RESEARCH ARTICLE

Role of Behavioral Determinants for Investment Decision Making

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Abstract: Investment decision-making is the process of identifying decisions, collecting relevant information, and making informed choices. This study unfolds the behavioral determinants which affect the investment decision-making behavior of equity investors. A survey was conducted on a sample of 384 registered individual investors of the Pakistan Stock Exchange (PSX). The impact of behavioral determinants, including heuristics, herding effect, and market variables on investment decision-making behavior, was measured through structural equation modeling. The analysis outcomes indicated a positive and significant impact of behavioral determinants on investment decisions. Hence, heuristics, herding effects, and market variables have strong and significant roles in making educated and informed decisions. The present study proposes multidimensional functional insights for academicians, money and mutual fund managers, stockbrokers, and investment advisors to comprehend the determinants, which are important for the investment decisions of equity investors.

Keywords: heuristics, herding effect, market variables, investment decision making, Pakistan Stock Exchange (PSX)

Decision-making is a multifaceted process that has a critical role in the field of behavioral finance. Investor behavior is based on various psychological and behavioral biases other than market volatility and opportunities for profit maximization (Kim & Nofsinger, 2008; Puaschunder, 2017b). Schindler (2007) found that behavioral finance investigates psychological, cognitive, and social aspects of an investor's behavior and their effects on financial decisions. Therefore, investors may improve the capability of decision-making, financial performance, and risk tolerance by identifying their behavioral biases (Agarwal et al., 2016; Waweru et al., 2008).

The literature highlighted the impact of behavioral factors on the investment decisions of investors. The effect of behavioral factors such as heuristics, prospect, herding, and overconfidence on investors' decision-making behavior was explored by various investigators (i.e., Asad et al., 2018; Blake et al., 2017; Ghalandari & Ghahremanpour, 2013; Shah et al., 2018; Shukla et al., 2020). Heuristics and herding are the most influential behavioral factors of irrational decision-making (Chandra & Kumar, 2012;

Nayak & Kumar, 2020; Pompian, 2012). Individuals' investment decisions are also massively dependent on heuristics and market variables (Chandra & Kumar, 2012). Similarly, herding, market, overconfidence, and anchoring ability have a significant positive impact on investor's behavior (Kengatharan & Kengatharan, 2014; Luong & Ha, 2011; Shukla et al., 2020).

Various studies from developed and developing markets indicated herding, heuristics, and market variables are the most influential behavioral biases with an important effect on investment decision making of investors (Blake et al., 2017; Chawla et al., 2018; Luong & Ha, 2011; Shah et al., 2018). Particularly, the stock market investors are significantly influenced by herding and heuristics. For instance, herding and heuristics have a positive impact on the investment performance of stock investors (Puaschunder, 2017a). Similarly, investors with herd behavior follow the investment decisions of a dominant group of investors (Fang et al., 2017). The heuristics behavior of stock investors also has a significant impact on their stock investments (Shah et al., 2018). Investor's reaction to market variables, that is, stock price changes and past market trends, is also crucial for a stock investment and financial performance (Phan & Zhou, 2014a; Waweru et al., 2008). The evidence from United States, Japan, Italy, Spain, China, India, Taiwan, Sri Lanka, and Pakistan identified a significant role of herding behavior in developing markets, while a minimal role in developed markets (Asad et al., 2018; Economou et al., 2011; Lao & Singh, 2011; Luong & Ha, 2011; Shukla et al., 2020). The developed markets are well-established and display entire market information, whereas the developing markets are uncertain and exhibiting asymmetric information. Therefore, investors in developing markets are more dependent on behavioral biases than the developed markets.

Keeping in view the prior literature, this research intends to highlight the issues related to the decision-making behavior of stock investors in the Pakistan stock market. The existing research has discussed the impact of behavioral factors (Agarwal et al., 2016; Asad et al., 2018; Luong & Ha, 2011; Pandey & Jessica, 2018; Shah et al., 2018; Waweru et al., 2008) on financial markets and investors in different domains. The previous researchers examined the impact of behavioral factors on investor's decisions. However, being a frontier economy, an in-depth investigation of behavioral factors on investment decision-making of individual equity investors in Pakistan will be a useful addition to the literature. Moreover, Pakistan is one of the young economies and comparatively undeveloped financial markets with minimal equity market capitalization (Association of Chartered Certified Accountants, 2012). The frontier economies tend to achieve higher economic growth rates on average with respect to their developed and emerging counterparts. Thus, such economies can accommodate significant development given the set of opportunities that they offer for investors. As per the survey conducted by the 2018 A.T. Kearney's (2018) Foreign Direct Investment (FDI) Confidence Index, 39% of the investors are willing to enhance their investments in frontier markets, in comparison to 44% in emerging markets and 40% percent in developed markets. The investment decisions in frontier markets are also easier and more accessible in recent years. Therefore, it is important to study behavioral factors in Pakistan with the frontier economy perspective as it will contribute to the body of knowledge with a new perspective. Moreover, it will be very meaningful for the policymakers to devise new policies to build the investor's confidence (Larsen, 2019).

Hence, current research aims to investigate the direct impact of behavioral factors, including herding, heuristics, and reaction to market variables on investment decision-making behavior among individual equity investors of the Pakistan Stock Exchange. To our best knowledge, this study is the first to explore the combined effect of behavioral factors on the investment decision-making behavior of equity investors of the Pakistan Stock Exchange.

Literature Review

Investment Decisions-Making Behavior

Investment decision-making is a process of choosing a particular alternative from a number of alternatives. It is also an activity that follows after proper evaluation of all the alternatives (Jariwala, 2015). Past literature identified that investors could be rational or irrational in their investment decisions (Wong & Cheung, 1999). The irrational decisions of investors are based on various behavioral and psychological biases, whereas rational decisions are based on the analysis of statistical data of the market (Janssen et al., 2006).

Rational investors are using fundamental and technical analysis in making their investment decisions. The ultimate purpose of utilizing fundamental analysis is to discover the value, which can be equated with the current price of a stock and figuring out how to deal with a specific stock (i.e., the underpriced stocks=buy and over-priced=sell). The fundamental analysis also depends on macroeconomic and firm-specific factors, whereas technical analysis is the assessment of stocks by examining the statistical data generated by market activities such as past prices of the stocks and their volume. Technical analysis mostly depends on the past performance of stocks to perceived future returns on stock investment (Fisher & Statman, 1997). Janssen et al. (2006) said that technical analysis generally depends on the movement of stock prices, and investors consider the same to perceive future movements of stock prices. Rational investors generally use technical analysis for short-term, whereas fundamental analysis is for long-term investments (Lui & Mole, 1998; Wong & Cheung, 1999).

Various behavioral science researchers revealed that individuals are largely dependent on several investment decision-making determinants (Elmassri et al., 2016; Shah et al., 2018). Past literature indicated that investors do not have a constant rational behavior in their investment decisions (Wang et al., 2006). Karlsson et al. (2004) explored that, most of the time, investors' decision-making is based on their personal financial needs, financial conditions, amount of savings, and available investment opportunities. In this regard, financial behavior is one of the vital determinants for making investment decisions (Hershey & Walsh, 2001; Mouna & Anis, 2017). Investors are also facing asymmetric financial information, which affects investors' decision-making behavior (de Goeij et al., 2018; Kozup et al., 2008). The asymmetric information is basically an uneven and unequal piece of information that limits investors' decision-making; hence, decisions can be biased (Díaz, 2009; Rapp & Aubert, 2011).

In particular, behavioral biases play a significant role in making investment behavior (Phan & Zhou, 2014a; Waweru et al., 2008). For instance, Clark-Murphy and Soutar (2004) discussed that investors' investment decisions depend on the position of listed companies in the market and trends in stock price variation. Moreover, investors limit their selling decisions because of low stock prices compared to their buying price (Odean, 1998; Shefrin & Statman, 1985). Similarly, individual investors prefer to buy the stocks they traded in the past rather than the stocks they never traded (Waweru et al., 2008). The investors also consider previously traded stocks as a point of reference for their future investment decision (Luong & Ha, 2011). Investors also prefer to trade familiar and well-known stocks because of the minimum risk factor (Barber et al., 2009). Barberis and Thaler (2003) and Barber and Odean (2012) stated that individual investors are unwilling to sell attention-grabbing stocks due to good expected returns. The studies also signified that investors focus on the stocks that they currently own, although multiple choices of investment are available in the market.

In the case of Pakistan, several studies found that individual investors' decision-making behavior is under the massive influence of behavioral factors such as the herding effect, heuristics, and market variables in the Pakistan stock market (Ali et al., 2016; Farooq & Sajid, 2015; Ishfaq & Anjum, 2015; Khan, 2014; Mahmood et al., 2016; Nayak & Kumar, 2020; Shafi, 2014; Yasir, 2015).

Behavioral Factors

A review of the literature indicated that decision-making behavior is influenced by certain behavioral and psychological biases (Shefrin & Statman, 1985; De Long et al., 1990). Kahneman and Tversky (1979) stated that individuals usually behave irrationally in selecting their investment options. Studies also revealed that investors are irrational and under some psychological pressures that influence their financial activities (Rabin, 1998). According to Luong and Ha (2011), there are various behavioral determinants, including herding, overconfidence, anchoring ability, prospect variables, and market behavior affecting investors' decision-making. Heuristics, herding, and overconfidence have a positive and significant relationship with the investment decision-making of investors (Luong & Ha, 2011).

Heuristics

Heuristics biases are rules of thumb that make choices easier for individuals, particularly in multifaceted and uncertain circumstances (Ritter, 2003). In heuristics, individuals generally apply mental shortcuts instead of objective analysis of existing information (Waweru et al., 2008). According to Barberis and Thaler (2003), stock investors and fund

managers apply the heuristics approach for speedy investment decisions. Most of the studies identified a positive and significant impact of heuristics on the investment decisions of stock investors (Kahneman & Tversky, 1979; Mwangi, 2011; Tversky & Kahneman, 1974). Luong and Ha (2011) indicated that heuristics include overconfidence, representativeness, gambler's fallacy, anchoring, and availability bias. Ritter (2003) stated that in representativeness, investors consider recent trading practices and overlook the average long-term growth rate. Similarly, investors trade popular stocks rather than unpopular and poorly performing stocks (De Bondt & Thaler, 1995).

In addition, anchoring reflects that investors generally concentrate on present practices and are optimistic about future market trends (Puaschunder, 2017a; Shah et al., 2018; Waweru et al., 2008). Overconfidence is another significant feature of heuristics where investors overrate their assessment skills and trading capabilities in equity markets (Evans, 2006; Nayak & Kumar, 2020; Shiller, 1999). The overconfident stock investors usually trade excessively, which may increase or decrease their investment performance (Mathuraswamy & Rajendran, 2015). Barberis and Thaler (2003) discussed that availability bias also occurs when investors give extra weight to easily accessible market information rather than the actual and specific information. According to Luong and Ha (2011), overconfidence, gambler's fallacy, and representativeness are dominant heuristics biases and have a massive impact on investment decisions of stock investors.

In Pakistan, heuristics have a significant influence on the investment decisions of equity investors. For example, Farooq and Sajid (2015) revealed that heuristic biases have a significant positive influence on the investment behavior of individuals. Hence, the investors having heuristics biases do better than their counterparts. Mahmood et al. (2016), Khan et al. (2017), and Shah et al. (2018) stated that there is a significant positive relationship between heuristics and financial decisions of individuals. The studies further found that irrational investors generally utilize the heuristics approach for financial activities as an urgent response to resolve the issue. In view of prior literature, the following hypothesis has been developed:

Hypothesis 1. Heuristics has a positive and significant impact on the investment decision-making behavior of individual investor.

Herding Effect

Previous studies demonstrated that the herding effect is a propensity of an investor to follow the actions of other investors (Luong & Ha, 2011; Zhang & Zheng, 2016). Kengatharan and Kengatharan (2014) discussed four features of herding, including volume of trading, choice of stocks, speed of herding, and speed of trading. Luong and Ha (2011) stated that individuals with herd behavior generally make their decisions based on particular information. Therefore, such investors overlook the appropriate and relevant information, that is, analysis of financial reports and dividend policy of the company (Luong & Ha, 2011). A number of studies also found that individuals influenced by herding usually follow the leading equity investors for buying and selling of stock (Bikhchandani et al., 1992; Caparrelli et al., 2004; Chawla et al., 2018; De Long et al., 1990; Fang et al., 2017; Shukla et al., 2020). For instance, Humra (2016) stated that institutional investors of herding nature follow a similar track of investment they adopted earlier.

According to Odean (1999), investors with herd behavior usually prefer attention-grabbing stocks to achieve better returns and avoid risk. Moreover, Humra (2016) and Waweru et al. (2008) stated that financial actions such as volume of stock trading, selection of stocks, period of stock holding, and preference of stocks by dominant group strongly influence the decisions of other equity investors. Investors with herd behavior also prefer collective information to private information of the market to get more return (Blake et al., 2017; Humra, 2016). Similarly, herding exposes the over-dependence of investors on the judgments of a specific group of investors than personal analysis of the situation (Qasim et al., 2019; Zhang & Zheng, 2016).

In Pakistan, Javaira and Hassan (2015) stated that Pakistan Stock Exchange has various characteristics such as high volatility, high returns, and high market absorption to mobilize and attract new investment. Therefore, the likelihood of herd behavior in the Pakistani stock market is huge. In addition, according to Javaira and Hassan (2015) and Mahmood et al. (2016), there is a huge presence of herding in the stock exchange of Pakistan and employing a positive effect on the performance of individual investors. Therefore, literature on the herding effect following hypothesis is developed.

Hypothesis 2. Herding effect has a positive and significant impact on the investment decision-making behavior of individual investors.

Market Variables

Various prior studies signified that investor's reactions to market variables such as price variations, prior trends of stocks, customer preference, and market information have a significant impact on the investment decisions of stock investors (Waweru et al., 2008). The stock price changes, asymmetric market information, past trends in stocks, and stock preference of investors have an enormous effect on the investment behavior of individual equity investors (Kengatharan & Kengatharan, 2014; Phan & Zhou, 2014; Waweru et al., 2008). According to Waweru et al. (2008), variation in market variables have a great influence on the decision-making behavior of equity investors. The reaction of investors to market characteristics has a significant effect on trading plans and strategies of stock investors (De Bondt & Thaler, 1995; Lai et al., 2001). Andreassen (1990) and Economou et al. (2011) stated that past trends always affect investment behavior. Therefore, investors follow the past trends of stocks to manage risk and get more returns (Shiller & Pound, 1989; Waweru et al., 2008).

Numerous studies have been conducted in developed and developing markets to identify the significance of investors' reaction to market variables (Agarwal et al., 2016; Caparrelli et al., 2004; Phan & Zhou, 2014a; Puaschunder, 2017a; Waweru et al., 2008). Market variables have a huge importance in developing markets than the developed markets. For instance, Economou et al. (2011) highlighted that developing markets are facing insufficient and unreliable market information, lack of awareness about modern analytical tools, and less educated investor. Luong and Ha (2011) investigated the market variables and found that frequency of stock trading and stock selection has a positive impact on the performance of individual stock investors in Vietnam. The volume of stocks, trading, and speed of herding have moderate, whereas choice of stocks has low effect on the investment decisions of Sri Lankan equity investors (Kengatharan & Kengatharan, 2014; Qasim et al., 2019). According to Ghalandari and Ghahremanpour (2013), market variables have a positive impact on the investment decisions of equity investors in Tehran. The study further stated that market information has a huge impact on the investment decisions of investors. Accordingly, Agarwal et al. (2016) demonstrated that Indian stock investors positively react to price changes and business news to minimize risk.

In the purview of Pakistan, Yasir (2015) revealed that market conditions describe the overall behavior of equity investors toward investment activities. According to Qureshi et al. (2012), there is a significant and positive relationship between stock information and investment decisions. In view of the above discussion, it is obvious that market variables influence the investment behavior of individual equity investors; therefore, the following hypothesis has been developed.

Hypothesis 3. Market variables have a positive and significant impact on the investment decision-making behavior of individual investors.

Research Framework

The purpose of the study is to determine investment decision-making behavior among individual investors of the Pakistan Stock Exchange. After a review of the extensive literature, the significance of behavioral determinants, including heuristics, herding, and market variables for investment decision-making behavior, has been identified. In the light of literature and hypothesis, this study has developed a theoretical framework showing the relationship of herding has a significant positive impact on investment decisions of stock investors. Similarly, researchers investigated that heuristics variables positively influence the investment decisions of individuals. Moreover, investors' reactions toward market variables such as a change in stock prices, market information, and fundamentals of stocks have a significant positive impact on the investment decisions of individual investors.

Methods

The registered individual investors of the Pakistan Stock Exchange (PSX) are the target population for this study. The data was collected in November 2018. The total number of registered individual investors is 225,354 on Pakistan Stock Exchange (National Clearing Company Pakistan Limited, 2018; PSX, 2018).

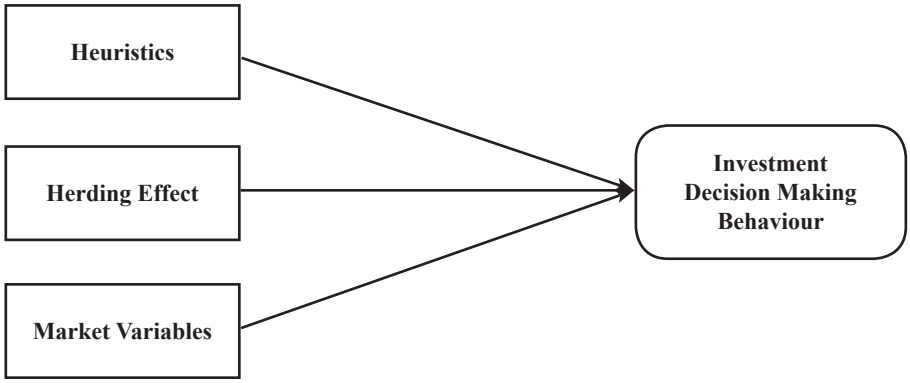

Figure 1. Research Framework

Based on Krejcie and Morgan formula, this study has selected a sample size of 384 (Krejcie & Morgan, 1970). A multi-stage sampling technique was used to collect the data. In the first stage, an overall random sample of 384 registered individual investors of PSX was calculated by using Krejcie and Morgan (1970). In the second stage, by using convenience sampling, 384 questionnaires were distributed among the individual equity investors of PSX registered through different security brokers. To achieve this logical number of 384 investors, 82 different security brokers of all three PSX branches located in Islamabad, Lahore, and Karachi were approached. In this regard, 47 brokers out of 133 sited in PSX Karachi branch, 24 brokers out of 74 located in Lahore branch, and 11 out of 23 situated in Islamabad branch were fully willing and agreed for data collection. Around three to six questionnaires were distributed among the individual investors of each aforesaid broker of PSX depending upon the availability and convenience of investors. Moreover, the reason for using convenience sampling is the unavailability of the list and total number registered with each broker, as they refused to provide the list and the total number of investors registered with each brokerage house due to PSX/NCCPL regulations and investors privacy concerns. According to the regulations of PSX, brokers and mutual funds are not allowed to provide the personal data of any individual stock investor (NCCPL, 2018; PSX, 2018).

According to Saunders et al. (2009), convenience sampling can be used when a specific number of population is not available, and the sample is chosen from a group of people easy to contact and access.

Table 1 presents that behavioral factors have been taken as independent variables to examine the direct impact on the investment decision-making behavior of individual equity investors. The behavioral factors were examined by several researchers in various domains (Agarwal et al., 2016; Luong & Ha, 2011; Phan & Zhou, 2014a; Waweru et al., 2008). These biases play an important role in making investment choices (Waweru et al., 2008). In view of behavioral factors, heuristics, herding effect, and reaction toward market variables were discussed. A scale of seven items for measuring heuristics, five items for measuring herding effect, and five items for measuring market variables has been utilized. The items were adapted from the studies conducted by Luong and Ha (2011) and Mahmood et al. (2016). The study has taken investment decision-making behavior as a dependent variable. For measuring investment decision-making behavior, a scale of nine items is used in the study. All items are adapted from prior studies conducted by Khan (2014), Sadiq (2015), and Gouws and Shuttleworth (2009). A five-point Likert scale is used to measure the items where 1 stands for strongly disagree and 5 for strongly agree.

Table 1

Items of the Variables

No.	Items	Source
	Heuristics	
1.	I buy 'hot' stocks and avoid the stocks that performed poorly in recent past.	Luong & Ha (2011), Mahmood et al. (2016)
2.	I use trend analysis of some representative stocks to make investment decisions for all stocks that I invest in.	Luong & Ha (2011), Mahmood et al. (2016)
3.	I believe that my skills and knowledge of stock market can help me to outperform the market.	Luong & Ha (2011), Mahmood et al. (2016)
4.	I rely on my previous trading expertise in the market for my next investment.	Luong & Ha (2011), Mahmood et al. (2016)
5.	I forecast the changes in stock prices based on the recent stock prices.	Luong & Ha (2011), Mahmood et al. (2016)
6.	I prefer to buy local stocks than international stocks because the information on local stocks is more available.	Luong & Ha (2011), Mahmood et al. (2016)
7.	I consider the information from my close friends and relatives as a reliable reference for my investment decisions.	Luong & Ha (2011), Mahmood et al. (2016)
	Herding Effect	
1.	Other investors' decisions of choosing stock types and volumes have an impact on my investment decisions.	Luong & Ha (2011), Mahmood et al. (2016)
2.	Other investors' decisions about the stock volume have an impact on my investment decisions.	Luong & Ha (2011), Mahmood et al. (2016)
3.	Other investors' decisions about buying and selling stocks have an impact on my investment decisions.	Luong & Ha (2011), Mahmood et al. (2016)
4.	Investment decisions of a dominant group of investors' have an impact on my stock buying.	Luong & Ha (2011), Mahmood et al. (2016)
5.	Financial experts' decisions have an impact on my investment decisions.	Luong & Ha (2011), Mahmood et al. (2016)
	Market Variables	
1.	I carefully consider the price changes of stocks that I intend to invest in.	Luong & Ha (2011), Mahmood et al. (2016)
2.	Market information is important for my stock investment.	Luong & Ha (2011), Mahmood et al. (2016)
3.	I put the past trends of stocks under my consideration for investment decisions.	Luong & Ha (2011), Mahmood et al. (2016)
4.	The fundamentals of underlying stocks impact my investment decisions.	Luong & Ha (2011), Mahmood et al. (2016)
5.	I overreact to price changes of stocks.	Luong & Ha (2011), Mahmood et al. (2016)
	Investment Decision-Making Behavior	
1.	With the given investment opportunities, I would prefer to invest in the stock market rather than the fixed income security.	Gouws & Shuttleworth (2009), Sadiq (2015), Khan (2014)
2.	I base my stock buying decisions on the company's historical information, such as historical returns.	Gouws & Shuttleworth (2009), Sadiq (2015), Khan (2014)
3.	My stock buying decisions are based on the company's fundamentals (dividend pay-out, cash flows, and earnings growth).	Gouws & Shuttleworth (2009), Sadiq (2015), Khan (2014)
4.	I like to buy stocks that have high trading volumes.	Gouws & Shuttleworth (2009), Sadiq (2015), Khan (2014)
5.	I like to buy stocks that recently outperformed the market.	Gouws & Shuttleworth (2009), Sadiq (2015), Khan (2014)
6.	I like to buy the stock that has been a loser in the recent past because I expect it to recover in the future.	Gouws & Shuttleworth (2009), Sadiq (2015), Khan (2014)
7.	I like to buy the stock that remained safe in the recent past	Gouws & Shuttleworth (2009), Sadiq (2015), Khan (2014)
8.	I prefer to invest in stocks that are frequently cited in the newsor advertised.	Gouws & Shuttleworth (2009), Sadiq (2015), Khan (2014)
9.	Financial literacy as "knowing about money management" helps in investment decisions making.	Gouws & Shuttleworth (2009), Sadiq (2015), Khan (2014)

This study has used SPSS and AMOS to analyze descriptive analysis, factor loading, reliability, correlation analysis, and model estimation to further analyze the causal relationship among independent and dependent variables. Initially, the study used SPSS to perform the data filtration, such as missing values and outliers' identification. Similarly, the study conducted univariate normality, multivariate analysis, and exploratory factor analysis (EFA) by using SPSS. Later, the confirmatory factor analysis (CFA) was conducted by using AMOS, model estimation, and causal relationships among independent and dependent variables.

Data Analysis and Findings

A total of 382 questionnaires were returned by the respondents. Missing values and outliers were treated in the data filtration process to avoid biases for statistical modeling. The remaining sample size was 357 for analysis of data and interpretation. Normality, linearity, and homoscedasticity tests were performed and indicated no violations and results meet the assumptions of multivariate analysis.

The demographics of the respondents revealed that 82.9% were males, and 17.1% were females. The statistics indicate that the majority of the respondents investing in PSX were males. Majority of respondents were in the age group of 26–35 years (31.9%). The married people were 75.6%, whereas the singles were 24%. In relation to the employment structure, the highest percentage was 58.3% who were full-time salaried, followed by 21.0% self-employed. Finally, regarding the type of investors, 55.7% were both short and long-term investors, 26.9% were short-term investors, and 17.4% were long-term investors.

Assessment of Measurement Model

The EFA and CFA were conducted, and the results fulfilled the threshold requirements (0.40). However, three items were suppressed due to cross-loading or under the threshold value during EFA. The assessment criterion of the measurement, convergent validity (item loadings, average variance extracted (AVE), and composite reliability), and discriminant validity (through square root of AVE) were found to be accurate and within range (>0.85).

Measurement Model Fit

Figure 2 is presenting the measurement model and fitness indices of the model.

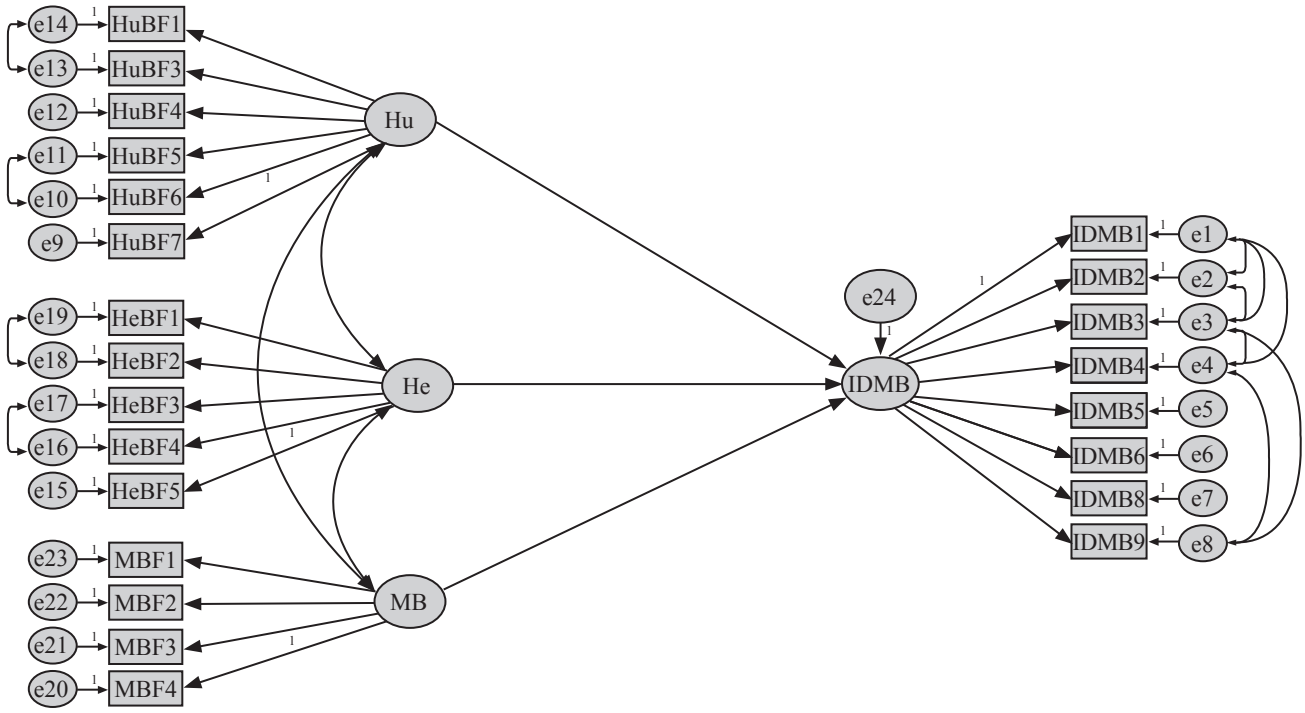

Figure 2. Measurement Model

Table 2

Structural Equation Model Fit Measures

Measurement Model Fit Indices		
Statistics	**Fit Indices**	**Model after Modification in Indicies**
Goodness of Fit	CMIN	784.540
	DF	279
	CMIN/DF	2.812
	AGFI	0.852
	GFI	0.873
	IFI	0.981
	TLI	0.973
	CFI	0.972
	NFI	0.958
Badness of Fit	RMR	0.073
	RMSEA	0.070

Similarly, Table 2 presents the results of the measurement model, where the realization of the goodness of fit values is key. The values revealed in structural equation model fit measures for goodness of fit are $\chi 2/df = 2.812$, AGFI = 0.852, GFI = 0.873, IFI = 0.981, TLI = 0.973, CFI = 0.972, and NFI = 0.958, which are within the acceptable range. Similarly, the values of the badness of fit are RMR = 0.73 and RMSEA = 0.70, which are also within the threshold.

The Structural Model and Hypothesis Testing

This study has three hypotheses that can be observed through the regression lines on the structural model. This study has answered the research objectives through these three hypotheses. Hypotheses 1, 2, and 3 present the direct effect among the variables. In relation to the direct impact, the relationship of heuristics with investment decision-making behavior is presented as hypothesis H1, the relationship between herding effect and investment decision-making behavior is indicated as hypothesis H2, and the relationship between market variables and investment decision-making behavior is shown as hypothesis H3. Figure 2 has presented the AMOS structural model graphical representation of beta values and t-values.

Behavioral Factors (Heuristics, Herding, and Market Variables) and Investment Decision-Making Behavior

Hypotheses H1, H2, and H3 present the relationship between antecedents of behavioral factors, including heuristics, herding effect, and market variable, and investment decision-making behavior.

Table 3 indicates complete results of H1, H2, and H3 hypotheses testing. The path coefficient values, which are known as the standardized version of linear regression weight, determine the probable causal relationship among statistical variables, that is, HBF, HeBF, MBF, and IDMB. The path coefficient values are also known as beta values. The beta values of hypotheses H1, H2, and H3 are $\beta=0.231$, $\beta=0.251$, and $\beta=0.225$, respectively. The t-values determine the insights regarding the rejection or acceptance of hypotheses. A threshold for a t-value greater than 1.96 (for two-tailed tests) indicates that the hypothesis is accepted. The t-values attained for H1, H2, and H3 are 4.480, 4.795, and 4.152, respectively, whereas paths were significant with a p-value of 0.00. Hence, the results indicate that H1, H2, and H3 are accepted; thus, heuristics (HBF), herding effect (HeBF), and market variables (MBF) have a positive and significant effect on investment decision-making behavior (IDMB).

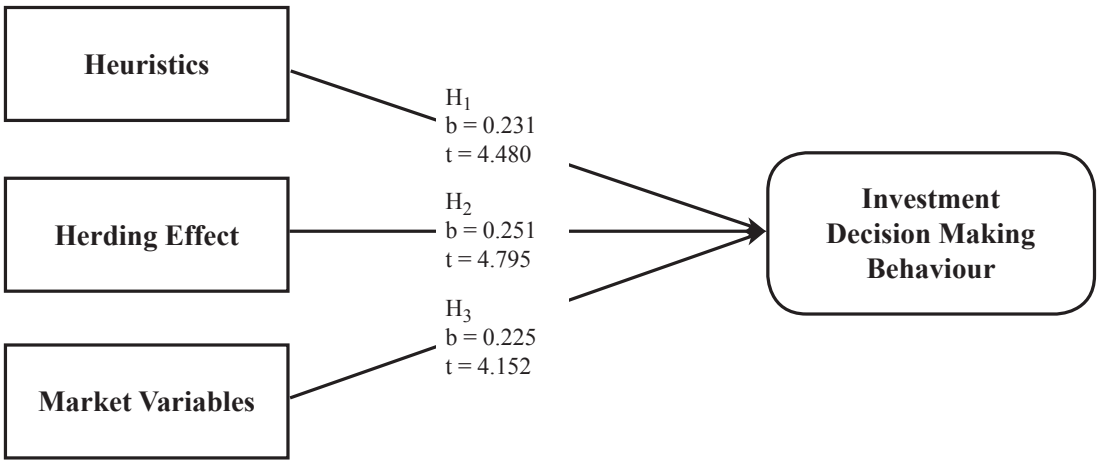

Figure 3. Structure Relationship of BF antecedents with IDMB

Table 3

Hypotheses Testing H1, H2, and H3

Hypotheses	Relationships	Path Coefficients (β)	*t*-values	*p*-values	Results
H_1	HBF → IDMB	0.231	4.480	0.000_{**}	Accepted
H_2	HeBF → IDMB	0.251	4.795	0.000_{**}	Accepted
H_3	MBF → IDMB	0.225	4.152	0.000_{**}	Accepted

Note: **P<0.01, *P<0.05

Discussion

The hypotheses H1, H2, and H3 of the study explain that heuristics, herding effect, and market variables have significant and positive effects on the investment decision-making behavior of individual equity investors of PSX. The outcomes of this study indicate that the standardized path coefficient was positive, and the t-value was also greater than the defined threshold value (1.96). Moreover, the hypothesized relationship was significant at a 1% level of significance. Therefore, statistical findings established a positive and significant impact of behavioral factors (heuristics, herding effect, and reaction towards market variables) on investment decision-making behavior among individual investors of PSX. The prospect theory presented by Kahneman and Tversky (1979) is consistent with the results, as it explains that the outcomes of different investment choices are based on some heuristics biases of the individuals.

For instance, the results show that investors strongly agree with three components of the heuristics variable, including stock preferences for investment decisions, forecasting the changes in stock prices based on the recent stock prices, and reliability on information from close friends/relatives for investment decisions. This indicates that the majority of the heuristics have a strong positive relationship with the decision-making behavior of the equity investors in the Pakistan Stock Exchange. The respondents also agree with the remaining items, which reveal a positive relationship with investment decision-making. Moreover, investors perceive that the outcomes of the decisions are matching with the point they are taking as a reference. Hence, investors try to choose the stocks having greater returns and lesser losses in the past as a point of reference to get a good return on stock investment. Hence, this discussion concludes that individual investors in Pakistan Stock Exchange strongly rely on heuristics variables during their investment decision-making process.

In view of the herding effect, the finding indicates that investors are strongly aligned with its subsequent components, such as the impact of other investors' decisions about choosing stock on investment decisions and the impact of other investors' decisions about the stock volume on investment decisions. The results reveal that investors also agree with the other items of the herding effect. This shows that investors are strongly considering the herding effect while making their investment decisions in PSX. Moreover, the findings also indicate a significant and strong impact of herding on the decisions of equity investors in Pakistan.

The descriptive results of market variables also signify an agreement of equity investors with all the items, that is, reaction toward stock price changes for making investment decisions, the impact of past market trends on investment decisions, the impact of fundamentals of underlying on investment decisions, and impact of market information on stock investment decisions. This indicates that investors consider market variables while investing in Pakistan Stock Exchange. The overall result also established a positive and significant impact of market variables on the investment decisions of Pakistani stock investors. Therefore, the discussed results conclude a strong impact of market variables on investment decisions in the Pakistani market.

Some evidence from developing and developed markets indicated that behavioral factors including heuristics, herding, and market variables have a significant influence on pension funds, bonds investment, and investment performance of individuals (Luong & Ha, 2011; Kengatharan & Kengatharan, 2014; Blake et al., 2017; Kutasi et al., 2018; Nayak & Kumar, 2020). Moreover, herding and heuristics have a substantial impact on the stock purchasing of individual and institutional investors (Waweru et al., 2008; Phan & Zhou, 2014; Fang et al., 2017; Shukla et al., 2020). In Pakistan, Farooq and Sajid (2015) and Asad et al. (2018) revealed that herding and heuristics affect individual investors and fund managers. The previous findings have supported the outcomes of this study that heuristics, herding effect, and market variables positively affect the decisions of stock investors, hence transform the buying behavior among individual equity investors of PSX.

Heuristics, herding effect, and market variables have a significant positive impact on investment decisions among individual investors of PSX. The Pakistan stock market is an important entity for economic growth in Pakistan; therefore, stock investors have a significant role in the economic development of Pakistan by making informed and true investment choices. Being a developing country, investment decision-making is very difficult for PSX investors because of high volatility and massive heterogeneity in the investment behavior of investors. Keeping all in view, it is obvious that heuristics, herding effect, and market variables have a huge role in making educated and informed investment decisions. Consequently, investors perform remarkably by earning more stock dividends and better returns on equity investment. Moreover, strong heterogeneity in behavioral biases of PSX investors is also linked with the volume of investment.

This research suggests different measures to policymakers and PSX authorities wherein rational use of behavioral biases among individual equity investors can increase their wealth and return on investment; hence, significantly increasing the national savings of the country. This research proposes multidimensional functional insights for stockbrokers to guide their registered equity investors for investment in different stocks in PSX. Similarly, mutual fund managers can get an insight regarding the investors' heuristics and herding behaviors. They will be able to devise their investment strategies and manage trading activities in the light of this research. They can also get an insight of PSX investors towards the market variables (e.g., how the investors are reacting towards changes in stock changes and volume of investment). The investment advisors and financial managers of the companies listed at PSX, such as Fauji Fertilizer, Unilever Pakistan Foods, Lucky Cement, Nestle Pakistan, and Arif Habib are throughly examining the decision-making behavior of individual equity investors to handle the individual investors accordingly. For instance, the financial managers can get a good understanding of the behavior of the PSX investors and can offer them better opportunities for investment.

Declaration of ownership:

This report is our original work.

Conflict of interest:

None.

Ethical clearance:

This study was approved by our institutions.

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