Heuristic biases in investment decision-making and perceived market efficiency
A survey at the Pakistan stock exchange

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Abstract

Purpose – This paper aims to clarify the mechanism by which heuristics influence the investment decisions of individual investors, actively trading on the Pakistan Stock Exchange (PSX), and the perceived efficiency of the market. Most studies focus on well-developed financial markets and very little is known about investors’ behaviour in less developed financial markets or emerging markets. The present study contributes to filling this gap in the literature.

Design/methodology/approach – Investors’ heuristic biases have been measured using a questionnaire, containing numerous items, including indicators of speculators, investment decisions and perceived market efficiency variables. The sample consists of 143 investors trading on the PSX. A convenient, purposively sampling technique was used for data collection. To examine the relationship between heuristic biases, investment decisions and perceived market efficiency, hypotheses were tested by using correlation and regression analysis.

Findings – The paper provides empirical insights into the relationship of heuristic biases, investment decisions and perceived market efficiency. The results suggest that heuristic biases (overconfidence, representativeness, availability and anchoring) have a markedly negative impact on investment decisions made by individual investors actively trading on the PSX and on perceived market efficiency.

Research limitations/implications – The primary limitation of the empirical review is the tiny size of the sample. A larger sample would have given more trustworthy results and could have empowered a more extensive scope of investigation.

Practical implications – The paper encourages investors to avoid relying on heuristics or their feelings when making investments. It provides awareness and understanding of heuristic biases in investment management, which could be very useful for decision makers and professionals in financial institutions, such as portfolio managers and traders in commercial banks, investment banks and mutual funds. This paper helps investors to select better investment tools and avoid repeating expensive errors, which occur due to heuristic biases. They can improve their performance by recognizing their biases and errors of judgment, to which we are all prone, resulting in a more efficient market. So, it is necessary to focus on a specific investment strategy to control “mental mistakes” by investors, due to heuristic biases.

Originality/value – The current study is the first of its kind, focusing on the link between heuristics, individual investment decisions and perceived market efficiency within the specific context of Pakistan.

Keywords Availability, Overconfidence, Market efficiency, Anchoring, Investment decision, Representativeness

Paper type Research paper

JEL classification – D01, Z39
1. Introduction

Individuals make distinctive choices in their lives, some choices are substantial and others are of little consequence. Some decisions are simple and others are complicated and require a multi-step decision-making process. Human beings are referred to as making decisions on the basis of their experience and intuition, instead of gathering information, which would encourage them to make better decisions. Theories of finance have been developed on the assumption that investors in financial markets are rational, take part in frictionless markets and always make rational decisions. In the financial literature, there are important conventional theories, such as the Efficient Market Hypothesis (EMH; Fama, 1970) and the Modern Portfolio Theory (Markowitz, 1952), which hold that individual investors are rational as well as risk averse and prefer a low risk to a high risk at a given level of return. The Capital Asset Pricing Model explains market trends and the behaviour of individual investors, and large numbers of studies support these theories. Thus, traditional financial theories assume that individual investors are rational beings.

Recent studies in the field of standard finance show that individual investors want to make their investment decisions rationally (Kubilay and Bayrakdaroglu, 2016). Arora and Kumari (2015) documented that investors use different models and theories of standard finance to estimate risk and expected returns when making investment decisions. But, in reality, investors display irrational behaviour in the market place: they trade excessively, purchase stock without looking at the fundamental value, buy stocks which their friends are buying, base their decisions on past performance and retain loss-making stocks while selling winning stocks. Investors often simplify their decision-making processes by using behavioural heuristics that might cause systematic errors in judgment and lead to satisfactory investment choices, but not maximize utility (Kahneman and Tversky, 1979).

However, behavioural finance researchers say that human beings do not behave as rationally as economists suppose, their decisions are influenced by their psychological feelings. According to behavioural finance scholars, every individual has unavoidable psychological biases that prevent them from making rational decision, and have very bad consequences on investment decisions and market efficiency. Bakar and Yi (2016) found that psychological factors have a significant impact on the decision-making of individual investors in stock markets. According to Baker and Nofsinger (2010), "cognitive errors", "fundamental heuristics" and "psychological biases" affect the investment decision-making process. Mental biases are alluded to as convictions and inclinations (Pompain, 2006); they collectively influence the individual to adopt a particular method of activity (Sahi et al., 2013) and, in addition, intuitive reasoning and judgment clearly guide investment-related decisions (Bondt et al., 2013). According to Shefrin (2007), behavioural biases are the main reason for irrationality in decision-making and poor investment performance.

Cohen and Kudryavtsev (2012) showed that investors' decisions are influenced by their knowledge, historical performance, past experiences and expectations. Individual investors tend to show behavioural biases while trading and, due to these biases, they make trading mistakes (Chen et al., 2007) and then, due to these trading mistakes and/or incorrect investment decisions, the market may overreact or underreact; in both situations, the market becomes inefficient. Stock prices decrease dramatically, as a consequence of funds or capital moving from the stock market into the real estate market, and cause the withdrawal of a large number of investors, as a reflection of the effect of behavioural factors on investors' decisions and reactions (Ngoc, 2014).

Investment decision-making and market efficiency are complicated concepts that are still under discussion. There is a positive connection between the economy and the securities exchange; the deterioration of the stock exchange will adversely affect the economy and vice
versa. Thus, individual investors’ decisions on the securities exchange assume a critical part in deciding market development, which then manages the economy (Kengatharan and Kengatharan, 2014). To understand and give some suitable clarification for investors’ choices and market efficiency, it is important to explore which behavioural factors influence individual investors’ decisions on the Pakistan Stock Exchange (PSX) and how these factors influence the market’s efficiency.

Several studies have demonstrated that, in reality, markets are inefficient because of bounded rationality, cognitive and emotional weakness, fundamental heuristics, intuitive reasoning and limited information, as well as anomalies which persist in the market and produce inefficiency (Ajmal et al., 2011). Financial specialists make common errors because of behavioural biases (Baker and Nofsinger, 2002), which significantly affect the market price (Maheran and Muhammad, 2009) and, as a result, markets become inefficient. Due to heuristic biases, errors occur and the price of securities deviates from their fundamental value (Shefrin, 2006), thus causing markets to become inefficient.

The issue is how the various factors affect investment decisions and the market’s efficiency. The focus of this study was on behavioural biases; specifically, the study investigated how heuristic biases (overconfidence bias, representative bias, anchoring and adjustment bias and availability bias) affect the decisions of individual investors trading on the PSX and perceived market efficiency.

The present study thus planned to seek answers for questions such as: Do heuristic biases affect the investment decisions of individual investors trading on the PSX? Do heuristic biases affect market efficiency? The research is important for the domain of behavioural finance because the concept of behavioural finance is new as compared to other financial theories. In developing markets, behavioural finance is used to discover the factors that impact financial decisions, which could lead to markets becoming inefficient. However, behavioural finance has a limited number of applications in developing financial markets. This research is conducted with the hope of ensuring the suitability of using behavioural finance for all kinds of financial market.

As mentioned above, the field of behavioural finance is a very new area of research and hence, contextually, this research is going to be unique. Studies conducted in Western contexts cannot be generalized to Asian countries and may not necessarily have any relevance to Pakistan because of the difference in contextual paradigm (i.e. individualist vs collectivist)[1]. Most studies concentrate on individualistic cultures and well-developed financial markets, and very little is known about the profiles, inspirations and conduct of individual investors in collectivist cultures and less developed markets. This present study helps fill this gap in the literature by considering how investor behaviour influences markets and how markets become inefficient in collectivist societies, particularly in Pakistan. In developing countries, like Pakistan, market fundamentals are different from developed countries, and the thinking levels of Pakistani investors also vary from investors in developed countries; therefore, this research is going to contribute contextually. Hofstede (2006) says that “power distance as the culture is the collective programming of the mind which distinguishes the members of one group or category of people from another”.

The study is important for investors and stock market players because they can become aware of the impact of their own cognitive and emotional factors on their decision-making process. When they are aware of the psychological factors that lead to irrational decision-making, they can take corrective action to enable more rational decision-making, as a result of which, eventually the market will become efficient. This study is beneficial to stock market policy makers and regulators, in assisting them in understanding the mechanism and role behavioural factors have on investors’ decision-making.
Of two theories supporting the research phenomenon, one is known as prospect theory and the other is known as heuristics theory. Prospect theory, which is explained by Kahneman and Tversky (1979), posits that people make decisions on the basis of gains and losses, rather than final outcomes, as well as setting reference points and making decisions accordingly. People value gains and losses differently. This value is calculated from a reference point. In other words, we can say that this alternative theory of choice, in which different values are allotted to gains and losses rather than to final outcomes, in which decisions are related to the probability of an event, could be the theme of major biases and heuristics (Kahneman and Tversky, 1979). According to heuristics theory, decision makers use heuristics to avoid the risk of losses in uncertain situations. Heuristics are rules of thumb, which decision makers use in complex and uncertain situations to make decisions easily (Brabazon, 2000; Ritter, 2003), by reducing the complexity of measuring probabilities and forecasting values to simpler judgments (Kahneman and Tversky, 1974). Heuristics allows human beings to speed up decision-making, compared to rationally processing the available information. In general, these heuristics are beneficial and useful when time is limited (Waweru et al., 2008), but sometimes they lead to biases (Kahneman and Tversky, 1974; Ritter, 2003). According to Shah and Oppenheimer (2008), all heuristics are a form of effort reduction, using one or more of the following: analysing only a few clues, integrating less information or analysing only a few alternatives.

Representative, availability, overconfidence and anchoring and adjustment are heuristic biases which are used by investors to reduce the risk of loss in uncertain situations. When individual investors use heuristics, they reduce the mental effort in the decision-making process, but that leads to errors in judgment and, as a result, investors make incorrect investment decisions, which could lead to the market becoming inefficient. Many researchers in financial economics argue that these heuristics can influence financial decision-making and forecasting financial variables, such as earnings or material profit (Debondt and Thaler, 1990; Klein, 1990; Abarbanell and Bernard, 1992), as well as influencing financial markets’ behaviour (Debondt and Thaler, 1985). Standard finance does not demonstrate these patterns satisfactorily; they normally hurt the investor’s portfolio performance. But behavioural finance provides a satisfactory demonstration and understanding of why individual investors trade, how they choose their portfolios and how they perform (Subrahmanyam, 2008).

The remainder of the paper is organized as follows: we discuss previous studies regarding the relationship of heuristic biases with investment decision and perceived market efficiency. The section after that discusses the research methodology and design. The final section of the study reports the empirical results and discussion.

2. Literature review
Many researchers have investigated the effect of psychological biases on individual investors’ decision-making and market efficiency from different viewpoints in different cultures or environments, some of which obtained very relevant and valuable results for this study. A limited review of prior studies regarding heuristic biases (overconfidence bias, representative bias, anchoring and adjustment bias and availability bias), market efficiency and investment decisions are cited hereafter.

2.1 Market efficiency
The concept of market efficiency was explained by Fama (1970) in his paper “Efficient Capital Market”. It is one of the most important theories of standard finance, stating that financial markets are efficient (Sewell, 2011), which means that the price of securities holds
at their fair value (Aguila, 2009). Market efficiency means the price of securities dominating the financial market reflects all available information (Fuentes, 2011; Malkiel, 2003). So, we can say that a market in which prices always amply reflect all available information is called an “efficient market” (Fama, 1997; Lo, 2007). According to Hayat et al. (2006), in efficient markets, investors are regarded as rational, unbiased, consistent, making optimal investment decisions, without psychological and emotional effects.

According to the EMH, there are three forms of market efficiency: the weak form, the semi-strong form and the strong form. These three forms of market efficiency are discussed below.

The weak form of efficiency is defined as past prices or returns reflecting future prices or returns. When the piece of securities is adjusted on the basis of historical information, then this information is available to everybody, and so, on the basis of that information, nobody can earn abnormal returns (Aguila, 2009).

The semi-strong form of efficiency refers to when prices of securities not only reflect historical information but also any additional publicly available information. Public information means companies’ financial reports, press releases, government announcements, dividend announcements, merger and acquisition announcements, monetary policy announcements and inflation announcements. When the price of securities responds to the public information, the public information is available to everybody, and nobody can earn abnormal returns on the basis of this information (Aguila, 2009).

The strong form of efficiency suggests that prices of securities reflect all available information (private or public information). When the price of securities responds to private information, this information is available to everybody, and so, on the basis of that information, nobody can earn abnormal returns. The application of the strong form of efficiency is not possible in the market (Aguila, 2009).

According to Ritter (2003), The EMH is based on the assumptions that decision makers and financial investors are rational and competes to earn abnormal profits, and that the prices of securities hold their fundamental value due to competition between different profit-oriented investors. Moreover, Shiller (2003) said that all investors integrate all available information in their decisions, which is why prices can be considered as the best for true investment. We cannot hold onto the theory of rational behaviour, however, because human beings are affected by their emotions, beliefs and mood. So, they cannot remain rational for long periods of time and this is why we reject the traditional theory of finance (Shah et al., 2012).

The previous literature shows that behavioural biases can make financial markets less efficient by mispricing securities, even though there are rational arbitrageurs who bring security prices to their fundamental values (Kyle and Wang, 1997; Odean, 1998). The price of securities do not always hold with their fair value but can deviate from their fundamental value because of traders who are not fully rational (Barberis and Thaler, 2003). Shah et al. (2012) said that, due to heuristic biases and framing effects, the price of securities deviates from their fundamental value and, as a result, markets become inefficient. According to Birau (2011), it is impossible to improve markets for a longer period of time.

Several studies demonstrated that, in real life, markets are inefficient because of behavioural biases, as well as other aspects of capitalism. In reality, markets are never absolutely efficient nor absolutely anomalous (Pompain, 2006). Fama (1997) explained in his paper “Market Efficiency, Long Term Returns, and Behavioural Finance” that anomalies persist in the market for short periods of time, due to methodology, but, in the long run, the anomalies go away due to changes in proficiency. The “noise trader risk” and “limit to arbitrage” explain why so many anomalies persist in the markets that they produce...

The concept of bounded rationality also persists in the market; due to bounded rationality, individual investors cannot take decisions that cover every contingency and, as a result, markets become inefficient (Dietrich et al., 2001). Russel and Torbey (2002) said that individuals have limited capability to process information; therefore, they show systematic bias in information processing, which leads them to make mistakes and, as a result, markets become inefficient. Furthermore, according to Simon (1957), the power of human thinking is limited in a critical time, and so, when solving problems, we cannot process information at our maximum capacity.

According to the limit of arbitrage theory, if irrational traders cause deviations from fair or fundamental values, then rational traders are powerless to do anything about it (Shleifer and Vishny, 1997). Behavioural finance indicates that deviations from fair or fundamental values are caused by traders, who are not fully rational (Barberis and Thaler, 2003). This mispricing is evidence of limited arbitrage, which is why the prices of securities change even if their fundamental value does not change. According to Jo and Kim (2008), where rational and irrational traders interact, irrationality can have a substantial and long-term impact on prices. Daniel et al. (2001) state that arbitrageurs are risk averse; therefore, they may not be able to correct all systematic mispricing. According to Shleifer and Vishny (1997) and Shleifer (2000), arbitrage opportunity is the basis of EMH but, in a real situation, arbitrage is not only risky but also limited.

A common reason for the disappearance of the EMH is that investors normally do not gather complete information and thus their trading behaviour is based on incomplete data. For example, in some cases, investors may respond to functioning, selling stock in which they face losses and buying stock in which they face a gain; such a response leads to the price of stock deviating from its fair or fundamental value (Ajmal et al., 2011). Both underreaction and overreaction persist in the market as a result of trading behaviour, which Fama (1997) described as confirmation that anomalies persist in the market; as a result, the EMH changed. Shah et al. (2012) suggest that market inefficiency exists because the price of securities may not correctly reflect all available information. Some securities may be overvalued or undervalued. The concept of market efficiency is wrong because efficient market theory may lead to totally incorrect interpretation of events, such as a “major stock market bubble” (Shiller, 2003).

2.2 Investment decisions

Investment is the process of investing money with the hope of future benefit. The world of investment can be variable but, through research and keeping your head straight, you can be successful. Every investor wants to make optimal investment decisions (Sharpe, 1964). According to Merton (1987), optimal and rational investment decisions depend on advance financial knowledge. Standard finance assumes that people have complete information and make rational decisions all the time.

Behavioural finance assumes that investment decisions can be irrational, due to imperfect information (Bikhchandani et al., 1992), bounded rationality (Pompain, 2006), anomalies (Ajmal et al., 2011), fundamental heuristics (Baker and Nofsinger, 2002), psychological biases (Shefrin, 2007) or behavioural biases (Baker and Nofsinger, 2002) or behavioural biases (Shefrin, 2007) and psychological accounts of investors’ mental status play a key role in understanding irrational decision-making.
According to cognitive theory, cognitive biases and heuristics may cause individuals to make less than rational decisions (Bazerman, 1998; Baron, 1998). Heuristics is referred as “rules of thumb” that lead towards cognitive biases. Bazerman et al. (1984) argue that cognitive biases are personal beliefs that help individuals deal with difficult decisions. They are mental short cuts, which decision makers use in complex and uncertain situations to make decisions easily (Barnes, 1984; Ritter, 2003). According to Tversky and Kahneman (1973), systematic errors occur due to these heuristics and biases, which lead to adverse outcomes (Barnes, 1984).

Many researchers in economics argue that heuristic biases can influence financial decision-making and forecasting financial variables, such as earnings or material profit (Debondt and Thaler, 1990; Klein, 1990; Abarbanell and Bernard, 1992). This research measures the impact of overconfidence bias on individual investment decisions and performance. A limited review of prior studies of how heuristics affect individual investment decisions and market efficiency is discussed below.

2.3 Overconfidence bias

Overconfidence is a cognitive heuristic bias, which can be defined as unwarranted faith in one’s intuitive reasoning, judgments and cognitive abilities (Pompain, 2006). When people overestimate their knowledge and skills, it is a reflection of overconfidence (Debondt and Thaler, 1995; Hvide, 2002). Pompain (2006) argues convincingly, “too many people overvalue what they are not and undervalue what they are”; such people suffer from overconfidence bias.

According to Moore and Healy (2008), three attributes indicate individuals who are suffering from overconfidence bias: overestimation, over-placement and over-precision. In overestimation, individuals focus only on their own skills, the decision maker’s beliefs about their quality of performance rather than their actual performance (Statman et al., 2006). It can be measured through over-performance, the level of control, chance of success and overestimation of one’s actual abilities – all these attributes are known as overestimation (Duttle, 2015). Over-placement means people consider themselves better than others (Larrick et al., 2007). Over-precision means investors are too or excessively certain of their judgment, ignoring the risk factors, which are associated with investment decisions (Odean, 1999).

According to Simon et al. (2000), overconfidence may exist because individual investors do not sufficiently revise their initial assessment after receiving new information; therefore, they do not consider to what extent their assessment may be incorrect.

2.3.1 Overconfidence bias and market efficiency. Many studies have been conducted on overconfidence bias and market efficiency; some of them found a positive relationship between overconfidence bias and market efficiency, which means that market efficiency increased due to overconfidence bias. Overconfidence bias can affect rational behaviour in decision-making, but extensive information gathering can help increase market efficiency (Shah et al., 2012). According to Ko and Huang (2007), irrational behaviour does not always decrease market efficiency.

Overconfident investors believe that they can earn abnormally large returns by outperforming the market. Investors that are overconfident can help increase market efficiency because they spend enough time and resources collecting more and more information, which is why prices of securities are close to their fundamental value. Investors use their resources to collect new information; sometimes they underestimate information from others and try to get more and more information on their own behalf (Gruber, 1996; Malkiel, 1995; Elton et al., 1993). Ko and Huang (2007) found that overconfidence bias improves market efficiency because overconfident investors bring more and more
information into the market, so the chance of mispricing is very small as a result of a high level of rationality in the market.

Some researchers disagree with the view that there is a positive relationship between overconfidence bias and market efficiency. This school of thought is the motivating idea for this research. Overconfidence decreases market efficiency, even where there are rational arbitrageurs in the market that bring prices to their fair value (Odean, 1998; Kyle and Wang, 1997).

According to Malkiel (2003), when investors experience success again and again, they suffer from overconfidence bias and become irrational in their decision-making, which leads to market inefficiency. Hirshleifer et al. (1994) conducted a study in which they found that overconfidence bias can lead to inefficient results. Overconfident investors in the market engage in excessive trading and, therefore, markets become inefficient (Debondt and Thaler, 1995; Statman et al., 2006). A study conducted by Inaiishi et al. (2010) to investigate the effect of overconfident investor behaviour on stock markets concluded that, due to increasingly overconfident investors, the market increases or rising trends occur in the market.

From the previous literature, some studies show a positive relationship between overconfidence and market efficiency and some show a negative relationship. In the studies concluding in favour of overconfidence bias and market efficiency, researchers argue that overconfident investors can help increase market efficiency because they spend time and resources collecting more and more information and that is why the prices of securities are closer to their fundamental value. In the studies concluding against the overconfidence bias and market efficiency, researchers argue that overconfident investors underestimate risk factors and overestimate their investment skills, ignoring market realities and engaging in excessive trading; as a result, the market becomes inefficient:

**H1.** The overconfidence bias has a significant negative influence on perceived market efficiency.

### 2.3.2 Overconfidence and investment decision

An overconfident heuristic has very bad consequences for investment decision-making and the performance of investors. The study conducted by Bakar and Yi (2016) found that overconfidence bias has a significant impact on investors’ decision-making. Investors suffering from overconfidence bias underestimate risk factors and overestimate expected profit (Baker and Nofsinger, 2002), their portfolios are poorly diversified and they trade excessively, while experiencing lower profits or returns than those of the market (Odean, 2002). According to Shefrin (2000), investors overestimate their own ability in forecasting the trend accurately, which results in bad forecasting.

According to Odean (1998), due to traders’ overconfidence, excessive trading takes place on stock exchanges, which results in low returns for traders. Park et al. (2010) studied the impact of confirmation and overconfidence in investors and found that it negatively influenced their returns. Trinugroho and Sembel (2011) argue that overconfident investors trade excessively, due to their belief in their own skills and knowledge, consequently they get lower returns than others. Chen et al. (2007) conducted research on investment decision-making in an emerging market and found that Chinese investors make poor trading decisions or trading mistakes because they suffer from overconfidence bias.

According to Park et al. (2010), overconfidence negatively affects investment decisions and performance. Kengatharan and Kengatharan (2014) also suggest that overconfidence adversely affects investment-related choices and performance. Bashir et al. (2013) concluded that overconfidence bias impacts investors’ financial decisions. Fagerstrom (2008) found that the S&P 500 were inflated due to overconfidence bias and overoptimistic bias. Waweru et al. (2008) found that overconfidence bias affected the financial decisions of institutional
investors on the Nairobi Stock Exchange. According to Debondt (1998), financial decisions are affected by overconfidence bias. According to Gervais et al. (2001), both overconfidence and over-optimism are personality traits which affect the individual’s decision-making process. According to Kafayat (2014) and Seppala (2009), overconfidence bias negatively affects the rational decision-making of investors.

After reviewing the relevant literature, authors concluded that overconfidence bias has a negative effect on rational decision-making. Overconfident investors tend towards inappropriate or risky investments, as well as trading excessively, which can have a negative effect on their returns:

H2. Overconfidence bias has a significant negative influence on the investment decisions of individual investors on the PSX.

2.4 Representativeness bias
Representativeness is a cognitive heuristic bias which can be defined as a mental shortcut that involves decisions being made according to mental stereotypes (Shefrin, 2005). Representativeness is defined as the degree of similarity that an event has with its parent population (DeBondt and Thaler, 1995) or we can say that the degree to which an event represents its population (Kahneman and Tversky, 1974). Due to representativeness, people give more value to recent experience and ignore the average long-term rate (Ritter, 2003). Representativeness puts too much trust in stereotypes and leads individuals to make forecasts that are not appropriate for the relevant situation (Shefrin, 2008).

There are two types of representativeness bias: base-rate neglect and sample-size neglect. Base-rate neglect means the decision maker considers irrelevant or incorrect information, when judging the likelihood of a particular investment outcome or we can say that they depend on stereotypes when making investment decisions, without adequately incorporating the base likelihood of the stereotype occurring (Pompain, 2006). Sample-size neglect occurs when decision makers try to generalize on the basis of too few examples (Barberis and Thaler, 2003) or “incorrectly assume that small sample sizes are representative of populations” (Pompain, 2006).

According to Kahneman and Tversky (1974), individuals use the representativeness heuristic because they do not fully understand the basic concept of forecasts, the preponderance of an event within its population of events or characteristics. Another reason is insensitivity to the sample size because it is incorrectly believed that small samples of events, people, etc. are representative of the entire populations from which the sample is drawn. People tend to overestimate the likelihood that the characteristics of a small sample of a population adequately represent those of the entire population. “We also tend to use the representativeness heuristic when we are very aware of anecdotal evidence based on a very small sample of the population” (Kahneman and Tversky, 1974).

The consequences of the representativeness heuristic are that decision makers adopt forecasts on the basis of a small sample and update beliefs using simple classifications rather than complex data.

2.4.1 Representativeness bias and market efficiency. According to Hadi (2017), the representativeness heuristic negatively affects perceived market efficiency. People make probabilistic judgments using the representative heuristic (Tversky and Kahneman, 1973); the “positive feedback hypothesis” states that correct information (incorrect information) generates positive (negative) attitudes that emphasize the impact of information on the price of an asset. There is a particular form of representative heuristic which states that there is a trend to overstate the most recent experience (Clapp and Tirtiroglu, 1994). The
representative heuristic affects the market because investors become over-optimistic due to past successes, or over-pessimistic due to past losses, which affect investors’ decisions; subsequently the price of securities deviates from their intrinsic or fair value (Chong et al., 2011) and, as a result, the market becomes inefficient. Individual investors believe that past returns are indicative of future returns (Chen et al., 2007), which reflects representativeness. According to DeBondt and Thaler (1985), over-optimism due to past successes and over-pessimism due to past losses could affect the decision-making of individual investors and subsequently prices deviate from their fundamental levels and the market becomes inefficient.

The literature shows that the representativeness heuristic, directly or indirectly affects market efficiency. Markets are not efficient because of individuals’ biases; market efficiency also depends on the trading behaviour of individual investors who may make incorrect decisions:

**H3.** The representativeness bias has a significant negative influence on perceived market efficiency.

### 2.4.2 Representativeness bias and investment decisions

Many studies have been conducted on representativeness bias and investment decisions; some of them found a positive relationship between representativeness bias and investment decisions, which means that, due to representativeness bias, investment decisions improved. Toma (2015) investigated the impact of behavioural bias on the decisions of individual investors trading at the Romanian stock exchange and found that representativeness bias positively affected investment decisions. He suggested that individual investors’ returns increased due to representativeness bias. Irshad et al. (2016) also found a positive relationship between representativeness bias and investment decisions. Ikram (2016) found that representativeness bias positively affected the decisions of individual investors trading on the Islamabad stock exchange, meaning that individual investors’ returns increased due to representativeness bias.

Some researchers disagree with the view that there is a positive relationship between representativeness bias and investment decisions. This school of thought is the motivating idea for this research. Investors who have representativeness bias make trading mistakes or poor trading decisions, which lead them towards irrational behaviour. Chen et al. (2007) concluded that Chinese investors make trading mistakes or poor trading decisions due to representativeness bias. According to Lakonishok et al. (1994), companies engage in poor investments due to the problem of representativeness.

Athur (2014) suggested that representativeness bias negatively affects investment decisions. Yaowen et al. (2015) also found that representativeness bias decreases decision-making. Waweru et al. (2008) found that representativeness bias affected the financial decisions of institutional investors on the Nairobi Stock Exchange. A study conducted by Onsomu (2014) describes how individual investors’ decisions at the Nairobi Securities Exchange are affected by representativeness bias.

After reviewing the relevant literature, authors have concluded that some studies show a positive relationship between representativeness bias and investment decision and others show a negative relationship. In studies finding in favour of representativeness bias and investment decision, researchers argue that representativeness bias can improve investment decision-making. In studies finding against the representativeness bias and investment decision, researchers argue that representativeness bias decreases the quality of investment decision-making because investors who are suffering from representativeness bias cannot make rational
decisions all the time and they show irrational behaviour in the market, due to the representativeness heuristic and make trading mistakes:

\[ H4. \] Representativeness bias has a significant negative influence on the investment decisions of individual investors on the PSX.

2.5 Availability bias
Availability is a cognitive heuristic bias, also known as mental shortcut, that occurs when people rely too much on easily available information in their judgments or forecasting (Ngoc, 2014). It occurs when investors assess the likelihood of an outcome based on how easily the outcome comes to mind (Kahneman and Tversky, 1974). Availability heuristic is assessing the frequency of an event by its availability, the ease with which relevant cases come to mind (Brahmana et al., 2012).

Decision makers who are suffering from the availability heuristic fail to diversify their investment portfolio, choose investments based on retrievability rather than the basis of a thorough analysis of the options, fail to accomplish an appropriate asset allotment and fail to choose alternative investments when suitable because they limit their investment opportunities.

2.5.1 Availability bias and market efficiency. According to Hadi (2017), the availability heuristic negatively affects perceived market efficiency. Tversky and Kahneman (1973) suggest that individuals determine the chances of an event by using the availability heuristic, the ease with which relevant data come to mind. They explain in their study that depending on the availability heuristic leads individuals to “systematic biases” and, due to these biases, they overestimate the probability of it repeating. People use the availability heuristic in probabilistic situations to avoid risk, which has a negative impact on the decision-making process (Keller et al., 2006) and, as a result, the market becomes inefficient. According to Clark (2014), individuals “hear dramatically bad news” and, on the basis of that bad news, they tend to overrate the chance of it repeating; this phenomenon is known as the availability heuristic or availability bias. He also explains that the availability bias negatively affects individuals’ investment decisions and, as a result, markets become inefficient:

\[ H5. \] The availability bias has a significant negative influence on perceived market efficiency.

2.5.2 Availability bias and investment decisions. Many studies have been conducted on availability bias and investment decisions; some of them found a positive relationship between availability bias and investment decisions, which means that, due to the availability bias, investment decisions improved. Ikram (2016) investigated the impact of Behavioural determinants on the decisions of individual investors trading on the Islamabad stock exchange and found that availability bias positively affected their investment decisions, meaning that, due to availability bias, individual investors’ returns increased. Khan (2015) also found that availability bias has a significant impact on the investment decisions of individual investors.

Some researchers disagree with this view and this school of thought is the motivating idea for this research. Clark, who is an investment advisor, investigated how availability bias (How the news can hurt your investment decisions) affects investment decisions and suggested that availability bias negatively affects individuals’ investment decisions. Waweru et al. (2008) found that availability bias affected the financial decisions of institutional investors trading on the Nairobi Stock Exchange. Folks (1988) found that
consumers’ judgments of product performance were significantly influenced by the availability heuristic. A study conducted by Massa et al. (2005) indicated that individual stock picking decisions are affected by availability bias.

After reviewing the relevant literature, some studies show a positive relationship between availability bias and investment decisions, which means that, due to availability bias, investors make better investment decision. Some studies show that there is a negative relationship between availability bias and investment decisions, which means that availability bias can lead to worse investment decisions:

H6. Availability bias has a significant negative influence on investment decisions of individual investors on the PSX.

2.6 Anchoring and adjustment bias
Anchoring and adjustment is a cognitive heuristic bias that tells us about human beings’ tendency to rely excessively on the first piece of information provided (the “anchor”) when making decisions. Anchoring and adjustment occurs during the decision-making process, when investors use an initial piece of information to make decisions or judgments. Once an anchor is set, then all other assessments or judgments revolve around that anchor; as a result, there is an error or bias towards interpreting other information around the anchor. Slovic and Lichtenstein (1971) explain the anchoring and adjustment bias as people using some initial values to make an estimation that is adapted to yield the final answer. The initial value may be adjusted with the help of problem formulation, or it may be suggested by partial computation. Kahneman and Tversky (1974) argue that different starting points yield different estimates, which are biased towards the initial value. We call this phenomenon anchoring. So, the anchoring and adjustment bias can be explained by the tendency of individual investors to “anchor” their ideas or thoughts to a logically irrelevant reference point when making a decision (Pompain, 2006).

2.6.1 Anchoring and adjustment bias and market efficiency. According to Duc Hien et al. (2014), the anchoring and adjustment bias has a significant impact on the efficiency of the Vietnamese financial market. Anchoring and adjustment bias affects the market participants when they forecast the probability of future outcomes and has a significant impact on financial markets (Cen et al., 2013; Oomen, 2011). Early work by Duc Hien et al. (2014) shows that the anchoring and adjustment bias affects the quality of analysis and results in forecasting errors, which also influences market efficiency. Campbell and Sharpe (2009) show that professional forecasters anchor their anticipations of macroeconomic data, such as the consumer price index, on previous values, which leads to systematic and fairly large forecast errors as result markets become inefficient:

H7. The anchoring and adjustment bias has a significant negative influence on perceived market efficiency.

2.6.2 Anchoring and adjustment bias and investment decisions. Lowies et al. (2016) found that anchoring and adjustment has a significant effect on the decisions of property fund managers. A study conducted by Ishfaq and Anjum (2015) suggested that anchoring positively affects risky investment decisions. The results of the study by Waweru et al. (2008) indicate that the anchoring and adjustment bias affected the financial decisions of Institutional investors on the Nairobi Stock Exchange. A study conducted by Luong and Ha (2011) described how the anchoring and adjustment bias affected investment decisions of individual investors at the Ho Chi Minh Stock Exchange. A study conducted by Abraham et al. (2014) shows that anchoring and adjustment bias
influences the investment decisions of listed property fund managers in South Africa. Such bias may lead to judgment errors and the potential of missed gains.

Some studies have shown that the anchoring and adjustment bias influences different types of decisions, such as the estimation of the likelihood of disease (Brewer et al., 2007), judicial sentencing decisions (Englich and Mussweiler, 2001), real estate acquisitions (Northcraft and Margaret, 1987), job performance evaluation (Latham et al., 2008), judges’ rankings in competitions (Ginsburgh and Van Ours, 2003) and personal injury verdicts (Chapman and Bornstein, 1996). Murithi (2014) also found that decisions of individual investors in Kenya are affected by anchoring.

After reviewing the relevant literature, authors have identified that the anchoring and adjustment bias has a negative effect on rational decisions. Investors with an anchoring and adjustment bias tend to make inappropriate investments and judgment errors which may lead to missing gains:

**H8.** Anchoring and adjustment has a significant negative influence on the investment decisions of individual investors on the PSX.

So, the previous literature shows that heuristic biases, such as overconfidence bias, representative bias, anchoring and adjustment bias and availability bias, directly or indirectly, affect market efficiency and investment decisions. Markets are inefficient because of individual’s biases, as market efficiency depends on the trading behaviour of individual investors, who may make incorrect investment decisions due to bounded rationality; as a result, anomalies persist in the market and produce market inefficiency.

2.7 Research model

As mentioned in the literature review, heuristics biases undoubtedly impact the investment decisions of investors in the financial markets, especially in the stock markets, as well as having a significant impact on the markets’ efficiency. This study explores the influence levels of the heuristics variables on the individual investors’ decisions at the PSX and perceived market efficiency.

3. Research methodology and research design

Research methodology is an approach for problem solving and arriving at new knowledge of the subject in question. Everything that contributes to the goal’s achievement is the part of the research methodology (Holme and Solvang, 1996) and the research design furnishes the framework for the collection and analysis of data (Ghauri and Gronhaug, 2010; Bryman and Bell, 2007).

3.1 Target population

The population for this study was individual investors at the PSX, as well as brokers who invest on behalf of investors, because this study was conducted in the Pakistani context and the topic was relevant to investment decisions of individual investors and perceived market efficiency.

3.2 Sampling and data collection

The main objective of the research is to explore how heuristics influence the investment decisions of individual investors at the PSX and perceived market efficiency. To achieve this research objective, a questionnaire was used as the data collection method because of the time and cost savings as compared to other methods, such as interviews, video conferencing.
and brainstorming (Bryman and Bell, 2007). Another reason was that, as the respondents were individual investors, they might have not much time for interviews, so questionnaires are the best methods for data collection because they can complete it whenever they have free time.

A total of 315 questionnaires were directly delivered to individual Pakistani investors currently trading at the PSX. Of these, 217 were returned, but only 143 questionnaires were fully completed by individual investors and used for analysis, representing a response rate 68.89 per cent. The sample size depended on the availability of resources, such as time, human capital, financial resources and the ability of researchers (Saunders et al., 2009). Hair et al. (1998) documented that, in quantitative research, data collected from at least 100 respondents is needed to get reliable results from the data analysis statistical tools. The convenient purposively sampling technique was used in this study for data collection.

3.3 Nature of data collected for this study
Primary data were collected for testing the hypotheses. Primary data are data collected first time for a particular purpose and which are required to accompany secondary data which is demanded (Eriksson and Wiedersheim-Paul, 1997).

3.4 Instrumentation for data collection
Primary data were collected using five-point Likert scales in the questionnaire. The target population was asked closed questions in the questionnaire. All items in the questionnaire were responded to using a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), unless otherwise stated. The questionnaire consisted of seven sections. In first the section, the respondents were asked questions about their personal information. Details of other sections are discussed below.

3.4.1 Section II: perceived market efficiency. Six items were used to measure market efficiency. Questions were adopted from Luong and Ha (2011). Sample items include: “You consider carefully the price changes of stocks that you intend to invest in” and “Market information is important for your stock investment”.

3.4.2 Section III: overconfidence. Sixteen items were used to measure overconfidence. The questions were divided into its three facets, namely, over-precision, over-placement and overestimation as identified by Odean (1999), Barber and Odean (2000). There were six questions about over-precision and five questions each regarding the other two facets. Sample items for overestimation include “You believe that your skills and knowledge of stock market can help you to outperform the market” and “You are confident of your ability to do better than others in picking stocks”. The sample items for over-placement include “You have a better investment record as compared to others” and “You earned more return than others”. The sample items of over-precision include “You are actively involved in trade activity” and “You make investment for making money quickly”. Items were adopted from Mouna and Jarbouï (2015), Kengatharan and Kengatharan (2014) and Nada and Moa’mer (2013). Some items were self-constructed after reviewing the relevant literature and with the help of the book “Behavioural Finance and Wealth Management” by Pompain (2006).

3.4.3 Section IV: representativeness. Four items were used to measure the representativeness bias. The questionnaire was adopted from the study by Nada and Moa’mer (2013). The sample items include “I try to avoid investment in companies with a history of poor earnings” and “I rely on past performance to buy stocks because I believe that good performance will continue”.

3.4.4 Section V: anchoring and adjustment. Six items were used to measure the anchoring and adjustment bias. The questions were adopted from the study by Nada and Moa’mer (2013).
The sample items include “I compare the current stock prices with their recent high and low prices to justify my stock purchase” and “I use the stock purchase price as a reference point for trade.”

3.4.5 Section VI: availability. Six items were used to measure the availability bias, adopted from the study by Nada and Moaler (2013). The sample items include “If I heard from a friend about a stock that achieved high returns I would buy it” and “If I want to invest in the stocks of a certain company, I rely on information from the internet”.

3.4.6 Section VII: investment decision. Nine items were used to measure the investment decisions. The questionnaire was adopted from Nyamute (2016). The sample items include “I understand all the fundamentals of the company that I am confident in making my investments” and “I am willing to take high risk in exchange for high expected share returns”.

3.5 Data analysis method
The data collected through the questionnaires were processed and analysed using SPSS software. First, a pilot test was conducted to check the validity and reliability of the instrument, as well as improving the questionnaire by removing poor quality questions, such as those including too many missing values or bias ratings. Then, statistical techniques were used to achieve the research objectives, including Cronbach’s Alpha test, Descriptive Statistics, Correlation Analysis and Regression Analysis.

4. Empirical findings
4.1 Pilot testing
For pilot testing, 80 questionnaires were delivered by hand to individual investors operating at the PSX and collected right after they completed it. Only 52 were returned, from which 39 questionnaires were useable, representing a response rate of 65 per cent. The pilot test was conducted to find out the reliability of items included in the instrument.

4.2 Reliability analysis
The result indicated that the Cronbach’s Alpha value of all factors is greater than 0.6, and the F test is significant for each factor. These indexes indicate that items included in the variables are reliable to use in further analysis (Table I).

4.3 Statistics for demographic variables
The sample for the research was composed of 89.5 per cent male and 10.2 per cent female, investors and financial analyst. This composition of sample symbolizes the cultural and social norms of Pakistan. In terms of qualification, 51.7 per cent held bachelor’s degree, 36.6 per cent held a Master’s degree, 11.2 per cent of the respondents had done MS/MPhil, while 0.7 per cent of respondents had done intermediate. In terms of age groups, major portion of the sample (about 39.2 per cent) lied within the age level of 35-45 years, while 4.2 per cent

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cronbach’s alpha</th>
<th>F (sig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overconfidence</td>
<td>0.828</td>
<td>5.025 (0.000)</td>
</tr>
<tr>
<td>Representativeness</td>
<td>0.697</td>
<td>17.255 (0.000)</td>
</tr>
<tr>
<td>Anchoring and adjustment</td>
<td>0.669</td>
<td>4.659 (0.001)</td>
</tr>
<tr>
<td>Availability</td>
<td>0.839</td>
<td>7.718 (0.000)</td>
</tr>
<tr>
<td>Investment decision</td>
<td>0.910</td>
<td>4.829 (0.001)</td>
</tr>
<tr>
<td>Perceived market efficiency</td>
<td>0.715</td>
<td>6.243 (0.000)</td>
</tr>
</tbody>
</table>

Table I. Result for reliability analysis
represented below 25 years, 18.9 per cent representing 25-35 years, 26.6 per cent representing 45-55 years and 11.2 per cent representing 55 above of age. The sample for research included 81.1 per cent married, 11.9 per cent single and 7.0 per cent divorced participant. Years of experience were as follows: 20.2 per cent were having less than two years’ experience, 32.9 per cent having two to five years of experience and 46.9 per cent having five years and more of experience for attending stock market. Statistics for demographic characteristics of sample are also displayed in Table II.

4.4 Correlation analysis

Table III presents descriptive statistics and correlations among the variables. The output of the analysis shows the correlation coefficient for five variables. The results show that each variable is perfectly correlated with itself because the value of correlation coefficient is one \( r = 1 \). The output also shows overconfidence is negatively related to investment decisions, with a Pearson’s correlation coefficient of \( r = -0.202 \), which is significant at \( p < 0.01 \), and perceived market efficiency with a Pearson’s correlation coefficient of \( r = -0.332 \), which is significant at \( p < 0.01 \). This means that, as overconfidence increases, the quality of investment decisions and perceived market efficiency decrease. These findings are consistent with research by Simon et al. (2000) and Odean (1998), who reported negative

<table>
<thead>
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<th>Category</th>
<th>Frequency (%)</th>
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</thead>
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<tr>
<td>Gender</td>
<td></td>
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<tr>
<td>Male</td>
<td>128</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Below 25 years</td>
<td>6</td>
</tr>
<tr>
<td>25-35</td>
<td>27</td>
</tr>
<tr>
<td>35-45</td>
<td>56</td>
</tr>
<tr>
<td>45-55</td>
<td>38</td>
</tr>
<tr>
<td>Above 55</td>
<td>16</td>
</tr>
<tr>
<td>Qualification</td>
<td></td>
</tr>
<tr>
<td>Metric</td>
<td>0</td>
</tr>
<tr>
<td>Intermediate</td>
<td>1</td>
</tr>
<tr>
<td>Bachelors</td>
<td>74</td>
</tr>
<tr>
<td>Masters</td>
<td>52</td>
</tr>
<tr>
<td>MS/MPhil</td>
<td>16</td>
</tr>
<tr>
<td>PhD</td>
<td>0</td>
</tr>
<tr>
<td>Marital Status</td>
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<tr>
<td>Single</td>
<td>17</td>
</tr>
<tr>
<td>Married</td>
<td>116</td>
</tr>
<tr>
<td>Divorced</td>
<td>10</td>
</tr>
<tr>
<td>Tenure</td>
<td></td>
</tr>
<tr>
<td>Less than 2 years</td>
<td>29</td>
</tr>
<tr>
<td>2-5 years</td>
<td>47</td>
</tr>
<tr>
<td>5 years and more</td>
<td>67</td>
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<table>
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<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overconfidence</td>
<td>2.8365</td>
<td>0.4773</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Representativeness</td>
<td>2.8864</td>
<td>0.8236</td>
<td>0.535**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anchoring and adjustment</td>
<td>2.7890</td>
<td>0.5722</td>
<td>0.421**</td>
<td>0.356**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability</td>
<td>2.8112</td>
<td>0.5730</td>
<td>0.621**</td>
<td>0.439**</td>
<td>0.492**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment decision</td>
<td>3.4580</td>
<td>0.9391</td>
<td>-0.294**</td>
<td>-0.459**</td>
<td>-0.263**</td>
<td>-0.307**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Perceived market efficiency</td>
<td>3.4126</td>
<td>0.6902</td>
<td>-0.332**</td>
<td>-0.313**</td>
<td>-0.281**</td>
<td>-0.238**</td>
<td>0.462**</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes: \( N = 143; \) ** \( p < 0.01 \)
correlations between overconfidence, investment decisions and market efficiency. Overconfidence is positively related to representativeness, availability and anchoring and adjustment (Table III). Psychologically this means that, as overconfidence increases, representativeness, availability and anchoring and adjustment also increase.

The results also indicate that the representativeness heuristic is negatively related to investment decisions, with a Pearson’s correlation coefficient of \( r = -0.459 \), which is significant at \( p < 0.01 \), and perceived market efficiency with a Pearson’s correlation coefficient of \( r = -0.313 \), which is significant at \( p < 0.01 \). This means that, as representativeness increases, the quality of investment decisions and perceived market efficiency decrease. These findings are consistent with research by Yaowen et al. (2015) and Hadi (2017). Availability bias is negatively correlated with investment decisions \( (r = -0.459, p < 0.01) \) and perceived market efficiency \( (r = -0.313, p < 0.01) \). This means that, due to the availability heuristic, the quality of investment decisions and perceived market efficiency decrease. These findings are consistent with research by Keller et al. (2006) and Hadi (2017).

Anchoring and adjustment bias is negatively associated with investment decision \( (r = -0.307, p < 0.01) \) and perceived market efficiency \( (r = -0.238, p < 0.01) \). The results show that the quality of investment decisions is positively related to perceived market efficiency, with a Pearson’s correlation coefficient of \( r = 0.462 \), which is significant at \( p < 0.01 \), which means that, as investment decisions increase, market efficiency also increases.

4.5 Regression analyses
We performed hierarchical regression analyses to test the hypotheses formally. First, overconfidence, representativeness, availability and anchoring and adjustment were regressed on investment decisions. In the first step, gender age, qualification and experience were entered as control variables and only the value of their \( R^2 \) is reported, which shows that 9.3 per cent of the dependent variable (ID) is explained by the control variables. In the second step, overconfidence, representativeness, availability and anchoring and adjustment were entered and the values of their \( R^2 \), change in \( R^2 \) and beta \( (\beta) \) are reported. The value of \( R^2 = 0.46 \) that shows about 46 per cent of the variation in investment decisions is caused by overconfidence, representativeness, availability and anchoring and adjustment collectively but the remaining 54 per cent is not captured in this model and needs to be explored. The value of the F-statistic \( (5.406, \text{sig} 0.000) \) is significant and indicates that the model is fit. The change in \( R^2 \) indicates that, after controlling for demographics, the value of \( R^2 \) is significantly affected.

Second, overconfidence, representativeness, availability and anchoring and adjustment were regressed on perceived market efficiency. In step one, control variables were entered and only the value of their \( R^2 \) is reported. The value \( R^2 = 0.057 \) shows that about 5.7 per cent of the variation in perceived market efficiency is caused by control variables. In step two, overconfidence, representativeness, availability and anchoring and adjustment were regressed on perceived market efficiency and the values of their \( R^2 \), change in \( R^2 \) and beta \( (\beta) \) are reported. The value of \( R^2 = 0.34 \), which shows about 34 per cent of variation in perceived market efficiency is caused by overconfidence, representativeness, availability and anchoring and adjustment collectively but the remaining 66 per cent is not captured in this model and needs to be explored. The value of F-statistic \( (3.866, \text{sig} 0.005) \) is significant and indicates that the model is fit. The change in \( R^2 \) indicates that, after controlling for demographic values, the value of \( R^2 \) is significantly affected.

4.5.1 Investment decisions. The hypotheses predict that heuristic biases are negatively associated with investment decisions. To test these predictions, we regressed investment decisions on heuristic biases (Table IV). Overconfidence heuristic bias \( (\beta = -0.292, p < 0.001) \) was a significant predictor of investment decisions, lending support to \( H2. \)
Representativeness heuristic bias ($\beta = -0.443, p < 0.001$) was a significant predictor of investment decisions, providing support for $H4$. A significant negative association was found between the availability heuristic ($\beta = -0.313, p < 0.001$) and investment decisions, supporting $H6$. Anchoring and adjustment heuristic has a significant negative influence on investment decisions ($\beta = -0.269, p < 0.001$), lending support to $H8$.

4.5.2 Market efficiency. The hypotheses predict that heuristic biases are negatively related to perceived market efficiency. Results reported in Table IV show that overconfidence heuristic bias ($\beta = -0.331, p < 0.001$) has a significant negative influence on perceived market efficiency, providing support to $H1$. Representative heuristic was a significant predictor of perceived market efficiency ($\beta = -0.317, p < 0.001$), so $H3$ was accepted. Similarly, a significant negative relationship with perceived market efficiency was found for the availability heuristic ($\beta = -0.229, p < 0.001$) and the anchoring and adjustment heuristic ($\beta = -0.280, p < 0.01$). These findings support $H5$ and $H7$ respectively.

5. Discussion
Decisions relating to investment are complex tasks for all sorts of financial specialists these days. All speculators confront unstable financial conditions with elevated levels of uncertainty. This instability makes the decision-making process more complex than at any other time. In a quickly evolving situation, it is challenging to utilize available opportunities and resources better and to make investment decisions using all available information, to be a rational investor or financial specialist. By the time decisions are made, it is likely that the opportunity no longer exists. In such complex circumstances, cognitive biases and heuristics play an important role in decision-making process and the performance of individual investors (Kannadhasan and Nandagopal, 2010a, 2010b).

This study has expanded prospect theory and heuristic theory with regards to investment decisions and perceived market efficiency, by apprehending the perceptions of individual investors trading on the PSX in regard to their overconfidence heuristic, representativeness heuristic, availability heuristic, anchoring and adjustment heuristic, investment decisions and market efficiency. The idea of the study was developed from the existing literature and tested with the help of hierarchical regression analyses, using SPSS software. The tested model of this review provides empirical support to the existing literature, although this review could not locate any astonishing outcomes or results.

The findings of this study confirm that investors behave irrationally and make trading mistakes due to heuristic biases. The results of the study indicate that the overconfidence

| Predictors | Investment decision $/R^2$ | $\Delta R^2$ | B | Perceived market efficiency $/R^2$ | $\Delta R^2$
|-------------|-----------------------------|----------------|---|-----------------------------------|----------------
| **Step 1**  |                             |                |   |                                   |                |
| Control variable | 0.093                       | 0.057          |   |                                   |                |
| **Step 2**  |                             |                |   |                                   |                |
| Overconfidence     | $-0.292^{***}$               | $-0.331^{***}$ |   |                                   |                |
| Representativeness | $-0.443^{***}$              | $-0.317^{***}$ |   |                                   |                |
| Availability       | $-0.313^{***}$               | $-0.229^{***}$ |   |                                   |                |
| Anchoring          | $-0.269^{***}$               | 0.46           | 0.367** | $-0.280^{**}$                   | 0.34           | 0.283^{***}

Notes: $N = 143; **p < 0.01; ***p < 0.001; control variables were gender, age, qualification and experience.
6. Conclusion
The aim of this study was to explore the impact of heuristics on the decisions of individual investors, operating at the PSX and on perceived market efficiency. To achieve this research objective, a questionnaire was used to collect data, in which closed questions were asked of the target population. The collected data were analysed using SPSS software. The sample consists of 143 individual investors and brokers trading on the PSX, who were selected on a convenient basis. The hypotheses were tested through correlation and regression analysis.

The results of the study prove that heuristic biases negatively affect the investment decisions of individual investors who are operating on the PSX and perceived market efficiency. We have found that heuristics, such as overconfidence, representativeness, availability and anchoring negatively influence investment decisions and perceived market efficiency. These results are consistent with heuristic theory and prospect theory, which hold that that decision makers use heuristics to avoid the risk of losses in uncertain situations but that leads to errors in judgment; as a result, investors make irrational decisions, which may cause the market to overreact or underreact – in both situations the market becomes inefficient.

The idea of heuristics negatively affecting investment decisions and market efficiency might be unfamiliar to investors, especially if they are also unfamiliar with the idea of behavioural biases in their personality, which have very bad effects on their investment decisions as well as on market efficiency, which depends on the behavioural patterns of the individual investors in the market. Based on our findings, first, of all we would like to suggest that individual investors try
to identify which types of behavioural bias exist in their personality, understand and avoid them. Second, they should not rely on heuristics while making investments, but conduct a proper analysis of investment opportunities, develop quantitative investment criteria and establish investment objectives and constraints, to make better investment decisions and move towards appropriate investment opportunities.

7. Directions for future research
This study investigated the impact of heuristic biases on individual investment decisions and perceived market efficiency, in the specific context of Pakistan and its sample size is small. It is necessary for further research to confirm the findings of this research with larger samples and a greater diversity of respondents. Furthermore, we suggest applying behavioural finance to explore heuristics and other behavioural factors which influence the investment decisions of individual investors and have significant effect on market efficiency, by taking mediator and moderator variables to clearly understand how psychological factors affect investment-related choices and market efficiency. The impact of heuristics and other psychological factors can be tested on both long-term and short-term investments.

Note
1. Theoretically, psychologists and social scientists believe that propensities towards behavioral biases can be nourished by culture, although the levels may differ (Yates et al., 1997), Kim and Nofsinger (2008) and Hofstede (1980) differentiate among cultures with an individualism and collectivism continuum. Asian cultures are considered a socially collective paradigm, in which investors suffer from overconfidence that leads to behavioural biases (Luong and Ha 2011). Cultural differences, particularly education and life experiences, can affect behaviours; therefore, it is believed that tendencies towards behavioural biases can differ from culture to culture. Some evidence has been found to prove that Asian people exhibit more behavioral biases than people raised in Western countries (Yates et al., 1997).

References


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