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Behavior of fund managers in Malaysian investment management industry

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Abstract

Purpose – This paper aims to explore the relevance of bounded rationality to the practice of institutional investors in Malaysia. Understanding institutional investor behavior is important, as it can determine the asset prices and consequently the market behavior.

Design/methodology/approach – A set of questionnaires is used to solicit information regarding the understanding and practical application of behavioral finance theories and strategies among fund managers in the Malaysian investment management practice. In the process, bounded rational theory is aimed to be validated. Fund managers' possible bounded rational behavior is assessed with reference to their investment management approaches and strategies right from individual beliefs and acquisition of information, as well as investment management and strategies used.

Findings – The findings lend support to the notion that institutional investors too, being normal human beings, are expected to think and behave in a boundedly rational manner as postulated in bounded rational theory. The sources of bounded rationality are individual, institutional and social forces. Thus, portfolio trading and investment management strategies are exposed to wide varieties of behavioral risks. Despite the notions that behavioral risks are real and the impact on fund performance could be pervasive, fund managers' self-awareness regarding control and institutional readiness to govern behavioral risks in investment practices is still low.

Research limitations/implications – Empirical evidence drawn in the current paper is subjected to small sample size and specific focus on Malaysian context. Despite this limitation, the sample is statistically sufficient and provides a fair representation, as well as quality opinions, of fund manager's investment management behavior in Malaysia. This research provides valuable implications to practitioners (fund managers) and regulators (investment management and capital market policymakers). In practice, the current study draws some practical ideas, especially for buy-side institutional investors, on the source and impact of behavioral biases on fund management practices and performance. For regulators, this research highlighted the needs and possible ways to regulate these behavioral risks.

Originality/value – The current paper provides new insights on the theory and practice of the institutional investor. In theory, this research provides evidence of bounded rationality of institutional investor behavior, practicing in the asset management industry in the emerging markets of Malaysia. This evidence lends support to the validity of the bounded rationality theory in explaining institutional investor behavior. In practice, this

research provides new insights on the relevance of behavioral finance perspectives and strategies in the asset management industry practice and policy.

1. Introduction

The assumption of investor rationality in investment decision is fundamental in theory and model building in finance, but it remains puzzling. In particular, modern and behavioral finance paradigms are divided into perspectives with regards to the theoretical foundation of investors and market behaviors. The former defends the assumption of rationality and market efficiency as the correct theoretical basis describing the approximate behavior of the investor and the market. On the other hand, the latter believes that the investors' behavior is boundedly rational, as postulated by the bounded rationality theory (Simon, 1955) and collectively distorts market efficiency stability.

In academic circles, behavioral finance postulates that a normal human being, either a retail or an institutional investor, displays some elements of irrationality in his reasons, decisions and actions. This human irrationality is biologically, psychologically and sociologically embedded in a normal human being (Ahmad *et al.*, 2017). Owing to this complexity, the investor and market behavior are predicted to be heterogeneous. Nonetheless, the validity of these postulates still remains vague because there are empirical evidences supporting the rationality of investors. This contradicting evidence challenges many finance theories that concern investor, firm and market behaviors. In practice, the perspectives of and the belief in the nature of behavioral biases are also unclear. Particular questions such as whether behavioral biases are good or bad for investors, fund management company and financial markets in general are inconclusive. Some claims that heuristics and biases can guide successful decisions and actions and others believe they could cause disasters (Sias *et al.*, 2001; Loewenstein and Willard, 2006; Cuthbertson *et al.*, 2016). In addition, whether behavioral biases have short- or long-term influences on financial prices and market behavior are openly debated. In this regards, some scholars argued that behavioral biases could cause prices to deviate from fundamental value for long periods (Shefrin, 2000). Others believe the effects are only temporary and need not be incorporated in theorizing and modeling work in finance (Fama, 1998).

Given the above problems, the objective of this paper is to document some behavioral biases among fund managers, who represent institutional investors in financial markets. The focus will be on Malaysia's investment management industry. We use survey-based evidence and approach to understand the behavior from the individual level, which has been noted as one of the best approaches to understand investor behavior (Warneryd, 2001). In particular, the use of the survey method can be used to gain important insights on real investor behavior using primary data (Karyn and Neuhauser, 2007). In the current research, the bounded rationality theory will be validated. The fund managers' possible bounded rational behavior is assessed in reference to their investment management approaches and strategies right from individual beliefs and acquisition of information, as well as investment management and strategies used. The findings lend support to the notion that institutional investors too, being normal human beings, are expected to think and behave boundedly rational as postulated in bounded rational theory.

2. Literature review

2.1 Bounded rationality

Behavioral finance offers an alternative paradigm in finance based on positive philosophical views, which does not assume full rational of market players and constant efficiency of financial markets. The current theoretical foundations for investor behaviors in the behavioral finance paradigm are the bounded rationality theory of Simon (1955) and the prospect theory of Kahneman and Tversky (1979).

The bounded rationality theory postulates that individual decisions and behaviors contain both rational and irrational elements. Thus, decisions are normally goal-oriented and adaptive (Jones, 1999). The bounded rationality of human decision has been conceptualized by Kahneman (2003) into the dual system of the human mind: intuition (System I) and reasoning (System II). The operational processes of System I is categorized as fast, automatic, effortless, associative and emotional, whereas those of System II are slower, serial, effortful, deliberately controlled and rule-governed.

The prospect theory provides a complementary perspective to individual bounded rationality. The Prospect theory suggested an alternative model of decision-making under risk and uncertainty in contrast to the use of expected utility theory as a descriptive model of decision-making under risk in modern finance. In the prospect theory, the individual choice process is not motivated by utility maximization but by framing and valuation. In the framing stage, the individual constructs a representation of the acts, contingency and outcomes relevant to the decision. Whereas, in the evaluation stage, an individual assesses each of the prospects available and decide accordingly. The choice value function will be influenced by a reference point as well as by prospects of losses and gains. In addition, individual choice is generally more sensitive to losses than to gains (Kahneman and Tversky, 1979; Tversky and Kahneman, 1986).

In line with the two aforementioned theories, psychologists have long acknowledged that irrationality on the part of human decision is a basic human nature (Ellis, 1976). This notion is substantiated with extensive experimental evidence from cognitive psychologists on the systematic heuristics and biases that arise from people's beliefs and preferences (Tversky and Kahneman, 1974; 1981; 1986).

2.2 Evidences on investor bounded rational behavior

Empirical evidences from interdisciplinary science domains highlight that investors' behaviors are shaped collectively by internal and external forces, namely, psychological, sociological and biological factors (Ahmad *et al.*, 2017). Psychological factors are decision-making biases that are produced internally by the individual through the two systems of human thinking. Based on this perspective, decision-making is a dual cognitive–affective process (Carmerer *et al.*, 2005). From the perspective of these two thinking systems, both these systems induce errors in individual decision-making. Specifically, a cognitive system produces errors that are collectively known as cognitive heuristics or the tendency to use rules of thumb in the decision-making process to simplify complex decision situations (De Bondt, 1995; 1998; Fuller, 1998). On the other hand, biases in decision-making produced by the affective system are sentiment or feelings, emotion and mood (Lowenstein *et al.*, 2001; Ackert *et al.*, 2003; Lucey and Dowling, 2005; Dow, 2011; Kuhnen and Knutson, 2011; Summers and Duxbury, 2012). The sociology factors are external forces that induce decision-making biases on the part of individual because of social influence in the social networks (Zafirovski, 2000; Shiller, 2002; Fligstein and Dauter, 2007; Frith and Singer, 2008; Baddeley, 2010; Carruthers and Kim, 2011; Fenzl and Pelzmann, 2012; Seyfert, 2012). The biological origin of human irrationality had been explained by Ellis (1976). The earlier

understanding of individual financial risk tolerance based on biological perspectives was provided by Harlow and Brown (1990) with the idea that biological and psychological traits influence the formation of preferences and decision-making processes. In particular, personality characteristics such as sensation-seeking and extroversion, as well as various components of human neurochemical systems, influence an individual's financial risk tolerance.

Empirical evidence from interdisciplinary inquiries provides insights that different individuals have or a group of individuals has different degrees of behavioral biases. These differences are partly due to the differences in individual, cultural and institutional traits as discussed below.

2.2.1 Individual traits. Individual traits refer to demographic and personality types. Behavioral aspects of demographic and personality types that possibly influence decision-making and financial risk-taking behavior have been well documented in finance and economics literature since Siegal and Hoban (1982).

Demographic forces as important determinants for individual investment decisions and risk-taking behaviors have been well established in behavioral finance literature. These factors include the following. The first factor is gender differences. In psychology, men have been acknowledged as being more risk-tolerant than women when making many decisions (Byrnes *et al.*, 1999), partly because they are more exposed to overconfidence bias (Montier, 2002). This hypothesis has also been supported in behavioral finance research (De Venter and Michayluk, 2008; Halko *et al.*, 2012). The second factor is age differences. Positive relationship between investor ages and level of risk tolerance has been empirically supported in finance research. Riley and Chow (1992) documented that investor level of risk aversion decreases with age. However, evidence from Halko *et al.* (2012) showed that the age effect on risk aversion is reduced when controlling for financial knowledge. The third factor is experience differences. Empirical evidences showed that more experienced and expert investors are more prone to overreaction and overconfidence biases (Chen *et al.*, 2004; Griffin and Tversky, 1992) and more risk-taking (Corter and Chen, 2006). Education difference is the fourth factor. Previous research suggests that education is important in predicting preferences and behavior. In finance research, finance education that is expected to increase financial literacy has been associated with choices for investment (Schooley and Worden, 1999; Bernheim and Garrett, 2003) and risk-taking behavior (Wang, 2009), and it encourages wealth-creating investment (McCannon, 2014). Nikiforow (2010) shows that training on behavioral finance does increase awareness and reduces fund managers' behavioral biases.

Personality types are psychological characteristics of the individual. Many have examined the connection between personality type and risk tolerance level. There are many personality tests available, but the popularly used psychology-based personality type tests are the Myers-Briggs Type Indicator, Big Five personality taxonomy[1], Zuckerman's Sensation Seeking Scale (Zuckerman, 1994), Domain-Specific Risk Taking Scale (Blais and Weber, 2006) and Risk Tolerance Questionnaire (Corter and Chen, 2006). Using the Myers – Briggs Type Indicator test in behavioral finance research provides insights that a higher score for extraversion, intuition, thinking and perceiving is positively related to higher level of risk tolerance (Filbeck *et al.*, 2005). The use of Big Five personality taxonomy in finance research also explains the investment behavior and variation in risk-taking among investors in accordance with their personality types. Mayfield *et al.* (2008) provide evidence that extraverted individuals intend to engage in short-term investing, and neuroticism individuals show that they are more risk-averse and do not engage in short-term investing. Meanwhile, individuals with openness to experience are inclined to engage in long-term investing.

2.2.2 Cultural traits. Culture impact on finance is a new emerging sub-field of behavioral finance research. Based on sociology perspective, culture is partly important in understanding individual behavior. The cultural factor has a great role in investment decision-making because investors personally and collectively adhere to conserve personal relationship within the organization or society they belong to (Ellison and Fudenberg, 1993). Growing evidences from behavioral finance research and other sociology research indicated that investors' behaviors are related to the cultural origin of the individual. This perspective suggests that individual investment behavior could be predicted based on their cultural traits. In this regard, Hofstede's cultural dimension (Hofstede and Bond, 1984) has been recently capitalized in behavioral finance research to explain the behavior of stock markets. Nguyen and Truong (2013) provide worldwide evidence that the information content of stock markets is higher in more individualistic countries and in low uncertainty avoidance countries. Beracha *et al.* (2014) provide evidence those institutional investors from different cultural backgrounds trade differently. In addition, they provide evidence that institutional investors trade with higher frequency in their home countries and in countries with a similar cultural background. This finding is corroborated with earlier findings by Anderson *et al.* (2011), which provide evidence that home bias and international diversification by institutional investors are influenced by cultural bias.

2.2.3 Institutional traits. We discuss two important institutional traits, namely, governance and ethical concerns. Current corporate governance policy and practice, which are based on the rational model of decision-making, may be insufficient to mitigate future corporate failure (Marnet, 2005). Lack of corporate governance in curving the behavioral biases and information asymmetry has been pointed out as one of the reasons for failure in addressing behavior-induced risks in financial markets. Marnet (2005) argued that to gamble imprudently seems inherent in human nature. Stock returns in emerging markets tend to be more positively skewed, which can be attributed to managers having more discretion to release good information immediately and bad information slowly (Claessens and Yurtoglu, 2013). Some scholars have voiced the need for corporate governance to include a new mission to control behavioral biases in firms (Baccar *et al.*, 2013) and in financial markets in general (Suto and Toshino, 2005). Ethical concerns have also been reported to have important roles in mitigating behavioral biases in fund management. In this perspective, Marco *et al.* (2011) provide evidences of differences in risk-taking behavior between ethical and conventional mutual fund managers.

2.3 Evidence of behavioral risks in investment management practice

Financial market behavior is an aggregate of investors' behaviors (Tuckett and Taffler, 2012) that can be grouped into institutional and retail (individual) investors. Institutional investors are the main actors in financial markets. Institutional investors are defined as asset management companies that principally work for their customers as agents (Suto and Toshino, 2005). In general, institutional investors comprise investment funds, insurance companies, pension funds and other forms of institutional savings (Gonnard *et al.*, 2008) that have been holding major shares in financial markets activities. Although the characteristics of institutional investors are not uniform throughout the world, generally they have four common features according to Midgley and Burns (1977). First, they are intermediaries who invest on behalf of others. Second, they have a large amount of funds for investment. Third, they are only few and could act in concert to influence the market. Fourth, they tend to have a net inflow of funds readily available for investment.

Because institutional investors are the largest players in financial markets, understanding their behavior is important in understanding the asset prices innovation and

market behavior in general. They are expected to be rational and to act professionally. Nonetheless, there are many issues of irrationality of institutional investors (Menkhoff, 2002; Montier, 2002; Suto and Toshino, 2005), and some have blamed them for creating excessive volatility that distorts financial markets stability (Menkhoff, 2002). However, to date, the real-world behavior of fund managers has been largely ignored in finance academic literature (Tuckett and Taffler, 2012).

In academics, modern finance assumes that institutional investors offset the irrational wave of retail investors through rational arbitrage activities. This will ensure the financial market will always be operationally and informationally efficient. However, growing evidences are challenging the validity of this assumption. Moreover, there is also evidence of the irrationality of their behaviour, and some believe that lay people and experts are alike (Akerlof and Shiller, 2009; Garling *et al.*, 2009).

In investment practice, actual fund management behavior is based on modern finance paradigm has been challenged. First, behavioral biases on the part of institutional investors' thoughts, behaviors and actions (as summarized in Table I) provide evidences that they contradict their role as shareholders (Suto and Toshino, 2005) as predicted by the agency theory. Second, there is a need of corporate governance to address the negative effect of behavioral biases as highlighted by some scholars. In this regard, Suto and Toshino (2005) argued that institutional investors who underperform in corporate governance, distort the corporate evaluation and neglect their long-term fiduciary roles entrusted to them as an agent. They also noted that there is still a large gap between awareness and action on enhancing corporate governance to address behavioral biases in investment institutions (Suto and Toshino, 2005).

2.4 Fund managers' perspective in emerging market of Malaysia

Institutional investors in Malaysia dominate the financial market both by trading volume and value (Securities Commission Malaysia, 2015). Based on the following data (Figures 1 and 2), the largest players in the Malaysian asset management industry are the unit trust (mutual fund) firms and public and private pension management firms.

With regards to the nature of institutional investors' rationality and market efficiency in Malaysia, earlier studies by Lai *et al.* (2001), Ahmad and Tjan (2004) and Lai *et al.* (2013) provide indications that behavioral forces influence investors in Malaysia. The curiosity on institutional investors rationality is substantiated with a research conducted by Mohamad and Perry (2015), which highlighted that investment decisions by fund managers are way beyond modern finance descriptions and that behavioral forces play an important role. Owing to suspicion on bounded rationality of investor decisions, behavioral risks are argued to influence the asset prices and consequently forming the adaptive market efficiency as discussed by Tuyon and Ahmad (2016).

3. Methodology

3.1 Sample and data

A list of 100 registered fund management firms in Malaysia as at 31 December 2015 is obtained from the Securities Commission of Malaysia[2]. Accordingly, we have distributed a questionnaire addressed to the head of fund managers to all these firms via courier. The questionnaire is given to chosen individuals involved in investment fund decisions in their respective firms. Altogether, we received 30 completed and usable questionnaires for further analysis, representing a response rate of 30 per cent. This sample is sufficient for statistical inferential analysis albeit the small size with the following justification. According to the Central Limit Theorem in statistics, the distribution of randomly selected sample sizes of 30

Investment management stages	Behavioral biases	Psychological justifications
Information use	Rely on various information other than firm and economic fundamentals, including; *Company visits* (Clatworthy and Jones, 2008); *Newspaper reports* (Al-Abdulqader *et al.* 2007); *Political news* (Lai *et al.*, 2001); *Analysts reports* (Clatworthy and Jones, 2008); *Other opinions* (Wong and Cheung, 1999); *Rumors* (Lai *et al.*, 2001); *Non-accounting information* (Clatworthy and Jones, 2008; Lutje, 2009); *Words of mouth* (Shiller and Pound, 1989)	Biased information search to avoid information overload and uncertainty of decisions. Herding bias induce use of non-fundamental information (Lutje, 2009; Garling *et al.*, 2009; Cronqvist and Siegel, 2014)
Investment analysis use	*Popular use of technical analysis* (Wong and Cheung, 1999; Lai *et al.*, 2001; Al-Abdulqader *et al.*, 2007; Menkhoff, 2010; Kourtidis *et al.*, 2011)	Induced by momentum trading to exploit anomalies and trends or performance chasing (Menkhoff and Nikiforow, 2009; Baker and Ricciardi, 2014)
Investment and trading strategies	*Excessive trading/excessive portfolio turnover* (Bodnaruk and Simonov, 2014)	Overconfidence; Sensation-seeking (Garling *et al.*, 2009; Cronqvist and Siegel, 2014); Self-attribution bias (Baker and Ricciardi, 2014)
	Disposition effect (the tendency of selling stocks that have appreciated in price too early and holding on losing stocks too long) (Baker and Ricciardi, 2014)	Loss aversion; Mental accounting; Framing; Asymmetric risk attitude; Multiple reference points (Garling *et al.*, 2009; Cronqvist and Siegel, 2014)
	Overreaction to news	Overconfidence; Optimism; Money illusion (Cronqvist and Siegel, 2014; Garling *et al.*, 2009)
	Performance chasing (Baker and Ricciardi, 2014)	Excessive extrapolation; Hot hand fallacy; Representativeness (Garling *et al.*, 2009; Cronqvist and Siegel, 2014; Baker and Ricciardi, 2014)
	Attention to winner and spotlight stocks (Arnswald, 2001)	Induced by herding, attention and momentum trading biases (Arnswald, 2001)
	Momentum trading (Scott, Stumpp and Xu, 1999; Menkhoff and Nikiforow, 2009; Richardson, Tuna and Wysocki, 2010)	Overconfidence bias (Scott *et al.*, 1999) and herding bias (Menkhoff and Nikiforow, 2009)
	Self-monitoring (Kourtidis *et al.*, 2011)	Self-attribution bias and overconfidence (Baker and Ricciardi, 2014)
Portfolio diversification strategies	*Insufficient diversification/Naive risk diversification* (Garling *et al.*, 2009; Cronqvist and Siegel, 2014)	Ambiguity aversion; Familiarity, Mental accounting; Diversification heuristics; Co-variation neglect (Garling *et al.*, 2009; Cronqvist and Siegel, 2014)
	Short-termism (Suto and Toshino, 2005; Menkhoff, 2010)	Herding (Lutje, 2009) and momentum trading for short term gains (Suto and Toshino, 2005)
	Home bias (Menkhoff and Nikiforow, 2009)	Investor preference for familiarity with local market (Menkhoff and Nikiforow, 2009)

Note: Summarized by the author from the referred articles (as cited) concerning institutional/fund manager behavioral biases

Table I.
Behavioral biases in fund portfolio management

and more tends to follow a normal distribution. Thus, the issue of the normality assumption is mitigated and the parametric statistics can be performed (Kim and Volsky, 2004; Ghasemi and Zahediasl, 2012). Apart from this, all respondents are actual persons involved in investment decision-making ranging from the chief executive officer to fund managers. The sample is fairly representative of the fund managers' players in Malaysia, where the majority of the respondents are from unit trust and pension fund management firms, the largest players in the industry. In addition, the sample also represents a good mixture of local and foreign fund managers. Finally, this sample is also comparable with some surveys involving institutional investors such as Menkhoff and Nikiforow (2009), who used 35 fund managers in Germany, and a comparable research by Mohamad and Md Nassir (1997), in which a survey on 27 Malaysian brokerage firm's investment analysts' method was conducted to appraise investments in ordinary shares.

3.2 The questionnaire

The questionnaire is designed to solicit wide perspectives of behavioral risks in the fund management industry practice from both local and foreign fund managers practicing in Malaysia. The construct and items in the questionnaire are referred (i.e. adopted, adapted and self-constructed in reference to evidence) from the existing literature investigating a similar problem. The referred articles for the respective construct and items used in the questionnaire are provided in the respective tables. The initial set of the questionnaire is subject to a two-stage validation process. Three academic experts with interest in behavioral finance have validated the contents

Figure 1.
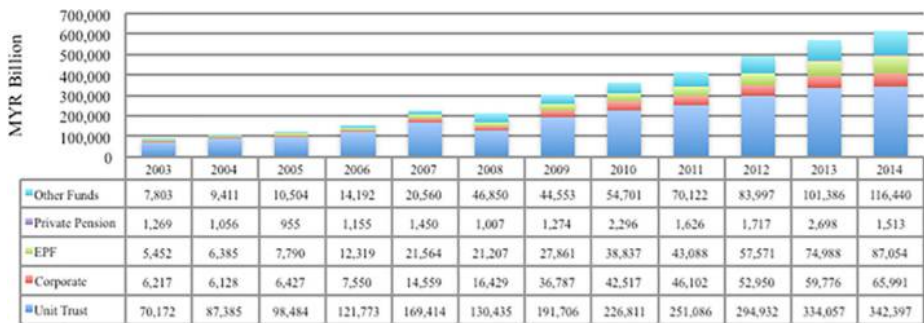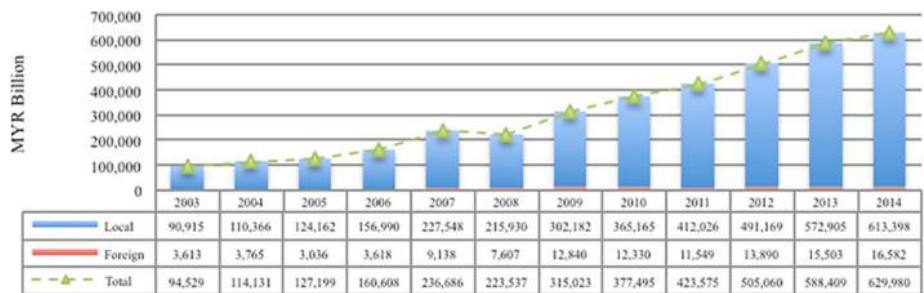Source of fund under management (types of investment management firms)

Figure 2.
Source of fund under management (local vs foreign)

Source: Securities Commission Malaysia, 2015

of the questionnaire. Amendments have been incorporated as suggested by these experts to set the final questionnaire. In the second stage, the questionnaire was pilot-tested using real fund managers. The extract part of the questionnaire is as summarized in Table II. The overall and sub-construct questionnaire reliability analyses is good, as reported in Table II. Thus, no further amendment has been made. It is also noted that the risk aversion construct reliability statistic of 0.40 is theoretically acceptable. Theoretically, risk aversion is heterogeneous and thus we do not expect a homogeneous answer for this construct.

3.3 Exploratory analyses

Exploratory analyses are used using standard statistical methods to uncover the real behavior of target respondents. The current research interest is to validate the rationality of institutional investor behavior. This irrationality behavior is extracted from their beliefs, psychology tests and strategies used in investment and fund management, as well the influence of behavioral biases in portfolio management.

The exploratory analysis starting with the descriptive and frequency statistics of the respondents' institutional and demographic characteristics is self-explanatory, and reported in Table III. Subsequently, the following analyses are undertaken. First, personality psychology tests are performed. This is intended to explore the validity of psychology-based hypothesis that states that individual behavior can be differentiated based on five different groups and their risk tolerance profiles are different. Second, views on the financial market efficiency and awareness of behavioral finance are explored. This analysis is intended to gauge the institutional investors' beliefs on market efficiency, their awareness of behavioral finance theories and the governance of behavioral risks in their current practice. Third is investment management practice. Here, the relevance of fundamental, technical and behavioral strategies to investment and fund management strategies is explored. Fourth, behavioral biases in portfolio management are probed. In this final analysis, the influence of selected behavioral risks, namely, mental account bias and diversification heuristics bias, is validated. These two behavioral biases are popularly noted as being among the source of behavioral biases committed by institutional investors and present in fund management industry.

4. Exploratory analysis and findings

4.1 Personality psychology

The personality psychology of fund managers is identified using a psychology-based standard test instrument called Big Five Personality test and non-standard risk-aversion measures used previously for investors (Kourtidis *et al.*, 2011). The Big Five personality test categorized individual behavior into five different categories, namely, neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. Meanwhile, the risk aversion measures the tendency of risk tolerance (high or low) of an individual. From this survey, male respondents show more extraversion and females are more open to experience [Figure 3(a)]. As for the risk-aversion test, risk tolerance among males is relatively that that in females [Figure 3(b)].

Further statistical analyses to validate these relationships are performed, and results are summarized in Table IV. Table IV provides a summary of group mean differences for Big Five Personality and risk aversion based on gender. The significance of equality tests based on Levene's F test and t-test is summarized in Table V. However, these tests fail to provide statistical significance of the aforementioned observed relationships as indicated by non-significant statistics for

Construct [Source]	Items	Reliability statistics	
		No. of Items	Cronbach's alpha
Personality psychology tests			
Big-Five personality taxanomy[a]	Big Five personality measures (revised scales)	23	*n/a
Risk aversion[b]	I am not willing to take the risk when choosing a stock or investment	4	0.40
	I prefer a low risk/high return investment with a steady performance over an investment that offers higher risk/higher returns		
	I prefer to remain with an investment strategy that has known problems rather than take the risk trying a new investment strategy that has unknown investment strategy has great returns		
	I view risk in investment as a situation to be avoided at all cost		
Opinion on market efficiency			
Malaysian market efficiency	It is possible to predict future returns to Malaysian stocks using only past returns	6	0.60
	It is possible to predict future returns to Malaysian stocks using only past returns and publicly available information		
	It is possible to predict future returns to Malaysian stocks using only past returns, available information, and the private information public		
	Investment returns are solely a compensation for risk		
	Investment strategies exist that consistently beat average market returns without above-average risk taking		
	I believe that, by and large, security market prices offer arbitrage opportunities		
Awareness and governance of behavioral finance			
Awareness on behavioral risks[c]	Are you aware of any behavioral finance theory?	8	0.71
	Have you taken any behavioral finance courses during your undergraduate or postgraduate studies?		
	Have you ever attended any training or workshop related to behavioral finance during your employment?		
	Are you aware of behavioral factors and investment risk associated with them?		
	Behavioral finance approaches are already integrated in our investment strategies		
	Do you think behavioral factors influence your trading behavior?		
	Do you think behavioral factors influence your fund portfolio performance in the short term?		
	Do you think behavioral factors influence your fund portfolio performance in the long term?		
Governance of behavioral risks[d]	Does your firm currently have an investment policy to mitigate behavioral risks?	4	0.91
	Does your firm currently have a governance mechanism to mitigate behavioral risks?		

Table II.
Extract sub-sections
of the questionnaire

Construct [Source]	Items	Reliability statistics	
		No. of Items	Cronbach's alpha
	Is your trading process regularly audited to mitigate behavioral risks?		
	Is your portfolio management record regularly audited to mitigate behavioral risks?		
Behavioral risks in portfolio management			
Mental accounts[e]	I tend to treat each element/account in my investment portfolio separately	4	0.80
	I separate my portfolio in several layers that consists of stocks varying from high to low risk		
	I separate my portfolio in several accounts that consists of safe investment, moderate risk investment and high risk investment		
	I treat unrealized gains and loss accounts separately		
Diversification heuristics[f]	I consider holding stock with high reputation in my portfolio	9	0.85
	I consider holding stock of top brand value in my portfolio		
	I consider holding stock of leader firms in the industry in my portfolio		
	I consider holding more Malaysian firm stocks in my portfolio		
	I consider holding Malaysian government linked firm stocks in my portfolio		
	I consider holding "lottery like" stocks in my portfolio		
	I consider holding "spotlight like" stocks in my portfolio		
	I consider having safe investment first before investing for potential in my portfolio design		
	I consider holding ethical and socially responsible firm's stocks		
	Overall (All variables)	41	0.74

Notes: *The reliability test for the Big Five Personality taxonomy items is not conducted because it is a standard measure used in psychology domain. All items for the reported constructs are referred (i.e. adopted, adapted and self-constructed in reference to evidence) from the existing research to ensure validity of the items to represent the respective constructs
Sources: [a]Adopted from Mayfield *et al.*, (2008); [b] adapted from Mayfield et al. (2008); [c]self-constructed with reference to Suto and Toshino (2005), Menkhoff and Nikiforow (2009), Nikiforow (2010); [d] self-constructed with reference to Suto and Toshino (2005, Baccar *et al.*, 2013); [e] Self-constructed in reference to Shefrin and Statman (2000), Waweru et al. (2008), Garling et al. (2009), Cronqvist and Siegel (2014); [f] Self-constructed in reference to Shefrin and Statman (2000), Arnswald (2001), Lutje (2009), Menkhoff and Nikiforow (2009)

Table II.

Levene's F test for equality of variances and t-test for equality of means. This is expected to be due to slim differences between male and female scores on Big Five Personality and risk aversion. Also, this is possibly because of the small sample used in this research.

Further cross-tabulation analyses are presented in Table VI to explore the possible relationship between Big Five personality and risk aversion of the respondents. The results indicate a significant association between Big Five personality and risk aversion after controlling for institutional and individual characteristics. In particular, the Big Five personality is significant (at 5 per cent) and positively correlated to risk aversion after controlling for both individual and institutional characteristics (refer to Table VII).

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Panel A: Descriptive statistics	N	Minimum	Maximum	Mean	SD
Institutional characteristics					
Age (Years of establishment)	27	2.00	52.00	18.93	14.31
Fund Size (MYR Million)	27	20.00	2,880,000.00	120,163.44	552,165.18
Domestic Investment (%)	25	3.20	100.00	72.57	32.04
Equity Investment (%)	25	3.20	100.00	57.81	34.71
Return (% – last year)	23	0.95	14.00	6.87	3.88
Risk – Standard Deviation (% – last year)	12	1.00	4.80	2.75	1.09

Panel B: Frequency statistics	N	(%)	Cumulative %
Institutional characteristics			
Type			
Local Private	13	43.30	50.00
Local Public	5	16.70	66.70
Foreign	10	33.30	100.00
Age (Years of establishment)			
Less than 5 years	2	7.40	7.40
5 to 10 years	9	33.30	40.70
11 to 20 years	5	17.70	59.30
21 to 52 years	11	40.70	100.00
Domestic investment (%)			
Less than 50%	5	20.00	20.00
50 to 80%	6	24.00	44.00
90 to 100	15	56.00	100.00
Equity investment (%)			
Below 50%	13	52.00	52.00
50 to 80%	3	12.00	64.00
90 to 100%	8	36.00	100.00
Fund manager characteristics			
Gender			
Male	19	67.90	67.90
Female	9	32.10	100.00
Race			
Malay	12	42.90	42.90
Chinese	11	39.30	82.10
Indian	1	3.60	85.70
Others	4	14.30	100.00
Age			
Below 30 years old	6	21.40	21.40
Between 30-39 years old	12	42.90	64.30
Between 40-49 years old	7	25.00	89.30
Above 49 years old	3	10.70	100.00
Education			
Diploma	2	7.10	7.10
Degree	17	60.70	67.90
Master	5	17.90	85.70
PhD/DBA	1	3.60	89.30
Professional/CFA/Others	3	10.70	100.00

Table III.
Respondents'
descriptive and
frequency statistics

(continued)

Designation			
Fund manager	13	46.40	46.40
Senior fund manager	8	28.60	75.00
Head of fund manager	2	7.10	82.10
Chief investment officer	2	7.10	89.30
Other (Fund manager & Research)	3	10.70	100.00
Tenure (Years of employment)			
Below 3 years	5	19.00	17.90
3 to 5 years	9	32.20	50.00
6 to 10 years	8	28.60	78.60
11 to 21 years	6	21.50	100.00
Remuneration			
Salary based	28	93.30	93.30
System (missing values)	2	6.70	100.00

Notes: Total number of respondents is 30. However, some respondents did not disclose the institutional and fund manager profiles. All incomplete responses are coded with missing values (999), allowing valid utilization of the full sample. Panel A summarizes the descriptive statistics for institutional characteristics. These institutions represent a good mix of local- (private and public) and foreign-owned fund management institutions. Panel B, provides frequency statistics for institutional characteristics and fund managers characteristics. The pool of fund managers represents a good mix of demographic characteristics. Collectively, both institutional and individual characteristics provide a good quality of sample to represent the institutional investors in Malaysian asset management industry

Table III.

4.2 Views on financial market efficiency and awareness of behavioral finance

Opinions on market efficiency and relevance of behavioral finance are reported in Table VIII. With regards to market efficiency, respondents are of the opinion that the Malaysian stock market is predictable and believed to be offering arbitrage opportunities. This is reflected by a high percentage of respondents who agree to items suggesting the inefficiency of the market (refer to Panel A). Different from the previous research, the current research solicits fund managers' awareness on behavioral finance theory and behavioral risks, as well as governance of these behavioral risks in investment practices. As for the awareness on behavioral risks, the majority of respondents were unaware of any behavioral finance theory and did not undertake any courses or training related to behavioral finance. However, the majority indicated that they are aware of behavioral risks associated with investment. In addition, the majority of them also indicated that behavioral finance strategies have been incorporated in investment practices and believe that behavioral risks matter in the short term only (refer to Panel B). As for the governance of behavioral risks, it is interesting to note that the majority of respondents indicated that mitigating behavioral risks have been incorporated in: investment policy, governance mechanism, audit of trading process and audit of portfolio management record (refer to Panel C). However, the specific governance mechanisms used to mitigate these behavioral risks have not been solicited from the respondents.

4.3 Investment management practice

Drawn from existing literature, the relevance of various investment strategies is solicited from the respondents as summarized in Table IX. Panel A provides a
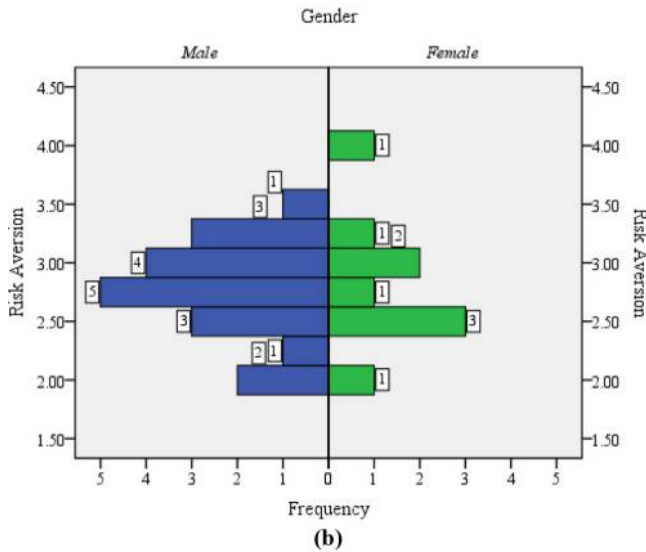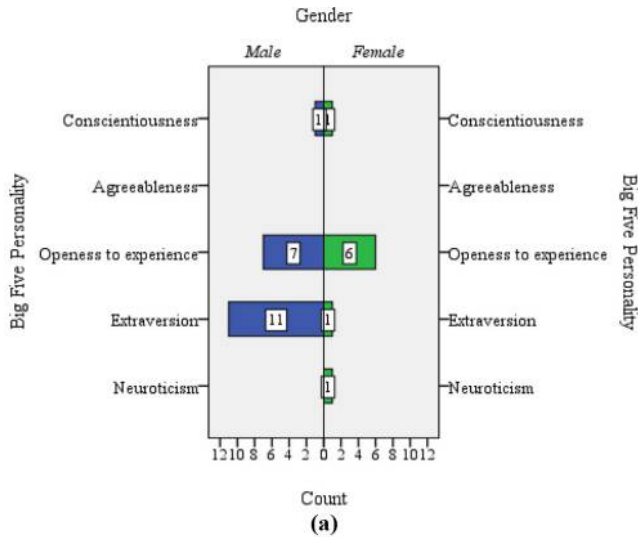
Figure 3.
Gender Big Five
personality and
gender risk aversion

Notes: (a) Gender versus Big Five personality and (b) gender
versus risk aversion

summary of various possible strategies used in investment decision and fund portfolio
management. These include investment decision, investment horizon, investment
management approach, frequency of portfolio checking, frequency of stock prices
checking, frequency of portfolio rebalancing, forecasting horizon in investment
decision and investment exit strategy. The results can be summarized as follows. First,
investment decision is a collective group-based decision and is subjected to a firm's

investment policy. This evidence highlighted the importance of group decision-making and institutional characteristics in fund portfolio management. Second, there is higher evidence of short-termism in investment strategies. This is reflected in frequency of portfolio checking (daily – 53 per cent), frequency of stock prices checking (daily – 83

Group statistics	Gender	N	Mean	SD	Standard error mean
Big Five personality	Male	19	2.53	0.77	0.18
	Female	9	2.89	1.05	0.35
Risk-aversion rank	Male	19	2.78	0.42	0.10
	Female	9	2.83	0.57	0.19

Table IV.
Group mean differences

Independent samples test	Levene's test for equality of variances		t-Test for equality of means			
	F	Significance	t	df	Significance (two-tailed)	Mean difference
Big Five personality						
Equal variances assumed	0.00	0.97	−1.03	26.00	0.31	−0.36
Equal variances not assumed			−0.92	12.23	0.38	−0.36
Risk-aversion rank						
Equal variances assumed	0.83	0.37	−0.30	26.00	0.77	−0.06
Equal variances not assumed			−0.27	12.16	0.79	−0.06

Notes: Total number of respondents is 30. However, some respondents did not disclose the institutional and fund manager profiles. All incomplete responses are coded with missing values (999), allowing valid utilization of the full sample. Panel A reports the mean differences of Big Five personality and risk-aversion rank of male and female respondents. Panel B summarizes equality test of the score between these group based on variance (Levene's F-test) and means (t-test)

Table V.
Equality tests

Big Five personality	Cross-correlation	Crosstabulation statistics Risk-aversion rank									
		High				Moderate		Low			
		2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	Total
Neuroticism	Count	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00
	% within	0.00	0.00	0.00	0.00	17.00	0.00	0.00	0.00	0.00	3.00
Extraversion	Count	3.00	1.00	1.00	2.00	3.00	2.00	0.00	2.00	0.00	14.00
	% within	100.00	100.00	17.00	33.00	50.00	50.00	0.00	100.00	0.00	47.00
Openness to experience	Count	0.00	0.00	5.00	4.00	2.00	1.00	1.00	0.00	0.00	13.00
	% within	0.00	0.00	83.00	67.00	33.00	25.00	100.00	0.00	0.00	43.00
Agreeableness	Count	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	% within	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Conscientiousness	Count	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	2.00
	% within	0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00	100.00	7.00
Total	Count	3.00	1.00	6.00	6.00	6.00	4.00	1.00	2.00	1.00	30.00
	% within	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Chi-Square Test	Value	33.94	Df	24.00	Significance	0.09					

Table VI.
Crosstabulation statistics for Big Five personality × risk-aversion rank

Control variables	Correlation statistics	Big Five personality × Risk aversion rank
Fund manager characteristics	Correlation	0.44
[gender, age, education and tenure]	Significance (two-tailed)	0.03
	df	22.00
Institutional characteristics	Correlation	0.50
[Type, Length of establishment, fund size,	Significance (two-tailed)	0.03
percentage of domestic investment and		
percentage of equity investment]	Df	18.00

Notes: Total number of respondents is 30. However, two respondents did not disclose the institutional and fund manager profiles. All incomplete responses are coded with missing values (999), allowing valid utilization of the full sample. In Panel A, the cross-tabulation between Big Five personality and risk-aversion rank is tabulated. The overall Big Five personality consists of (i) neuroticism, (ii) extraversion, (iii) openness to experience, (iv) agreeableness and (v) conscientiousness. However, only types are reported, as no score is recorded for agreeableness. For risk-aversion rank, lower score (2.00-2.75) ranked as high risk aversion, moderate score (3) ranked as moderate risk aversion and higher score (3.25-4.00) ranked as low risk aversion. In Panel B, the Spearman rank correlation between Big Five personality and risk-aversion rank assessed by controlling the individual and institutional characteristics. In the initial cross-tabulation analysis, all institutional and individual characteristics have been entered in the model. However, only significant control variables are reported

Table VII.
Spearman correlation statistics

per cent) and frequency of portfolio rebalancing (monthly – 37 per cent). Third, popular investment exit strategy is target price which can be corroborated with the use of purchase price as the reference point for profit and loss determination not based on the forecasted fair value as popularly thought in modern finance text book.

Panel B summarizes the intensity of use of several investment strategies including buy and hold, momentum, contrarian, dividend-oriented, value investing and growth investing. Generally, both fundamental- and behavioral-based strategies are used by institutional investors. In particular, rational investing using buy and hold, dividend-oriented, value and growth investing is used by fund managers. In addition, behavioral-based strategies, namely, momentum and contrarian investment strategies, are also noted to have a significant influence on fund managers' investment decision. These provide evidence to the relevance of both rational and non-rational strategies in investment decision and portfolio management, lending support to the bounded rationality of institutional investors in investment decision and portfolio management.

Interesting insights drawn from Table X is that fund managers use a combination of fundamental, technical, and behavioral investment appraisal approaches in their practices (Panel A). These managers rank fundamental method as a priority, rank technical into second and behavioral into third importance. The mix investment appraisal approaches are also consistent with the important source of information referred to by fund managers (Panel B). Where fund managers are referring to both rational sources (i.e. company visits, annual reports, analysts' recommendations, investor relation reports, broker recommendations and management financial reports) and information sources with possible irrational elements (i.e. television and newspapers, internet and investment blogs, friends, and rumors) (Panel C).

Construct/Items	N	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
			% of responses			
Panel A: Opinion on market efficiency						
It is possible to predict future returns to Malaysian stocks using only past returns	30	20.00	36.70	26.70	16.70	0.00
It is possible to predict future returns to Malaysian stocks using only past returns and publicly available information	30	3.30	13.30	43.30	40.00	0.00
It is possible to predict future returns to Malaysian stocks using only past returns, private and publicly available information	30	0.00	6.70	33.30	56.70	3.30
Investment returns are solely a compensation for risk	30	6.70	16.70	26.70	46.70	3.30
Investment strategies exist that consistently beat average market returns without above-average risk taking	30	6.70	10.00	23.30	53.30	6.70
I believe that, by and large, security market prices offer arbitrage opportunities	30	0.00	13.30	33.30	53.30	0.00
Panel B: Awareness on behavioral risks	N	Yes	No			
Are you aware of any behavioral finance theory?	30	36.70	63.30			
Have you taken any behavioral finance courses during your undergraduate or postgraduate studies?	30	36.70	63.30			
Have you ever attended any training or workshop related to behavioral finance during your employment?	30	43.30	56.70			
Are you aware of behavioral factors and investment risk associated with them?	30	86.70	13.30			
Behavioral finance approaches are already integrated in our investment strategies	30	60.00	40.00			
Do you think behavioral factors influence your trading behavior?	30	83.30	16.70			
Do you think behavioral factors influence your fund portfolio performance in the short term?	30	83.30	16.70			
Do you think behavioral factors influence your fund portfolio performance in the long term?	30	46.70	53.30			
Panel C: Governance of behavioral risks	N	Yes	No			
Does your firm currently have an investment policy to mitigate behavioral risks?	30	63.30	36.70			
Does your firm currently have a governance mechanism to mitigate behavioral risks?	30	63.30	36.70			
Is your trading process regularly audited to mitigate behavioral risks?	30	66.70	33.30			
Is your portfolio management record regularly audited to mitigate behavioral risks?	30	63.30	36.70			

Notes: Items in Panel A are adapted from previous studies with refinement to the context of Malaysian market. Items are tested on five scales ranging from 1 (strongly disagree) to 5 (strongly agree) on the statements. Items in Panels B and C are self-constructed since no existing reference is available. Items are tested based on Yes and No answer options

Table VIII.
Opinions on market
efficiency and
relevancy of
behavioral finance

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Construct	Items	N	(%)	Cumulative (%)
Panel A: Investment decision and management				
Investment decision	According to investment strategy prescribed by investment policy	12	40.00	40.00
	Joint decision with colleagues	9	30.00	70.00
	After consultation	5	16.70	86.70
	After authorization	2	6.70	93.30
	Others	2	6.70	100.00
Investment horizon	Short-term	1	3.30	3.30
	Medium-term	11	36.70	40.00
	Long-term	7	23.30	63.30
	Combinations	11	36.70	100.00
Investment management approach	Passive investment	3	10.00	10.00
	Active investment	26	86.70	96.70
	Others	1	3.30	100.00
Frequency portfolio checking	Daily	16	53.30	53.30
	Weekly	6	20.00	73.30
	Monthly	6	20.00	93.30
	Quarterly	2	6.70	100.00
Frequency stock price checking	Daily	25	83.30	83.30
	Weekly	2	6.70	90.00
	Monthly	2	6.70	96.70
	Quarterly	1	3.30	100.00
Frequency portfolio rebalancing	Daily	3	10.00	10.00
	Weekly	7	23.30	33.30
	Monthly	11	36.70	70.00
	Quarterly	6	20.00	90.00
	Semi-annually	2	6.70	96.70
	Annually	1	3.30	100.00
Forecasting horizon in investment decision	Weeks	4	13.30	13.30
	2-6 months	7	23.30	36.70
	6-12 months	5	16.70	53.30
	1 year	1	3.30	56.70
	More than 1 year	11	36.70	93.30
	Combinations	1	3.30	96.60
Investment exit strategy	Stop loss	3	10.00	10.00
	Maximum profit	5	16.70	26.70
	Target price	14	46.70	73.30
	Wait and see	2	6.70	80.00
	Other	4	13.30	93.30
	Combination	2	6.60	100.00
Panel B: Investment strategy (intensity of use)				
Buy and hold	Low (0-40%)	16	53.00	50.00
	Moderate (50-60%)	6	20.00	70.00
	High (70-100%)	8	27.00	100.00
Momentum	Low (0-40%)	24	80.00	80.00
	Moderate (50-60%)	3	10.00	90.00
	High (70-100%)	3	10.00	100.00
Contrarian	Low (0-40%)	23	77.00	77.00
	Moderate (50-60%)	4	13.00	90.00

Table IX.
Investment management strategies

Construct	Items	N	(%)	Cumulative (%)
	High (70-100%)	3	10.00	100.00
Dividend oriented	Low (0-40%)	17	57.00	57.00
	Moderate (50-60%)	6	20.00	77.00
	High (70-100%)	7	23.00	100.00
Value	Low (0-40%)	15	50.00	50.00
	Moderate (50-60%)	2	7.00	57.00
	High (70-100%)	13	43.00	100.00
Growth	Low (0-40%)	19	63.00	63.00
	Moderate (50-60%)	3	10.00	73.00
	High (70-100%)	8	27.00	100.00

Notes: Panel A summarizes the possible investment decision and management strategies, whereas Panel B reports the intensity of use for various possible investment strategies. All of these possible strategies are referred from existing research
Source: Items are referred from various evidence as reported in Table I

Table IX.

It can also be observed that these fund managers use a mixture of modern finance asset pricing models and behavioral asset pricing models, namely, capital asset pricing model (CAPM), CAPM with behavioral factors and CAPM with industry and size adjustments, Fama–French three factors model, arbitrage pricing theory (APT) with behavioral factors and other unmentioned models (Panel B). The uses of these valuation models are consistent with the importance of various fundamental, technical and behavioral variables or factors to fund managers (Panel D).

The practical relevancy of using mix methods in investment analysis is captured from the following qualitative opinions provided by some fund managers who have responded to open-ended questions. These qualitative data serve as a supplement and confirmation to the quantitative data gathered to understand the existing practice in details. This research method is possible within the emerging mix methodology of a pragmatic approach research (Morgan, 2007; Kaczynski et al., 2014):

Fundamental information used are multiple and changing [. . .] Interviews may add to these insights [. . .] (Respondent 28 – Fund manager with nine years of experience).

We/I believe in long term value investing. Investing can vary depending on the person, but the investment philosophy of an asset management company must resonate amongst its staff especially the fund managers. Building a team of management that is like minded helps strengthen the performance (medium to long term) of the portfolios. No one person is an island!! Buying is easy, selling is always the differentiating factor that separate managers [. . .]. Managing money is a collective method will have over them [. . .] (Respondent 9 – Chief executive officer with 15 years of experience).

[. . .] generally, I do believe that the stock market movement does largely being impacted by the fund managers' emotions and sentiment which typically very much to do with the amount of knowledge/information that they have [. . .] (Respondent 4 – Senior equity fund manager with 4 years of experience).

Managing a portfolio is not a clear cut decision making [. . .]. Sometimes the rationale can be varied and multi layered and is not consistent from one to another. There are no text book answers. Best fund managers are those with years of experience – both good and bad

Panel A: Investment appraisal methods

Methods	N	Yes	No		Important rank	First	Second	Third
Fundamental	30	93.30	3.30		Fundamental	86.70	10.00	3.30
Technical	30	66.70	33.30		Technical	6.70	66.70	26.70
Behavioral	30	53.30	46.70		Behavioral	6.70	16.70	76.70

Panel B: Risk calibration model used

Model	N	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Model	30	30.00	3.30	3.30	0.00	3.30	10.00	3.30	46.70

Model 1 (CAPM model), Model 2 (CAPM model with size and industry adjustment), Model 3 (Fama–French 3 factor model), Model 4 (APT model), Model 5 (Other multifactor models), Model 6 (CAPM with behavioral factors), Model 7 (APT with behavioral factors), Model 8 (Other model)

Panel C: Importance source of information

Information	N	1	Very Important		4	Moderately Important			Less Important		10	Overall Rank
			2	3		5	6	7	8	9		
TV and Newspapers	30	0.00	3.30	3.30	3.30	3.30	16.70	36.70	23.30	3.30	6.70	7
Annual Reports	30	0.00	23.30	20.00	6.70	6.70	13.30	3.30	0.0	3.30	3.30	2
Management financial reports	30	16.70	10.00	20.00	20.00	13.30	6.70	0.00	10.00	0.00	3.30	6
Internet and investment blogs	30	0.00	0.00	10.00	3.30	3.30	13.30	10.00	43.30	10.00	6.70	8
nalysts' recommendations	30	23.30	16.70	23.30	10.00	3.30	10.00	10.00	0.00	0.00	3.30	3
Broker recommendations	30	10.00	20.00	10.00	16.00	20.00	10.00	6.70	3.30	3.30	0.00	5

(continued)

Table X.
Analytical approach
and source of
information

Information	N	Very Important					Moderately Important		Less Important			Overall Rank
		1	2	3	4	5	6	7	8	9	10	
Investor relations												
eport	30	3.30	3.30	3.30	16.70	20.00	26.70	16.70	10.00	0.00	0.00	4
Company visits	30	26.70	16.70	10.00	13.30	23.30	3.30	3.30	0.00	3.30	0.00	1
Rumors	30	3.30	0.00	0.00	3.30	3.30	0.00	13.30	3.30	10.00	63.00	10
Friends	30	3.30	3.30	0.00	0.00	0.00	0.00	0.00	3.30	56.70	33.30	9

Panel D: Open-ended questions[a] (important fundamental, technical and behavioral information in investment analysis)

Fundamental — EPS (4); DY(5); DPR (2); PER (10); PBT (2); Gearing/DR/DER (8); Earnings growth (5); Cash flows (5); Competent management (3); Corporate governance (2); Strategic advantage/sustainable competitive advantage (2); Transparency of accounting (1); Economic outlook (2); Interest rates (2); Financial – Balance sheet strength (7); Income statements (1); Understanding the business/Business model (3); Industry/sector positioning (3); ROI (4); NTA (1); P/BV (2); Global economics (1); Growth potential (2); *Shariah*-compliant (1); Sustainability of profits (1); IRR(1); Economics factors (5); Credit risk (1); Legal and regulations (1); ROE (2); NAV (2); Inflation (1); US non-farm payrolls (1); Interest coverage (1); Relative valuations (1)

Technical — Stochastic (3); Moving average/MACD (10); Momentum (4); Bollinger bands (3); Elliot waves (1); Relative strength index (10); Volume/Volume liquidity (3); Retracement Fibonacci (1); Supply flow (1); Price movements (1); Market breadth-Advance/decline indicator (1); 52 weeks high (1); Volatility index (1); Money averages (1); Liquidity (1); Supply and demand flow (2); DMI (6); Head and shoulder (2); Double tops/bottoms (1)

Behavioral — Market sentiment (2); behavior of the stocks (1); Economic perceptions (1); Regional market performance (1); Sentiment (5); Overall perception (1); Contrarian trends (3); Politics (1); Herding – trade flows (4); Anchoring (2); Market liquidity (1); Market value traded (1); Policy makers statement and speech (1); Ground staff opinions (1); Investors global flows across multi assets (1); Investor position in risk assets (1); Emotion (2); Rules of thumb (1); Hindsight (1); Support and resistance (1); Past experience (1)

Notes: [a]Open-ended questions have been incorporated into the questionnaire to solicit specific fundamental, technical and behavioral information popularly used by fund managers in investment appraisal. The responses are recorded manually and the number in the parenthesis is the number of respondents mentioning the respective variableSource of items are referred from various evidence as reported in Table I.

Table X.

experiences – that's why decisions are more matured and in depth [...] (Respondent 20 – Fund manager and research with 20 years of experience).

To summarize, what has transpired in these qualitative opinions is that fund managers resort to the use of a combination of fundamental, technical and behavioral approaches in investment analysis owing to the fact that portfolio investment management is a complex process and yet expected to perform better among the peers. Based on these qualitative opinions, the use of mix method is promoted by the following practical factors. First, multiple and changing information possibly comprising fundamental, technical and behavioral factors can be referred to for investment analysis. Second, behavioral factors like sentiment and emotion influence fund managers' decision-making owing to the fact that fund management decision is a collective effort of a fund manager's team that is assigned to manage a particular fund portfolio. In the process, fund managers need to refer to other opinions and ensure that their collective actions always adhere to the firm investment policy. Third, portfolio management involves varied and multi-layered processes that promote opinions and practices that are not consistent. In the process, fund managers' experiences and others' experiences are always part of the influential factors in a fund manager's decision-making to justify a more matured and in-depth portfolio analysis and management decisions.

4.4 Behavioral biases in portfolio management

In the questionnaire, two constructs are used to measure behavioral biases in portfolio management. First is mental account bias with four items. The other is diversification heuristic bias with nine items. Details of the items are as reported in Table II. The respective items have been transformed (i.e. mean score for all items is obtained) into a single construct to represent mental account bias and diversification heuristic bias. The unreported frequency analysis indicated the presence of a higher mental account and diversification of heuristic biases. The crosstabulation analysis between these biases shows that the association relationship is statistically significant, as provided in Panel A of Table XI. This can be read as evidence that higher mental account bias is associated with higher diversification heuristic bias.

In Panel B, differences of mental account biases between three groups of respondents (i.e. local private, local public and foreign fund managers) are analyzed. Based on the mean score, there is a difference in mental account biasness among these three groups, with local public recorded (3.70) followed by local private (3.11) and foreign (2.98). The analysis of variance (ANOVA test) of mental account bias among these three groups is significant at 10 per cent.

Similarly, in Panel C, differences of diversification heuristics bias between these groups are summarized. For this bias, a consistent score trend is noted similar with the trend obtained in mental account bias where a higher score is recorded by local public (3.58), followed by local private (3.33) and foreign (3.27). However, the variance difference is insignificant for this sample.

To explore the institutional and individual characteristics that are associated with behavioral risks, the following models are estimated using the stepwise regression analysis. This method is used to select an appropriate explanatory variables from a wide set of possible explanatory variables (Agostinelli, 2002). Accordingly, Models 1 and 2 for mental account and diversification heuristic, respectively, have been estimated using stepwise regression model as below:

		Mental account bias	Diversification heuristics bias
Panel A: Correlations – Spearman's rho			
Mental account bias	Correlation coefficient	1.00	0.33
	Significance (two-tailed)		0.08
	N	30	30

Panel B: Mental account bias					
Descriptives	*N*	Mean	SD	Minimum	Maximum
Local Private	14	3.11	0.59	2.00	4.25
Local Public	5	3.70	0.21	3.50	4.00
Foreign	11	2.98	0.68	1.50	4.00
Total	30	3.16	0.62	1.50	4.25
ANOVA test	Sum of squares	df	Mean Square	*F*	Significance
Between groups	1.86	2.00	0.93	2.70	0.09
Within groups	9.32	27.00	0.35		
Total	11.19	29.00			

Panel C: Diversification heuristics bias					
Descriptives	*N*	Mean	SD	Minimum	Maximum
Local Private	14	3.33	0.38	2.67	3.78
Local Public	5	3.58	0.36	3.00	4.00
Foreign	11	3.27	0.68	2.67	5.00
Total	30	3.35	0.50	2.67	5.00
ANOVA test	Sum of squares	df	Mean square	*F*	Significance
Between Groups	0.33	2.00	0.17	0.64	0.54
Within groups	7.04	27.00	0.26		
Total	7.38	29.00			

Notes: Panel A provides the correlation analysis between Mental account bias and Diversification heuristics bias. While Panels B and C summarize the differences in these behavioral biases between different types of institutional investors (i.e. local private, local public and foreign fund management institutions)

Table XI.
Correlation and analysis of variance (ANOVA) test

$$Behavioural\ biases\ =\ f\ (Institutional\ characteristics\ +\ Individual\ characteristics$$
$$+\ Awareness\ +\ Governance\ +\ Analysis\ Approach)$$

Where at the initial stage, all items for the aforementioned independent variable constructs (institutional characteristics [5 items] + individual characteristics [7 items] + awareness [8 items] + governance [4 items] + analysis approach [6 items]) are regressed with the respective behavioral biases' proxy (mental account bias and diversification heuristic bias) to explore their influence on this behavioral risk. The stepwise regression analysis produces various alternative models and best models with the most significant independent variables are finally selected. The results are shown in Table XII. Analysis for Model 1 (mental account bias) indicated that this bias is significantly explained by two governance variables (i.e. trading process is audited to mitigate behavioral risks and portfolio management is audited to mitigate behavioral risks) and awareness variable (have attended training in behavioral finance). Analysis for Model 2 (diversification heuristic bias) indicated that this bias is significantly explained by individual characteristic (i.e. fund manager education), institutional characteristics (domestic investment and fund size) and investment strategy variable (importance of fundamental).

Model	Unstandardized coefficients Beta	Standard error	t	Significance
Model 1: Dependent variable: Mental account bias				
Independent Variables				
(Constant)	2.70***	0.28	9.48	0.00
Trading process is audited to mitigate behavioral risks	2.26***	0.38	5.97	0.00
Portfolio management is audited to mitigate behavioral risks	−1.34***	0.38	−3.54	0.00
Have attended training in behavioral finance	−0.39***	0.17	−2.33	0.03
O-Statistics	18.00***			
Adjusted R^2	0.70			
Model 2: Dependent variable: *Diversification heuristics bias*				
Independent Variables				
(Constant)	3.82***	0.32	12.02	0.00
Fund Manager Education	−0.35***	0.08	−4.22	0.00
Institutional Domestic Investment	0.01***	0.00	4.06	0.00
Institutional Fund Size	0.00***	0.00	2.92	0.00
Importance of fundamental	−0.32**	0.15	−2.19	0.04
F-Statistics	9.17***			
Adjusted R^2	0.59			

Table XII.
Stepwise regression analysis

Notes: The stepwise regression model suggested only the significant explanatory variables in the model and excluded other variables. At the initial analysis, four models have been suggested for each regression above. The reported models are the models with the most number of significant independent variables. The *F*-statistic is for ANOVA test. *** and ** denote 1 and 5% levels of significance, respectively

5. Discussion and implications

5.1 Sources of bounded rationality

Understanding investor rationality is important for theory and model development in finance. For very long, investor behavior has been assumed as fully rational in modern finance theory building. Whereas, in the alternative behavioral finance, investors, being a normal human being, are argued to be bounded rational (Statman, 2005), which is in line with psychology domain views (Simon, 1955; Tversky and Kahneman, 1981). Despite not being popularly referred to in the modern finance domain, growing empirical evidence from the industry practice seems to provide support to the validity of the bounded rationality theory in explaining the real behavior of both institutional and retail investors. Currently, the academic perspectives on the nature of investor rationality are divided into two. Modern finance believes that institutional investors (expert investors) are fully rational and this behavior is expected to arbitrage behavioral risks reflected in the market by the retail investors (non-expert investors). On the other hand, the behavioral finance group sees that both institutional and retail investors are expected to be bounded rational in their decision-making. This bounded rationality is owing to the influence of behavioral heuristics and biases that are permanent features in the human mind and thus influence behavior consistently. The current research supports the assumption that fund managers are boundedly rational. This conclusion is in line with some recent research in this area (Coleman, 2014, 2015; Cuthbertson *et al.* 2016).

In line with the research focus, the discussion of possible sources of bounded rationality among fund managers focuses on individual traits (psychology and biology forces), cultural traits (sociology forces) and institutional traits (sociology forces) in inducing the bounded rationality of institutional investors as presented below.

5.1.1 Individual traits. Human behavior is heterogeneous partly due to the differences in individual traits, namely, gender, age, experience, education and personality types. In gender differences, both genders recorded a higher risk tolerance level, but female respondents proved to be relatively more risk-averse (do not like taking risks) compared with male respondents [as reported in Figure 3(b) and Table IV]. This is consistent with the personality type where the female personality type is more about being open to experience, whereas the male type is more about extraversion [as reported in Figure 3(a)]. The evidence is in line with recent studies connecting investors' Big Five personality with their risk tolerance. Generally, risk tolerance is high among those with a high level of extraversion and openness. Whereas, high level of conscientiousness is associated with low level of risk tolerance. These evidences are also in line with existing evidence (Byrnes, Miller and Schafer, 1999; Montier, 2002; De Venter and Michayluk, 2008; Halko, Kaustia and Alanko, 2012; Pan and Statman, 2013). Based on age differences, it has been generally hypothesize that age and the level of risk tolerance is positively related, but the age effect on risk aversion is reduced when controlling for financial knowledge (Riley and Chow, 1992; Halko *et al.*, 2012). The current research provides supports to this evidence in which age is significantly positively related to Big Five personality × risk aversion rank (as reported in Table VII). As for experience differences, tenure of service, which is used as a proxy for experience, is significant positively related to five personalities × risk aversion rank (as reported in Table VII). This indicates that the more experienced the fund managers are, the more risk-averse they are. It is interesting to note that this is in contradiction to the existing evidence which argued that more experienced and expert investors are more prone to behavioral biases and higher risk-taking behavior (Chen *et al.*, 2004; Griffin and Tversky, 1992; Corter and Chen, 2006). Finally, the education factor is significantly positively related to Big Five personality × risk aversion rank (as reported in Table VII) and also significantly negative in association with the diversification heuristic bias (as reported in Table XII – Model 2). The positive relationships between education and risk-aversion profiles can be referred to the fact that higher education on financial literacy has been associated with a more rational investment decision. Furthermore, training related to behavioral finance increases the awareness and reduces the fund manager's behavioral biases (Schooley and Worden, 1999; Bernheim and Garrett, 2003; Wang, 2009; McCannon, 2014; Nikiforow, 2010).

5.1.2 Cultural traits. The sociology hypothesizes that individual behavior is associated with the culture of the society, and bounded rationality of an individual is partly due to social forces. In behavioral finance research, some have highlighted that behavioral biases are present among institutional investors in emerging markets which are socially collectivist in nature. One of the behavioral biases that are believe to be induced by cultural factors is home bias which influences international diversification decision (Anderson *et al.*, 2011; Nguyen and Truong, 2013; Beracha *et al.*, 2014). This research provides complementary evidence on the differences between foreign and local fund managers' behavioral biases. In particular, local fund managers are more prone to mental account and diversification heuristics biases in their portfolio management compared to local fund managers (as reported in Table XI).

5.1.3 Institutional traits. The existing research discusses the importance of two important institutional traits, namely, governance and ethical concerns to mitigate behavioral risks in financial markets (Marnet, 2005; Suto and Toshino, 2005; Marco *et al.*,

2011; Baccar *et al.*, 2013; Claessens and Yurtoglu, 2013). This research provides confirmation of the evidence that portfolio management audit to mitigate behavioral risk is significantly negative in association with mental account bias (as reported in Table XII – Model 1). In addition, this research provides emerging findings that institutional characteristics, namely, institutional type, length of establishment, fund size, percentage of domestic investment and percentage of equity investment, are statistically significant in correlation with five personalities × risk aversion rank (as reported in Table VII).

5.2 Bounded rationality of fund managers

In line with the research objectives, the fund managers' possible bounded rational behavior is assessed in reference to their investment management approaches and strategies right from individual beliefs and acquisition of information, as well as investment management and strategies used. Discussions of the findings are provided below.

5.2.1 Individual beliefs. Based on cognitive psychology, behavioral finance believes that an individual makes judgments based on beliefs and preferences (Baker and Ricciardi, 2014). This justifies the theoretical importance of understanding the fund managers' beliefs on the state of the Malaysian financial market efficiency and the relevance of behavioral finance in fund management practices. The findings revealed that the majority of fund managers are of the opinion that the Malaysian financial markets are predictable and offer an opportunity to make profits. This implies the beliefs that the markets are not entirely rational at all times. This belief is also consistent with the majority of the opinions that endorsed the importance of behavioral finance strategies in fund management practices. These evidences can be corroborated with the existing postulates in behavioral finance that state that investors' behaviors are best described as boundedly rational and the financial markets are boundedly and adaptively efficient (Lo, 2012).

5.2.2 Investment management practice. In the investment decision and fund portfolio management strategies, this research captured various conformational evidences to the notion of the bounded rationality of fund managers. The first evidence is that investment decision is influence by other members in the fund management team, as well as subjected to pre-specified investment policies. This means that fund managers are not free to make decision that are in their best interests but are confined to others' opinions and governing rules. The second evidence provides confirmation of short-termism bias among fund managers in investment strategies, including portfolio checking, stock prices checking and portfolio rebalancing. The third evidence indicates that a popular investment exit strategy among fund managers is target price which can be corroborated with the use of purchase price as the reference point for profit and loss determination not based on the forecasted fair value. This is in line with the ideas postulated in the prospect theory. The fourth evidence highlighted that popular behavioral-based investment strategies, namely, momentum and contrarian investment strategies, are also noted to have a significant influence on fund managers' investment decision in line with global evidence.

In the information acquisition and investment analysis, various confirming evidence and emerging insights are uncovered. With regards to information sources for use in investment analysis (as reported in Table X), the top five referred sources of information based on ranking are:

(1) company visit;

(2) annual reports;

(3) analysts' recommendations;

(4)   investor relations reports; and

(5)   broker recommendations.

Majority of the fund managers have endorsed the use of a combination of fundamental, technical and behavioral investment appraisal methods. As for the asset pricing model used, the popular models are other models, CAPM with behavioral factors, the original CAPM model, CAPM with industry and size adjustment, Fama–French three-factors model and APT with behavioral factors. None of the respondents provides information on the specific name of other models used in their analysis. We are of the opinion that these other models are possibly related to the model used in the valuation of bonds and money market investments. This conclusion is supported by the fact that we only provide a list of equity-based valuation models in the questionnaire and some of the fund managers are managing bond and money market funds portfolio. As for the specific variables used, various fundamentals that comprise firm and economic fundamentals and technical and behavioral factors have been provided by these fund managers (as reported in Table X – Panel D). Reference to these multiple factors is consistent with mix methods of analysis used in investment analysis and management.

5.2.3 Behavioral biases in portfolio management. Selected behavioral risks proxies in portfolio management (i.e. mental accounting and diversification heuristic biases) have been endorsed by fund managers to be relevant to their practices. This evidence is in line with Fasano and Galloppo (2016) who argued that behavioral biases prevail in the active management of fund portfolio in emerging market. This research has also highlighted that fund managers highly rely on sell-side analyst and broker recommendations, which are also subjected to behavioral biases as highlighted by Durand *et al.* (2014). The application of behavioral finance strategies in investment management can be taken as an endorsement of the relevance of behavioral finance to institutional investors. This is in line with evidence reported by Menkhoff and Nikiforow (2009).

This collective evidence provides a testimonial support to the bounded rationality of fund managers in Malaysia. Being boundedly rational, various behavioral biases are expected in decision-making and portfolio management strategies. The current research provides additional and emerging insights to the existing behavioral finance research conducted in Malaysia financial markets (Lai *et al.*, 2001, 2013; Ahmad and Tjan, 2004; Mohamad and Perry, 2015; Tuyon and Ahmad, 2016).

5.3 Implications of research findings

We argue that negligence or rejection of the bounded rationality theory as a theoretical description of human behavior will be reflected by the misunderstanding of the importance of behavioral risks in the fund management industry, both in investment management and strategies, as well as in institutional governance. The presence of behavioral risks is expected to bring both positive and negative implications to fund management performance. On the positive side, behavioral risks can be capitalized as a strategy to conduct device investment analysis and to develop a sustainable fund portfolio. This practice is still not available in Malaysia, but there are some good examples in the USA. For instance, MarketPsych LLC[3] is an investment analysis company that focusses on behavioral risk analysis based on psychoanalysis and neuroscience perspectives. Equity portfolio management of Fuller and Thaler Asset Management, Inc.[4] is using the bottom-up approach to exploit insights from behavioral finance to manage their funds. On the negative side, ignorance of the importance of behavioral risks could negatively affect the performance of fund management performance. More importantly, many anomalies in

financial markets that are probably due to these behavioral risks were not recognized and would remain anomalies forever that promote misunderstanding and frustration in financial markets.

The current paper provides new insights to both theory and practice. Theoretically, this research provides evidence of bounded rationality of institutional investor behavior practicing in the asset management industry in the emerging markets of Malaysia. This evidence lends support to the validity of the bounded rationality theory in explaining the institutional investor behavior. In addition, this research also provides new insights on the relevance of behavioral finance theories and strategies in the asset management industry.

In practice, the current study draws some practical ideas, especially for the buy-side investment management market players that comprise investing institutions such as mutual funds, pension funds and insurance firms that tend to buy large portions of securities for money-management purposes. In specific, buy-side institutional investors need to be aware of behavioral biases and their impact on fund management practices and performance. Ideally, acknowledging human bounded rationality could be used to improve investment analysis and fund management strategies to reduce behavioral biases. In this respect, Shefrin (2000) advices practitioners to recognize their own and others' mistakes, to understand the reasons for these mistakes and to avoid mistakes. In investment analysis and fund management practices, Fromlet (2001) argued that behavioral finance theories provide an important contribution to avoid serious mistakes in investment analysis and in finding profitable investment strategies. As such, institutional investors need to be aware of the growing importance of behavioral finance (Montier, 2002). A list of strategies and a checklist to overcome behavioral errors are discussed by Kahneman and Riepe (1998), Fromlet (2001) and Baker and Ricciardi (2014).

As for the respective regulators, the need to regulate these behavioral risks has been stressed upon by Daniel *et al.* (2002) to mitigate the effects of irrational behavior and imperfect markets. This is fundamentally important because excessive irrational behaviors will cause highly imperfect markets and market crashes in the worst-case scenario. The negative implications arising out of excessive behavioral risks will be too costly to all parties be it the investors, the firm or the government. In short, these challenged the sustainability practice in financial markets. In this regard, Daniel, Hirshleifer and Teoh (2002) suggested that the regulator should come up with a policy to help investors avoid errors and to promote the efficiency of the markets. Globally, governing the financial markets against behavioral risks is needed (Suto and Toshino, 2005) and particularly crucial in Asia financial markets owing to psychological and sociological condition of market participants in Asia which have been reported to be more prone and vulnerable to behavioral biases (Kim and Nofsinger, 2008). Asian financial markets are among the largest in the world and serve as important markets for international diversifications among global fund managers. This issue remains relevant and neglected in current fund management industry management and governance framework globally (Cuthbertson *et al.*, 2016).

6. Conclusion
Generally, the findings lend support to the notion that institutional investors too, being normal human beings, are expected to think and behave in a boundedly rational manner as postulated in the bounded rational theory. The sources of bounded rationality are, in part, individual, cultural and institutional traits. Being boundedly rational, fund managers are challenged with various behavioral biases to be induced by individual, cultural and institutional forces.

The confirming and emerging insights drawn in this research provide valuable practical implications to the behavioral finance body of knowledge and the industry practices. In particular, acknowledging bounded rationality of institutional investors is important to both theory and practice of investment management. In theory, as far as human behavior is the concern, the bounded rational theory and prospect theory provide a rich description of real investors' behaviors, as well as real financial markets' functioning. In practice, awareness of the bounded rational of investors and the behavioral biases arising out of the irrational part of investor thinking provides a rational theoretical justification for the adaptive efficient financial markets. Behavioral biases offer both opportunities and costs in investment management. As such, behavioral finance strategies can be incorporated in the modeling, analysis and strategies of investment management. To increase awareness among fund managers, attending courses and training related to behavioral finance are necessary. On priority, the needs to govern the behavioral biases on part of investors and institutions and in the marketplace, are fundamentally required and crucial. Urgent attention and policy commitment are needed to be in place to protect the welfare of the investors, shareholders and the efficiency of the financial markets. These can be a valuable complementary strategy toward building a sustainable investment management practice that will benefit the investing society, the industry and the nation in the foreseeable future.

Notes

1. See Mayfield *et al*. (2008), for detailed descriptions.

2. See – www.sc.com.my/data-statistics

3. See – https://marketpsych.com

4. See – http://fullerthaler.com

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