance (Shah et al., 2012). On the same token, market efficiency is one of the most important tools of financing (Fama, 1970). It also represents financial market behaviour (Sewell, 2011). This implies that the price in the stock market does not hold its value but also represents available market information (Aguila, 2009; Fuentes, 2011; Malkiel, 2003). Investors' perception is that the financial markets generate both efficiency and inefficiency sentiments that cannot be anomalous all the time (Pompain, 2006). Due to this, investor perception plays an important role in understanding their investment decisions. In this context, Hayat et al. (2010)

argued that the investors are regarded as consistent, rational, make profitable decisions, unbiased, without considering emotional and psychological effects. Shah et al. (2018) shed light on the investor perception about market efficiency and report a negative association between investor biases and perceived market efficiency. Thus, this research articulates the following hypothesis:

H6: Perceived market efficiency will have a positive influence on investment decisions.

Investment decision

The core objective of the investor is to get maximum returns against the investments (Sharpe, 1964). Investment decisions are difficult to perform in isolation and require adequate financial knowledge (Merton, 1987). In behavioural finance, past studies examined investment decisions in several dimensions due to different study settings, such as anomalies (Ajmal et al., 2011), bounded rationality (Pompain, 2006), fundamental heuristics (Baker & Nofsinger, 2010), behavioural biases (Shefrin, 2007) and psychological biases (Baker & Nofsinger, 2002). These past studies proposed different thoughts about investment behaviour. Some believe that behavioural factors are strongly associated with financial decisions to earn more profits (Abarbanell & Bernard, 1992; Debondt & Thaler, 1990; Klein, 1990). Investment decision in the financial market is dependent on the investor's behaviour. Velumoni (2017) investigated the prospect theory of behavioural finance in investors' decision-making in the context of the Indian stock exchange. The results concluded that mental accounting, loss aversion, and regret aversion positively influence the investor's decision-making. Bakar and Yi (2016) examined the relationship between psychological factors and investment decisions in the context of the Malaysian stock market. They found that behavioural factors of conservatism and overconfidence positively impact decision-making. On the contrary, the herding factor did not affect decision-making. Kimeu at el. (2016) also studied the Nairobi stock exchange and examined the behavioural factors such as heuristic bias, rationality, prospect, and herding on decision-making. The results indicated that behavioural factors significantly impact an investor's decision-making process.

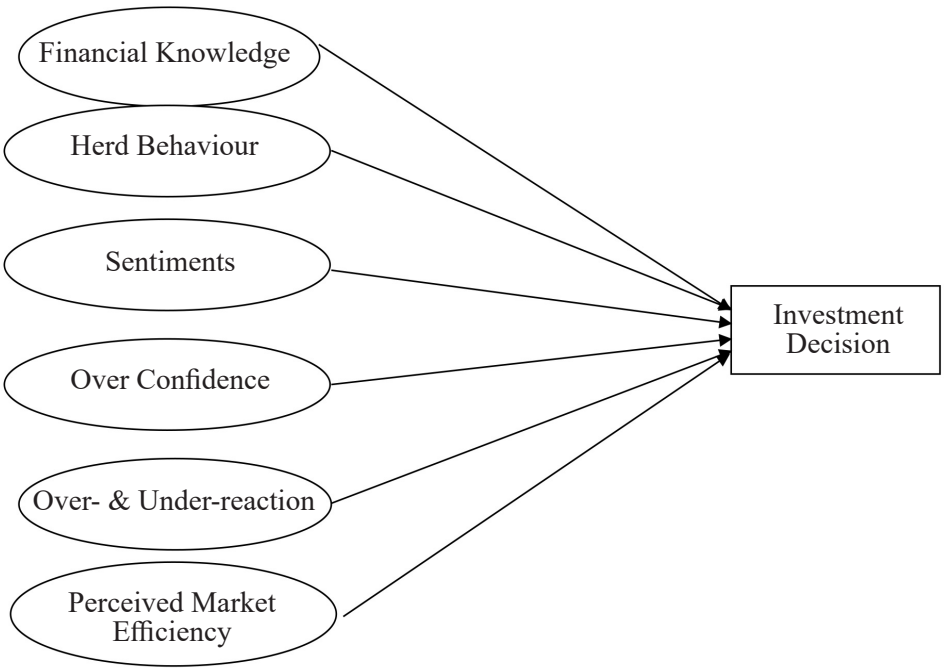

Figure 1. Conceptual framework

METHODOLOGY

Instrument and Variable Description

We used past empirical studies to employ a self-administered survey-based instrument. The questionnaire items were adapted from earlier studies (Kengatharan & Kengatharan, 2014; Knoll & Houts, 2012; Metawa et al., 2019; Waweru et al., 2008). The questionnaire contains seven variables (financial knowledge, herd behaviour, sentiments, overconfidence, over- and under-reaction, perceived market efficiency, and investment decision) with 26 items. Each item was measured on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. To ensure the reliability and validity of the instrument, this study conducted a pilot testing on a sample of 50 respondents who had prior experience of investment in the financial sector. Overall, the pilot testing results suggested a minor refinement and re-structuring of the questionnaire. Additionally, this study also ensures a sufficient level of degree of freedom by measuring the variables through multiple statements (Ali et al., 2018; Ting et al., 2016). Lastly, this study further established the instrument's face validity and internal validity. The description of variables and sources are reported in Table 1.

Table 1
Variable description

Variable	Operational definition	Symbol	Source
Sentiment	Investment sentiments as an individual mood, optimistic or suspicious feelings while making investment decisions in the stock market.	ST	Mian and Sankaraguruswamy (2012)
Overconfidence	Overconfidence as an individual's overestimations in stock trading related to knowledge, data information, market awareness, and personal opinions.	OC	Metawa et al. (2019)
Over-/Under-reaction	An individual act or behave on certain information in the stock market.	OUR	Metawa et al. (2019)
Herd behaviour	An individual behaviour to follow and depend on others' decisions while performing stock trading.	HB	Anum and Ameer (2017)
Perceived market efficiency	An individual perception about the stock market based on the financial information, price movements, data analysis, past trends, and other stocks-related information.	PME	Shah et al. (2018)
Financial knowledge	An individual's inside knowledge about stock trading.	FK	Wang (2009)
Investment decision	A process of investing money based on certain fundamentals to attain future profits.	ID	Kimeu at el. (2016)

Sample Data Collection Procedure

This study used power analysis to determine a sufficient and representative sample. We used a quantitative research approach and employed a purposive sampling technique in this context. The sample data was gathered from the individuals who participate in trading activities at the PSX. A well-trained research associate was hired to gather sample data from the investors. The research associate distributed a total of 400 physical questionnaires among the respondents. Prior permission from the administration of PSX was taken to avoid interruptions in the trading activities at PSX. All the respondents were politely requested to participate in the survey while they were assured that their information would remain kept confidential. Of 400 responses, this study considered 318 responses usable, while we removed

82 responses due to missing and incomplete information. The possible reason for missing and incomplete responses showed a lack of interest and weak participation in the survey. The survey response showed a 79.5% of response rate, which is acceptable and adequate to perform data analysis. The sample data were analysed using the partial least square (PLS) method. Hair Jr. et al. (2014) and Henseler et al. (2009) suggest that the PLS method is beneficial to gain the predictive power of a structural model. Additionally, prior literature in behavioural studies argued that the PLS approach explains better results for a structural model (Ali et al., 2019; Hair et al., 2012; Raza et al., 2019; Ting et al., 2016). Hence, we assessed our structural model using PLS assumptions.

RESULTS

Demographic Analysis

Table 2 highlights the demographic characteristics of our respondents. A total of 74% (234) respondents were male and 26% (84) were female. Most of the participants were age bracket 31–35 years (30%), while 135 respondents (42%) belonged to a private occupation. Our sample data shows that 55% (175) of respondents were graduated while the majority of the respondents (30%) had PKR40,000 and above income. Lastly, 193 respondents (61%) were married and 125 respondents (39%) were single.

Table 2
Respondent's profile

Demographic items		Frequency	Percentile
Gender			
	Male	234	74
	Female	84	26
Age			
	18–24	13	4
	25–30	47	15
	31–35	96	30
	36–40	61	19
	41–45	43	14
	46–50	32	10
	50 and above	26	8

(*Continued on next page*)

Table 2 (*Continued*)

Demographic items	Frequency	Percentile
Occupation		
Private	135	42
Semi-private	48	15
Public	84	26
Self employed	51	16
Education		
Undergraduate	54	17
Graduate	175	55
Postgraduate	61	19
Other	28	9
Income (in PKR1,000)		
20–25	38	12
26–30	48	15
30–35	41	13
36–40	97	31
40 and above	94	30
Marital Status		
Single	125	39
Married	193	61

Measurement Model Analysis

Table 3 illustrates the analysis of construct reliability and convergent validity. The Cronbach-alpha values for financial knowledge = 0.725, herd behaviour = 0.759, sentiments = 0.770, overconfidence = 0.714, over- and under-reaction = 0.741, investment decision = 0.718, and perceived market efficiency = 0.727, respectively. Similarly, the composite reliability (CR) values for financial knowledge = 0.826, herd behaviour = 0.811, sentiments = 0.776, overconfidence = 0.824, over- and under-reaction = 0.836, investment decision = 0.825, and perceived market efficiency = 0.829, respectively. Overall, our variables showed sufficient level of internal consistency in the model. Additionally, Table 3 further demonstrated that our study variables achieve minimum criteria of 0.50 for average variance extracted (AVE) and shows a sufficient level of construct's variance as recommended by Hair et al. (2014).

Table 3
Construct reliability and validity

Constructs	Items	Cronbach alpha	CR	AVE
Financial knowledge	4	0.725	0.826	0.544
Herd behaviour	3	0.759	0.811	0.589
Sentiments	3	0.770	0.776	0.536
Overconfidence	4	0.714	0.824	0.54
Over- and under-reaction	4	0.741	0.836	0.561
Investment decision	4	0.718	0.825	0.542
Perceived market efficiency	4	0.727	0.829	0.549

To assess the constructs' discriminant validity, we employed the heterotriat and monotriat (HTMT) correlation matrix. Table 4 illustrates the HTMT correlation matrix where all correlation values are less than 0.85 to satisfy the minimum criteria suggested by Henseler et al. (2016). Thus, the measurement model assessment indicates that our constructs showed an adequate convergent and discriminant validity level to perform structural model analysis.

Table 4
HTMT criteria

	Financial knowledge	Herd behaviour	Sentiment	Over confidence	Over- and under-reaction	Investment decision	Perceived market efficiency
Financial knowledge							
Herd behaviour	0.477						
Sentiment	0.770	0.594					
Overconfidence	0.657	0.686	0.601				
Over- and under-reaction	0.838	0.420	0.801	0.724			
Investment decision	0.836	0.536	0.821	0.699	0.812		
Perceived market efficiency	0.837	0.620	0.779	0.804	0.803	0.817	

Structural Model Analysis

We assessed our structural model using standardised path coefficients and their respective *p*-values. As shown in Table 5, each relationship corresponds to a hypothesis and is analysed by the bootstrapping procedure. Results indicate that all independent variables have a positive and significant impact on dependent variable (FK = 0.243, $P < 0.001$; ST = 0.267, $P < 0.001$; OC = 0.092, $P < 0.10$; OUR = 0.144, $P < 0.05$; PME = 0.172, $P < 0.05$) except HB who showed positive but insignificant impact on dependent variable (HB = 0.035, $P < 0.10$). Among all relationships, ST was the most influential factor in the hypothesised model. The structural model evaluation confirms the acceptance of H1, H3, H4, H5, and H6 except for H2. Additionally, the R-square value was used to check how much variance is explained by the independent variables on the dependent variable. Our results suggest that the R-square value is 0.560, which is acceptable to consider the variance explain in the dependent variable.

Table 5
Path coefficients

Hypothesis	Regression path	Coefficient	Standard deviation (STDEV)	*P*-value	Remarks
H1	FK → ID	0.243	0.060	0.000***	Supported
H2	HB → ID	0.035	0.054	0.561	Not supported
H3	ST → ID	0.267	0.059	0.000***	Supported
H4	OC → ID	0.092	0.052	0.082*	Supported
H5	OUR → ID	0.144	0.066	0.032**	Supported
H6	PME → ID	0.172	0.840	0.040**	Supported

Notes: FK = financial knowledge, HB = herd behaviour, ST = sentiment, OC = over confidence, OUR = over- & under-reaction, and PME = Perceived market efficiency. Dependent variable: ID = investment decision. ***, **, and * denote 1%, 5%, and 10% level of significance, respectively. R-square value = 0.560

DISCUSSION

The first hypothesis result showed a significant positive impact of financial knowledge on investment decisions to test the hypothesised model. The possible implication of this result could be that the investors have a greater ability to analyse and understand the market's financial knowledge before making investment decisions. Additionally, the investors utilise effective financial planning and interest rate calculation in their decision-making process. Al-Tamimi and Kalli

(2009) and Zhao and Zhang (2021) also established a positive relationship between financial knowledge and investment decision. The second hypothesis found a positive and insignificant relationship between herd behaviour and investment decision. This result is partially supported by past studies that found a positive relationship between herd behaviour and investment decision (Metawa et al., 2019; Gervais & Odean, 2001). The third hypothesis suggests that sentiments positively and significantly impact investment decisions. The possible justification of this finding could be that an investor's decision to hold or sell the stock is based on his perspectives and beliefs about cash flows. This result also highlights the investor's perception of historical market returns. The findings align with earlier studies that reported a positive relationship between sentiments and investment decisions (Sibande et al., 2021; Kling & Gao, 2008; Metawa et al., 2019; Li & Zhang, 2008).

Interestingly, the fourth hypothesis findings suggest that overconfidence have a positive and significant impact on investment decision. The possible explanation of this relationship could be that investment decisions are complex and suboptimal choices. The overconfidence may allow investors to trust their investment skills and abilities to induce excessive investment. It is also possible that the investors can accurately forecast the stock returns. This situation allows them to be more confident and generate good profits. Similarly, the lack of confidence declines investors' perception of higher returns on investment. The result contradicts earlier studies by Park et al. (2010), Seppälä (2009), Waweru et al. (2008), and Shah et al. (2018) however, it supports the findings of Fitri and Cahyaningdyah (2021).

The fifth hypothesis result indicates that over- and under-reaction positively and significantly impact investment decisions. The result signifies that the investors possibly over- and under-react to new information and seek benefit from stocks where the information generates higher returns. Our findings further indicate that an investor shows a balance reaction to stock-related information or any unforeseen news to avoid loss. The result is further supported by Metawa et al. (2019) and Talwar et al. (2021). Lastly, the sixth hypothesis established a positive and significant relationship between perceived market efficiency and investment decision. Our findings confirm the assumptions made by Fama (1970) that investor perceives financial markets as efficient. The possible implications of this outcome could be that an investor assumes stock prices at their fair value. Our arguments are also supported by Vasileiou (2021), Sewel (2011) and Aguila (2009) research.

CONCLUSION

Investment decisions are complex and difficult to understand for financial specialists. The financial speculators faced unstable financial conditions when behaviour was involved in investment decisions. Due to this, the vulnerability in the financial decisions emerges more frequently and creates a challenging environment for the investors. To be a rational financial specialist or investor, it is important to understand investment decisions based on human behaviour. In this situation, the analysis of behavioural factors play a significant role in assessing an investor's decision-making process (Kannadhasan & Nandagopal, 2010a, 2010b; Shah et al., 2018). Therefore, this paper used the PLS-SEM approach to analyse the influence of behavioural factors on investment decisions in the Pakistani stock market. The study apprehends the investment decision of investors who were involved in trading activities at PSX regarding financial knowledge, herd behaviour, sentiments, overconfidence, over- and under-reaction, and perceived market efficiency. Through this research, the empirical findings of this study further strengthen the existing literature.

Policy Implications

This study provides some useful implications for policymakers. We are confident that this research would benefit strategists to understand the behavioural factors of investors. Based on study findings, the behavioural factors of investors would encourage them to take a calculated risk and utilise financial and mathematical skills to perform investment decisions. Our results further suggest that sentiments and financial knowledge are the most influential factors of investment decisions. It is recommended that managers focus on investor sentiments and financial knowledge to understand investors' behavioural patterns better. They should not rely solely on behavioural biases and conduct a quantitative assessment to attain a proper investment analysis. The financial knowledge of investors may be improved by educating them on investment management, risk management, tax planning, retirement plans, saving methods, interest rate literacy, debit-credit traps, and information related to financial theft and safety. This can be done through awareness sessions, sharing knowledge on digital platforms, and counseling potential investors. Similarly, policymakers should emphasise investors' sentiments by analysing bullish and bearish sentiments of investors. This can be possible through industry-wise policy development based on industry characteristics. It is also essential for portfolio managers to focus on market anomalies and arbitrage components of investor sentiments. Additionally, decision-makers may consider sentiment-based approach policies by considering other significant behavioural

factors that we used in this research. However, creating a human sentiment index may support shaping investor-friendly policies in the investment market.

Study Limitations and Future Studies

Due to specific research objectives, this study used selected behavioural factors to analyse investment decisions in the Pakistani stock market. This limitation allows future studies to add more behavioural and psychological factors to investors to analyse investment decisions. The selected sample of this study is limited to the PSX. Therefore, we suggest upcoming studies to target other stock markets of developed and developing countries to establish new findings. Similarly, this research tested the only direct impact of independent variables on the dependent variable. Thus, we further recommend future studies use mediation and moderation tests. Lastly, this research also left a space for forthcoming studies to include the demographical characteristics of investors in the structural model.

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APPENDIX

Survey instrument

Construct	Items	Source
Sentiments	My current mood affects making my investment decisions.	Metawa et al. (2019)
	My optimistic feelings affect making my investment decisions.	
	My pessimistic feelings affect making my investment decisions.	
Overconfidence	I am aware of everything in the stock market.	Metawa et al. (2019)
	I trust my data sources.	
	I have the ability to analyse the new information in the market.	
	My opinion comes first when making the decision.	
Over- and under-reaction	I do react quickly to the new information in the market.	Metawa et al. (2019)
	I rethink before making an investment decision when the information source is unreliable.	
	My reaction depends on the availability of many sources for new data.	
	My reaction depends on my analysis of the data.	
Herd behaviour	I make my decision based on the majority of other investor's decision.	Metawa et al. (2019)
	I usually react quickly to the changes of other investors' decisions and follow their reactions to the stock market.	
	I confidently take a decision different from majority of investors in the market.	
	Other investors' decisions of choosing stock types have impact on my investment decisions.	
Perceived market efficiency	I carefully consider the price changes of stocks that I intend to invest in.	Waweru et al. (2008); Kengatharan and Kengatharan, (2014)
	In my opinion, market information is important for my stock investment.	
	I put the past trends of stocks in to consideration for my investment.	
	I analyse the companies' customer preference before I invest in their stocks.	

(*Continued on next page*)

Survey instrument (*Continued*)

Construct	Items	Source
Financial knowledge	I prefer investing my money into multiple business or investments	Knoll and Houts (2012)
	I believe that the risk of losing money decreases when I diversifies my investments.	
	I consider time value of money before making my investment decision.	
	I do consider the impact of inflation while making my investment decision.	
Investment decision	I work out all the pros and cons before making any investment decisions.	Metawa et al. (2019)
	I remain calm when I have to make an investment decisions very quickly.	
	I make investment decision after considering all of the implications.	
	I study about the market fundamentals of underlying stocks before making investment decisions.	