

**ROLE OF BEHAVIOURAL FACTORS IN ASSET
PRICING: PSYCHOANALYSIS PERSPECTIVE
AND EVIDENCE FROM MALAYSIA**

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PRICING: PSYCHOANALYSIS PERSPECTIVE
AND EVIDENCE FROM MALAYSIA**

by

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DEDICATION

“The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2013 was awarded jointly to Eugene F. Fama, Lars Peter Hansen and Robert J. Shiller “for their empirical analysis of asset prices””

“[Robert J. Shiller – Work] - For many of us, the rise and fall of stock prices symbolizes economic development. In the 1960s, Eugene Fama demonstrated that stock price movements are impossible to predict in the short-term. In the early 1980s, however, Robert Shiller discovered that stock prices can be predicted over a longer period, such as over the course of several years. In contrast to the dominant perception, stock prices fluctuated much more than corporate dividends. Robert Shiller's conclusion was therefore that the market is inefficient”

(The Royal Swedish Academy of Sciences, 2013)

This academic achievement is dedicated to my supervisor, parents, families, teachers, lecturers, friends, the Universiti Teknologi MARA, and the Universiti Sains Malaysia who have collectively shaped my life on the path of the pursuit for educational, career, and personal excellence that make this challenging dream a reality.

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“Behavioural finance is the study of the influence of psychology on the behaviour of financial practitioners and the subsequent effect on markets. Behavioural finance is of interest because it helps explain why and how markets might be [sometimes] inefficient”

(Sewell, 2010, p. 1)

“In the name of Allah, Most Gracious, and Most Merciful”

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LIST OF ABBREVIATIONS

ABC Model	Activating events-Beliefs-Consequences Model
AEH	Adaptive Expectation Hypothesis
AMH	Adaptive Market Hypothesis
APT	Arbitrage Pricing Theory
ARED	Adaptive Rational Equilibrium Dynamics
BAPM	Behavioural Capital Asset Pricing Theory
BAPT	Behavioural Arbitrage Pricing Theory
BCS	MIER's Business Condition Survey
BF	Behavioural Factors
BM	Book-to-Market ratio
BPT	Behavioural Portfolio Theory
BVPS	Book Value Per Share
CAPM	Capital Asset Pricing Model
CCAPM	Consumption Capital Asset Pricing Model
CF	Company Fundamental
CI	Coincident Index
CON	Construction Industry
CONP	Consumer Product Industry
CSI	MIER's Consumer Sentiment Index
D-APT	Downside APT model
DY	Dividend Yield
EIV	Errors-in-Variables
EMH	Efficient Market Hypothesis
EMO	Emotion
EPS	Earnings Per Share
FBMKLCI	Malaysia Stock Market Composite Index
FE	Fixed Effect Model
FF	Fundamental Factors
FIN	Financial Industry
FKLI	Malaysia Equity Futures Index
FTSEBM	FTSE Bursa Malaysia Index Series
HML	High Minus Low

ICAPM	Intertemporal Capital Asset Pricing Model
INDP	Industrial Products Industry
IPOs	Initial Public Offerings
KLSE	Kuala Lumpur Stock Exchange
LAD	Least-Sum of Absolute Deviations Estimator
LAI	Lagging Index
LEI	Leading Index
LM	Breausche-Pagan Lagrangian Multiplier Test
LSDV	Least Squares Dummy Variable
MAE	Mean Absolute Error
MC	Market Capitalization
MF	Macroeconomic Fundamental
MIER	The Malaysian Institute of Economic Research
MSCI	Morgan Stanley Composite Index
MV	Market Value
OLS	Ordinary Least Square Estimator
PE/PER	Price Earnings Ratio
PLAN	Plantation Industry
POLS	Pooled Ordinary Least Square
PQR	Panel Quantile Regression
PROP	Properties Industry
QR	Quantile Regression
RE	Random Effect Model
REH	Rational Expectation Hypothesis
RMSE	Root Mean Squared Error
SDF	Stochastic Discount Factor
SEN	Sentiment
SIZE	Market Capitalization
SMB	Small Minus Big
T&S	Trade and Services Industry
TECH	Technology Industry
The BCS Approach	Brennan, Chordia, and Subrahmanyam (1998)

The FM Approach	Fama and Macbeth (1973)
TOM	Theory of Mind
UAPT	Unified APT model
UAPT	Unified APT Model
VOL	Volatility
WML	Winner Minus Loser

DEFINITION OF TERMINOLOGIES

Affective	Affect is the umbrella term of System 2 mind that comprises of sentiment, emotion, and mood.
Cognitive	Cognitive is known as System 1 mind. Cognition is the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.
Neuroscience	Neuroscience (or neurobiology) is the scientific study of the nervous system.
Paradigm	In science and philosophy, a paradigm is a distinct set of concepts or thought patterns, including theories, research methods, postulates, and standards for what constitutes legitimate contributions to a field.
Philosophy	Philosophy is the study of general and fundamental problems concerning matters such as existence, knowledge, values, reason, mind, and language.
Psychoanalysis	Psychoanalysis is a set of theories and therapeutic techniques related to the study of the unconscious mind, which together form a method of treatment for mental-health disorders. The discipline was established in the early 1890s by Austrian neurologist Sigmund Freud.
Psychology	Psychology is the science of behaviour and mind, embracing all aspects of conscious and unconscious experience as well as thought.
Sociology	Sociology is the study of social behaviour or society, including its origins, development, organization, networks, and institutions.

**PERANAN FAKTOR PERLAKUAN DALAM HARGA ASSET:
PERSPEKTIF PSIKOANALISIS DAN BUKTI DARI MALAYSIA**

ABSTRAK

Paradigma kewangan perlakuan berhujah bahawa risiko perlakuan adalah penyebab utama ketidakpastian harga saham yang mendorong ketidakstabilan pasaran saham terutamanya di Asia dan menyebabkan krisis kewangan yang tidak menentu. Walau bagaimanapun, sebagai sekolah pemikiran baru, teori perlakuan harga asset dan bukti empirik masih belum lengkap yang mewakili kawasan penyelidikan yang baru muncul dengan banyak soalan terbuka dan peluang penyelidikan. Berdasarkan lensa falsafah kewangan perlakuan, tesis ini membincangkan teori, model, dan sumbangan baru berkaitan penentuan harga asset perlakuan. Pertama sekali, teori dan model alternatif ditubuhkan. Secara teori, pendekatan psikoanalisis digunakan sebagai teori alternatif untuk memahami tingkah laku manusia yang rasional dan tidak rasional. Dalam pemodelan, penentu harga aset pelbagai faktor yang separa-rasional dicadangkan menggabungkan penentu risiko ekuiti rasional dan tidak rasional. Asas firma (EPS, DY, PE) dan ekonomi (CI, LEI, LAI) dikenalpasti sebagai sumber risiko rasional. Sementara itu faktor tidak rasional diwakili oleh heuristik kognitif (bermusim), dan berat sebelah afektif akibat sentimen (BCS, CSI, FKLI) serta emosi (VOL). Dalam ujian empirikal, tesis ini menyiasat risiko ekuiti dan sifat pulangan menggunakan ideologi harga asset perlakuan dalam rangka kerja faktor dan pelaburan gaya untuk mengakui kepelbagaian hubungan risiko-pulangan. Ujian empirikal dilakukan berdasarkan sampel 238 pulangan saham syarikat Malaysia menggunakan kaedah regresi panel dan regrasi panel kuantil dengan kekerapan data bulanan. Analisis ini memberikan bukti menyokong hubungan dinamik risiko-pulangan disebabkan oleh penentu risiko separa-rasional

dan diberi sub-sampel yang berbeza. Ringkasnya, keputusan menunjukkan bahawa semua proksi risiko asas dan perlakuan adalah penting dalam mempengaruhi pulangan stok syarikat di Malaysia. Di samping itu, hubungan risiko-pulangan didapati bersifat pelbagai berdasarkan perbezaan kumpulan firma, kumpulan industri, keadaan pasaran, serta antara prospek keuntungan-kerugian. Penemuan ini selaras dengan perspektif kewangan perlakuan bahawa perlakuan pelabur adalah rasional terbatas dalam erti kata bahawa keputusan mereka untuk berdagang saham dipengaruhi oleh risiko rasional (asas) dan tidak rasional (perlakuan). Secara idealnya, dalam amalan pelaburan, pelabur rasional terbatas menyebabkan kelakuan penyesuaian harga saham dan akibatnya mendorong perubahan pola kecekapan pasaran. Selain bukti pengesahan teori dan empirikal, penyelidikan ini menawarkan pandangan baru mengenai strategi kepelbagaian portfolio ekuiti untuk meminimumkan pengaruh risiko perlakuan. Khususnya, saham milik industri berkisar, saiz sederhana-kecil, nilai tinggi, dan harga yang lebih rendah sangat terdedah kepada risiko perlakuan. Manakala saham milik industri defensif, saiz besar, nilai sederhana-rendah, dan harga yang tinggi kurang dipengaruhi oleh risiko perlakuan. Sebagai aplikasi industri pelaburan, kajian ini mencadangkan kuadran gaya perlakuan sebagai strategi pelindungnilai. Khususnya, ciri-ciri risiko-pulangan dianjurkan dalam lapisan portfolio ekuiti (iaitu firma, industri, pasaran, dan kalendar) untuk membentuk gabungan portfolio ekuiti yang berdaya tahan terhadap pengaruh risiko perlakuan. Secara kolektif, tesis ini bukan sahaja memberikan testimoni untuk kesahihan harga aset perlakuan tetapi menawarkan pandangan baru yang praktikal berkaitan dengan amalan pelaburan dan pembuat dasar pasaran kewangan untuk memahami harga aset dan tingkah laku pasaran kewangan berdasarkan perspektif kewangan perlakuan.

**ROLE OF BEHAVIOURAL FACTORS IN ASSET PRICING:
PSYCHOANALYSIS PERSPECTIVE AND EVIDENCE FROM MALAYSIA**

ABSTRACT

Behavioural finance paradigm argue that behavioural risks are the main driver of stock mispricing that induced stock market inefficiency particularly in emerging Asia and cause unpredicted financial crisis. However, being a new school of thought, the behavioral asset pricing theory and empirical evidence are still incomplete which represents a nascent research area with a multitude of open questions and research opportunities. Based on philosophical lenses of behavioural finance, this thesis discusses alternative theoretical, model, and new evidence on behavioural asset pricing determinants. First and foremost, the alternative theory and model are established. In theory, the psychoanalysis approach is used as an alternative theoretical basis to understand the rational and irrational human behaviours. In modeling, a quasi-rational multifactor asset pricing determinants is proposed that combined rational and irrational sources of equity risks determinants. Firm (EPS, DY, PE) and economic (CI, LEI, LAI) fundamentals are identified as a source of rational risk. While the irrational forces represented by cognitive heuristics (seasonality), and affective biases due to sentiment (BCS, CSI, FKLI) as well as emotion (VOL). In empirical test, this thesis investigates the equity risk and returns properties using behavioural asset pricing ideology in a factor and style investing framework to acknowledge the heterogeneity of risk-return relationships. The empirical tests are performed based on a sample of 238 Malaysian firm stock returns using the panel regression and quantile panel regression methods with monthly data frequency. The analyses provide evidence supporting the dynamic of risk-returns relationships due to quasi-rational risk determinants and given different sub-samples

in consideration. In brief, the results show that all fundamental and behavioural risks are significant in influencing firm stock returns in Malaysia. In addition, the risk-return relationships are found to be heterogeneous given different firm groups, industry groups, market states, and gains-losses prospects. The findings are in line with behavioural finance perspectives that investors' behaviour are bounded rational in the sense that their investment are influenced by both rational (fundamental) and irrational (behavioural) risks. Ideally, in investment practice, bounded rational investor's causes the adaptive behaviour of stock prices and consequently induced changing patterns of market efficiency. Apart from the theoretical and empirical confirming evidence, the research offers new insights on multi-styles equity portfolio diversification strategies to minimize the influence of behavioural risks. In particular, stocks belong to cycle industry, small-medium size, high value, and lower price are highly vulnerable to behavioural risks. Meanwhile stocks belong to defensive industry, big size, low-medium value, and high price are less influenced by behavioural risks. As an investment industry application, this research suggested the behavioural style quadrant as a diversification strategy. In specific, the risk-return characteristics are organized in the multi-style (firm, industry, market, and calendar) equity portfolio layers to form a mix of equity portfolio that is resilient on the influence of behavioural risks. Collectively, this thesis not only provide testimonial for the validity of behavioural asset pricing but offering new insights that are practically relevant to investment practice and financial markets policy makers to understand asset prices and financial markets behaviour based on the behavioural finance perspective.

CHAPTER 1

INTRODUCTION

“For many of us, the rise and fall of stock prices symbolizes economic development. In the 1960s, Eugene Fama demonstrated that stock price movements are impossible to predict in the short-term. In the early 1980s, however, Robert Shiller discovered that stock prices can be predicted over a longer period, such as over the course of several years. In contrast to the dominant perception, stock prices fluctuated much more than corporate dividends. Shiller's conclusion was therefore that the market is inefficient”
(*Nobelprize.org, 2013*¹)

The field of asset pricing is essential for many financial decisions that have had a profound impact to investment strategies and outcomes as well as financial market policy. Asset pricing research² has grown since the 1960s and remains important in finance research in the 21st century. Despite great research efforts over the last 50 years, the inconsistency between theoretical and empirical works coming from a competing perspective of modern- and the behavioural-finance paradigm bring serious challenge to investment practice and financial market policy.

This research focuses on behavioural asset pricing. This chapter aims to provide an overview of the research ideas and novelty. Sub-section of 1.1 summarizes the research motivation. Sub-section 1.2, provides background to this research. Sub-section 1.3 discusses the problem statements, which specifically focuses on the issues of behavioural asset pricing modelling. Sub-section 1.4 lists the research objectives followed by research questions in sub-section 1.5. Research significance and contributions are spelt out in sub-section 1.6, and research limitations are acknowledged in sub-section 1.7. Finally, the summary of the organization of this thesis is given in the last sub-section 1.8.

¹ Source: http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2013/shiller-facts.html

² Key ideas of underlying the seminal works on asset pricing research have been presented in Dimson and Mussavian (1999), The Royal Swedish Academy of Science (2013), Levy, De Giorgi, and Hens (2012), Campbell (2014), Fama (2014), Shiller (2014), Shabani and Toporowski (2015), and Linnenluecke *et al.* (2017).

1.1 Motivation

Asset pricing is one of important core theory in finance discipline which has been continuously developed since 1960s (Sundaresan, 2000) and still a main theme in current finance research (Linnenluecke *et al.*, 2017). In the current context of emerging financial markets, asset pricing, financial market efficiency and risk measurement are the important and promising avenues for finance research (Kearney, 2012). This research timely addresses these issues from behavioural finance paradigm that is also recommended in Kearney (2012) due to its philosophical appropriateness in understanding the investors and market behaviours in emerging financial market. The emergence, definition and significant importance of behavioural finance research are briefly summarized by Shiller who was awarded the Nobel Prize in economic sciences in 2013³ as follow;

“Academic finance has evolved a long way from the days when the efficient market theory was widely considered to be proved beyond doubt. Behavioural finance is finance from a broader social science perspective including psychology and sociology. [Behavioural finance] is now one of the most vital research programs, and it stands in sharp contradiction to much of efficient markets theory” (Shiller, 2003, p. 83)

Specifically, the research ideas build upon the implications of behavioural finance for modeling of stock prices in an adaptive and dynamic market environment. This research is extending the ideas of Statman (1999) and Thomaidis (2004) for the needs of developing a behavioural-based stock-pricing model. Specifically, Statman (1999) suggested the needs to focus on identifying asset pricing that reflect both value-expressive (behavioural factors) and utilitarian characteristics (fundamental factors) to provide insights on irregularity of market

³The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2013 has been awarded to three financial economic scholars namely, Eugene F. Fama, Lars Peter Hansen and Robert J. Shiller for their empirical analysis of asset prices. Fama has been the strong proponents for asset pricing in modern finance perspective. On the other hand, Shiller is the prominent scholar for asset pricing under behavioural finance perspectives. While, Hansen contribution was on the development of statistical methods for asset pricing research. Source; http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2013/

behaviour and other stock market anomalies in real worlds which have been inadequately explained by the modern finance theories and models such as EMH and CAPM. The inability of traditional framework to explain many empirical patterns in the stock markets are partly explained by critics on the foundation assumption on stock market efficiency, financial market anomalies and drawback on the modern stock pricing theories and models. In support to this, [Thomaidis \(2004\)](#) argues that incorporating behavioural ideas into the modeling framework will lead to more realistic and successful representations of security prices.

This research is offering new perspectives to further enhance the growing behavioural finance research paradigm specifically in establishing the theoretical origin, causes and effects of investors' irrational behaviours, which are rooted in the dual-system of thinking model. This will address the research gaps of missing the logic link between investors' irrationality and asset prices coined by various scholars.

This research work involves four stages as illustrated in Figure 1.1. First, the psychoanalysis approach (i.e. an interdisciplinary psychological approach used to understand human irrational behaviours) is used to synthesise various prepositions by previous researchers to better understand how investors as a normal human think and reasons and to recognize both rational and irrational factors affecting investors trading decisions in asset pricing model. This foundation then leads to the development of the theoretical framework. The theoretical framework for this research is drawn from interdisciplinary theories namely, the cognitive-affective theory of mind (from *neuroscience*), the two-system view of bounded rationality (from *cognitive psychology*), the dual system model of preference under risk (from *behavioural decision science*), and the ABC model (from *psychology*). Collectively, these theories are in complementary in building the theoretical framework of this

research. In second stage, the alternative conceptual framework for multifactor stock-pricing model is drawn from the interdisciplinary theoretical framework. The test for applicability and forecastability of this model in Malaysian stock market will be conducted in the third stage. The test will be performed in two homogeneous groups sample namely based on industry and firm characteristics. In addition, various conditions are considered to examine the heterogeneity of risk-return relationships. Furthermore, a possible ways to disentangle behavioural risks effects is discussed. Final stage four provides insights on behavioural investment strategies.

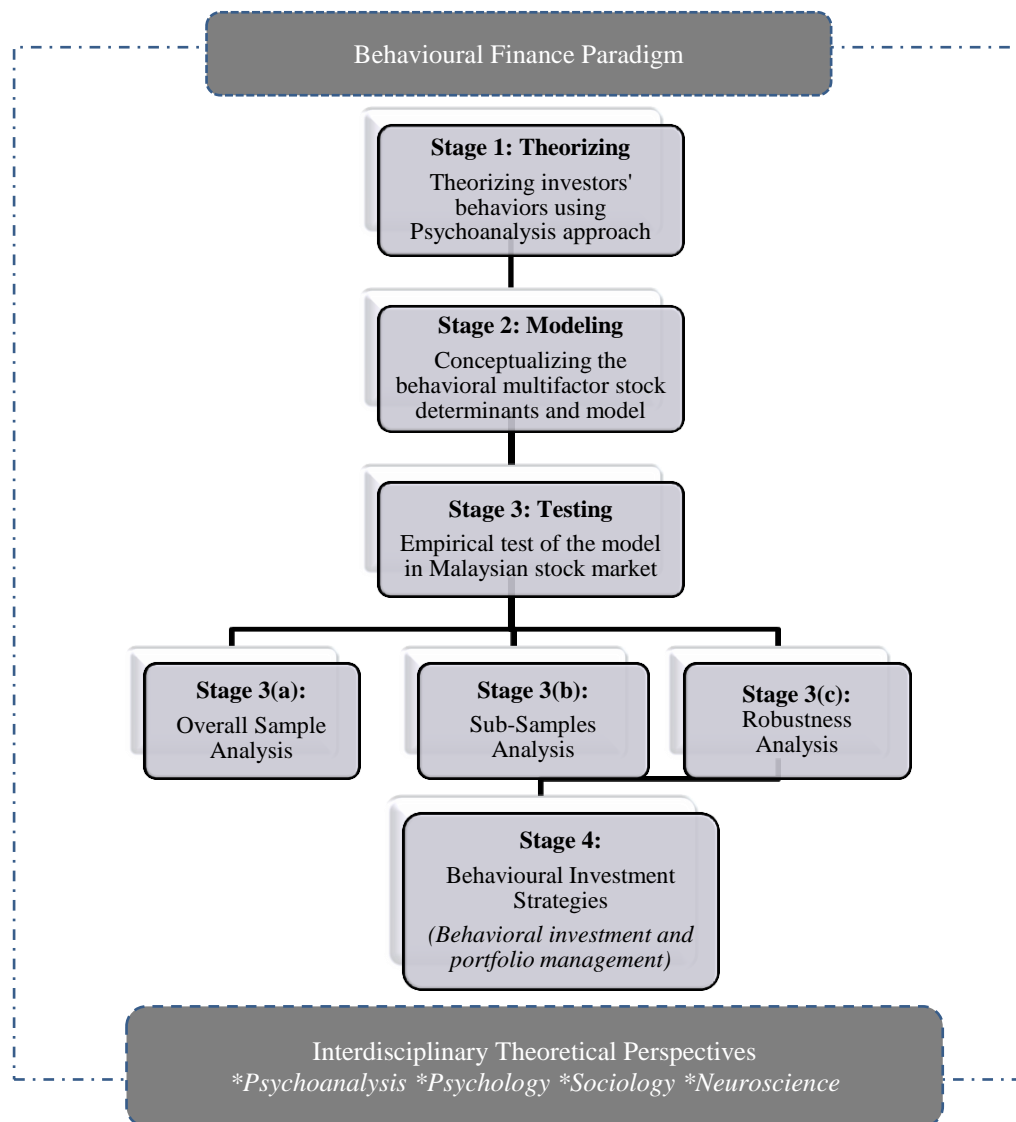


Figure 1.1: The thesis map: Modeling and testing of the multifactor stock pricing determinants
Notes: This figure graphically illustrates the theoretical boundaries of the thesis and the four stages of research sub-components that are inter-linked; theorizing, modeling, testing, and behavioural investment strategy.

1.2 Background of the Study

“The history of thought in financial markets has shown a surprising lack of consensus about a very fundamental question: what ultimately causes all those fluctuations in the price of speculative assets like corporate stocks, commodities, or real estate? One might think that so basic a question would have long ago been confidently answered. But the answer to this question is not so easily found. At the same time, there has been an equally widespread acceptance in other quarters of the idea that markets are substantially driven by psychology”

(Shiller, 2013, p. 460⁴)

The problems that are aimed to be addressed by this research are centered on the controversies in asset pricing modeling between modern and behavioural finance paradigms with regards to the importance of investors' behaviours as determinants of asset prices and lack of grounded theory that justify the importance of investors behaviour in asset pricing modeling. The following sub-sections summarize these issues.

1.2.1 Controversies in Asset Pricing Theories and Models

Forecasting fair value of financial assets has been very challenging given the presence of two contradicting school of thought with regards to valuation of asset prices which is rational-behaviour based models and irrational-behavioural based asset pricing models.

Over the past 100 years since the birth of random walk theory developed by [Bachelier \(1900\)](#) become the foundation for efficient market assumptions, most academics were convinced by the theory of efficient markets which assumes that investors behave reasonably rational. Since then, the concepts of market efficiency and investor rationality are central to modern financial market pricing mechanism and later become the center of the battle between modern- and behavioural-finance ([Statman, 1999](#)).

⁴ Source: https://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2013/shiller-lecture.pdf

According to the efficient market hypothesis (EMH), in an efficient market, the stock market seemed to work in a way that allowed all information reflected in past prices to be incorporated into the current price (Fama, 1965a; 1970). Since 1960s, a number of different approaches were used to test the EMH in the real world. However, many empirical works showed that the price movements were irrational and not subject to economic laws as assumed under the standard finance rational behaviour-based model. There are still a lot of puzzles and market anomalies remaining which could not be solved by using rational behaviour-based models because the model do not seem to offer perfect insight into asset pricing anomalies (Baker and Wurgler, 2007). These contradicted empirical findings raise two questions, either (i) pricing model is wrong but the market is efficient, or (ii) the pricing model is right but the market is inefficient (Baker and Wurgler, 2007).

To date, some scholars still insists on their point of view that these anomalies are due to statistical errors or wrong risk measurement. Among other, Fama (1998) stated that consistent with market efficiency prediction, apparent anomalies can be due to methodology and most long-term return anomalies tend to disappear with reasonable changes in technique. Additionally, EMH proponents opine that any observed anomalies would eventually be priced out of the market or explained by appeal to microstructure (Akintoye, 2008).

On the other hand, the behavioural finance scholars believe that there is enough theoretical as well as empirical evidence to state the market are not always efficient (Feix, 2002) and behavioural finance assumes that, in some circumstances, financial markets are informational inefficient (Ritter, 2003). Furthermore, there exists a body of literature arguing that investors may be irrational and their trade activities affect prices of securities (Shefrin and Statman, 1985; De Long *et al.* 1990).

Consequent to these ideas, researchers have proposed some key behavioural theories to supplement the existing finance model and better predict asset returns in the market (Pandel and Laux, 2010). There is a proliferation of theory based on behavioural assumptions and Hirshleifer (2001) argues that this is an exciting time for the field of asset pricing. The growing field of research related to behavioural finance studies asks how cognitive or emotional biases, which are individual or collective, create anomalies in asset and market behaviour that deviates from EMH (Akintoye, 2008). On a positive notes, behavioural finance is useful in understanding market anomalies (Feix, 2002). In particular, behavioural finance which is based on behavioural asset pricing theory and behavioural portfolio theory offers testable hypotheses and empirical assessment which are closer to reality (Statman, 2008).

Statman (2008) provides the comparison between modern finance and behavioural finance assumption. As for modern finance, it is assumed that; investors are rational, markets are efficient, investors should design their portfolio according to portfolio theory, and expected return are function of risk and risk alone. On the other hand, behavioural finance assumes that; investors are normal, markets are not efficient, even if they are difficult to beat, investors design portfolios according to the rules of behavioural portfolio theory, and expected returns follow behavioural asset pricing theory. Additionally, according to Ritter (2003), two building blocks of behavioural finance are cognitive psychology (how people think) and the limits to arbitrage (when markets will be inefficient).

All these years, the modern and behavioural finance theories heavily contradict each other and the validity of both hypotheses has been widely discussed for more than 20 years (Alexander and Rottke, 2009). Moving forward, Statman (1999) calls everyone to stop fighting on the market efficiency battle and focus on exploring asset

pricing that reflect both value-expressive and utilitarian characteristics which will benefit the investment players.

1.2.2 Behavioural Anomalies Puzzle in Finance

Investors' behaviour and its relation to asset prices formation in secondary stock market remain a puzzle in both modern and behavioural finance research literature since the 1990s. Whether investors' behaviour is a priced risk is one of the hotly debated topics in asset pricing research. To the proponents of behavioural finance paradigm, understanding the behaviours of market players is important due to the fact that the cognitive and affective biases of fund managers, financial analysts and individual investors and the interaction among them shapes the dynamic of asset prices. These issues have been scrutinized extensively by behavioural finance scholars (see - [De Bondt, 1995](#); [Daniel, Hirshleifer and Teoh, 2002](#); [Baker and Nofsinger, 2002](#); [Shiller, 2002](#); [Preda, 2007](#); [Keasey and Hudson, 2007](#); [Frith and Singer, 2008](#); [Baddeley, 2010](#); [Caginalp and DeSantis, 2011](#); [Singh, 2012](#); and [Gracia, 2013](#)).

In the early 1990s following many symptoms of market behaviour irregularity which did not conform to the axioms of modern finance, investor behaviour research appeared in the finance research agenda promoted by the new group of behavioural finance and economic scholars. The theoretical foundations for behavioural finance paradigm are the bounded rationality theory of [Simon \(1955; 1972\)](#) and prospect theory of [Kahneman and Tversky \(1979\)](#) drawn from psychology perspective that provides an alternative to rational maximizing utility assumption under modern finance paradigm. In psychology perspective, rationality assumption that leads to utility maximization hypothesis is a false description of normal human behaviour ([Kahneman and Thaler, 2006](#)). Guided by these theories, behavioural

finance research has been progressing with unification of modern finance, psychology and sociology theories that aim to better understand the investors' and market behaviours.

Collectively, investors' behaviour anomalies can be categorized as affective and cognitive biases from the perspective of two cognitive systems. Based on this system, decision-making is a dual cognitive-affective process (Kahneman, 2003; Carmerer, Loewenstein and Prelec, 2005). The following Table 1.1 provides summary of the identified investors' behaviour anomalies from the perspective of psychology (De Bondt, 1995; Hirshleifer, 2001; Daniel, Hirshleifer and Teoh, 2002; Baker and Nofsinger, 2002; Singh, 2012; Gracia, 2013), and sociology (Shiller, 2002; Preda, 2007; Frith and Singer, 2008; Baddeley, 2010).

Table 1.1: Cognitive heuristics and affective biases in investors' decision-making⁵

Psychology factors		Sociology factors
Cognitive heuristics and biases	Affective biases	
Representative; Dissonance; Endowment Effect; Reference/Anchoring bias; Law of Small Number Mental Accounting; Belief Updating; Self-Deception; Disposition Effects; Disjunction Effect; Illusion of Knowledge	Cognitive Familiarity; Status Quo; Law of Small Number Mental Accounting; Belief Updating; Self-Control; Attachment; Illusion of Knowledge	Sentiment or Feelings; Emotion; Mood; Media Influence; Social Influence; Internet Influence; Social cognition; Group Pressure; Diffusion of Opinions; Crowd effects (herding); Conformity of the group

Source: compiled from various authors mentioned in the text.

Notes: This table provides summary of psychology and sociology factors affecting investors' decision making.

Psychology factors are self-driven biases in investors' decision making and can be broadly categorized into cognitive and affective biases based on dual-decision processing perspectives. In neuroscience's dual-decision theory of mind, individual process information and make decision accordingly based on a combination of affective (System 1) and cognitive (System 2). According to this theory, both

⁵ Excellent reviews of investors' psychology are provided by Baker and Nofsinger (2002) and Daniel, Hirshleifer and Teoh (2002).

systems produce decision errors due to specific biases. Details discussion of this dual-decision theory is given in the Chapter 3. While, sociology factors are behavioural biases that arise due to social influences.

These investors' behaviour issues have been extensively investigated by both modern and behavioural finance scholars but on different perspectives. In modern finance, holding on rationality assumption in decision-making, these behaviours are noise of irrationality from retail unskilled investors. This noise is expected to disappear from the market offset by rational arbitrageurs, which are the smart institutional traders. On the other hand, the proponents of behavioural finance claim these behavioural anomalies will not disappear in the market so long people are trading in the market. This is due to the fact that human dual decision-making process is bounded rational. Thus errors due to both cognitive and affective biases are expected from the normal human being. Holding on the beliefs, that real-world investors may not be fully rational is an important influence on asset pricing modeling (Loewenstein and Willard, 2006). However, arising from conflicting views on these issues, investors' behavioural anomalies remain puzzle in finance literature.

On a positive note, Kuhn (1996) had given clue that any anomalies in the literature always attract new ideas of resolving them. Accordingly, this research reviews the problem of understanding investors' behaviour in the existing behavioural finance literature.

1.2.3 Investors Demographic and Stock Market Behaviours in Malaysia

1.2.3(a) Investor demographic in Malaysia stock market

Studying behavioural finance in Asia is of importance and interesting due to the fact that Asians suffer from cognitive biases on a different level than people of other cultures (Yates, Lee and Bush, 1997; Kim and Nofsinger, 2008; Statman, 2008) and

most of the retail investors in Asian are mere gamblers (Kim and Nofsinger, 2008). In the same opinion, Lai, Chong and Tan (2010) argued that studying investors and market behaviours in Malaysia is particularly important due to the fact that Malaysian stock market is still not fully developed and investors can easily overreact to market rumors, economic development and speculative political issues. In addition, the cultural diversity of investors in Malaysian stock market makes this study unique for behavioural finance research. Not only the local investors are multi-cultural, the market also has attracted many foreign investors coming from various parts of the world. This reflects their behaviour dynamism in Malaysian stock market.

Investors in Malaysia stock market can be grouped into two categories i.e. local investors (comprises of local institution, local retail, local nominees, local proprietary day traders) and foreign investors (comprises of foreign institution, foreign retail, foreign nominees, foreign proprietary day traders). Proprietary day traders (PTD) are dealer's representative at the respective stock broking firm. PDT was introduced in Bursa Malaysia in January 2007 to increase liquidity in the market and reducing the imbalance of long- and short-term investors. PDT program permit dealers to execute short sales on intraday basis and subjected to defined controls to curb speculation activity ([Securities Commission of Malaysia, 2006](#)).

As indicated in Table 1.2, local investors monopolize Malaysian stock market. This statistic also shows higher presence of retail investors and foreign investors, which trade based on noise due to information disadvantage (Richards, 2005; Wong and Lai, 2009; Toh and Ahmad, 2010; Chin, 2012; Pitluck, 2013) that causes many irrational behaviours in the Malaysian stock market.

Table 1.2: Statistics of investors' demographic in Malaysian stock market

Year	Investors' Trading Value (%)			
	Local vs. Foreign Investors		Local Investors	
	<i>Local</i>	<i>Foreign</i>	<i>Institutional</i>	<i>Retail</i>
2004	69	31	55	42
2005	63	37	71	29
2006	66	34	66	34
2007	63	37	63	37
2008	58	42	76	24
2009	74	26	67	33
2010	73	27	73	27
2011	74	26	74	26
2012	74	26	77	23
2013	76	24	70	30
2014	76	24	67	33
2015	78	22	50	23
2016	78	22	53	20
2017	78	22	56	22
Average	71	29	66	29

Source: Bursa Malaysia, Annual Report for Financial Year Ended December 31, 2008, 2009, 2012, 2013, 2014, 2015, 2016, and 2017.

Notes: This table provides the historical summary of investors' demographic in Malaysian stock market from 2004 to 2014 to gauge the monopoly power of respective investor category in Malaysia stock market.

In the next Table 1.3, the trade statistics of investors in Bursa Malaysia for the month of July, 2018 (Bursa Malaysia, 2018) is summarized. For this month, total volume of stock traded in Bursa Malaysia was 56.0 billion, which is amounting to RM 49.3 billion in ringgit value. Review of the details of trade statistics revealed that local investors dominated the market activities with volume and value traded accounted for approximately 92% and 76% respectively. The balance is accounted for foreign investors trading accordingly. This evidence that local investors drive the stock market in Malaysia. An interesting point to note is that local retail traders represent about 50% of volume traded and 22% of value traded in Bursa Malaysia for the same month. This evidenced that local players might drive Malaysian stock market behaviour if the noise traders hypothesis hold true in this market as coined by some of the previous researchers detailed in literature review section.

Table 1.3: Trade Statistics: Local vs. Foreign for July, 2018

	Volume Traded		Value Traded	
	Percentage	Rank	Percentage	Rank
Local Investors	82.59		74.32	
Local Institutions	23.15	2	40.85	1
Local Nominees	14.61	5	9.09	4
Local PDT	4.82	6	5.06	5
Local Retail	40.01	1	19.32	3
Foreign Investors	17.41		25.68	
Foreign Institutional	16.99	4	25.42	2
Foreign Retail	0.41	6	0.27	6
TOTAL	100	-	100	-

Source:http://bursamalaysia.com/misc/system/equity_market_statistics/securities_equities_trading_participation_investor2012.pdf

Notes: This table provides summary of different classes of investors' trade (by volume and value of trade) for July 2018 to gauge the monopoly power of the respective category of investor in the Malaysian stock market.

Earlier behavioural finance literature has established evidenced that retail and foreign investors are suspected to be the noise traders which causes irregularity in market behaviours. The recent behavioural finance research highlighted that institutional investors are also affected by behavioural biases despite being professionally trained (Ahmad, Ibrahim, and Tuyon, 2017a; 2017b)⁶. These issues are particularly important for behavioural stock pricing modeling.

1.2.3(b) The Historical Behaviour of Malaysian Stock Market⁷

The Malaysian capital market is an important emerging Asian market. Stock market which offers to sell, purchases or exchange of securities is the most active component of the capital market in Malaysia since in the 1960s (Butler, Dhillon, and Thiagarajah, 1991). In the modern context, the secondary exchange for stock market i.e. the Kuala Lumpur Stock Exchange (KLSE) was established in May 1973 (Ali, 1997) after the stock exchange for Malaysia and Singapore were separated (Kean, 1989; Yong, 1994). At the end of 1989, there were only 252 companies listed on the

⁶ In Shiller (1984), he note that “there is simply no reason to believe that institutional investors are less subject to social influence” (p. 507).

⁷ Part of this section has been published in Tuyon and Ahmad (2016)

KLSE and served by 53 stock broking firms located only in major towns (Nasir and Mohamad, 1993). In 2013 after for about 25 years later, there were 911 companies listed on Main and ACE market boards. Historically, the performance of KLSE has undergone series of ups and downs cycles influenced by internal and external's political, economic, social, and technological factors as illustrated in Figure 1.2.

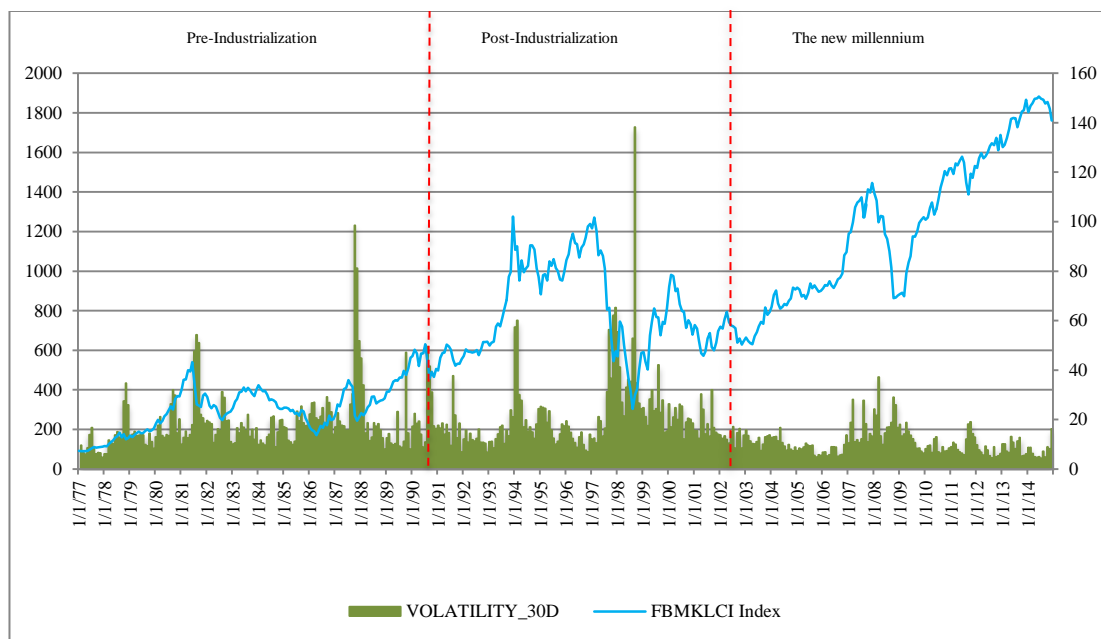


Figure 1.2: Malaysian stock market boom and bust cycles (1977 – 2014).

Notes: This figure illustrate the historical time series performance (measured by stock market index and 30 days volatility) of stock market in Malaysia. Scale on the right side represents the value for volatility 30 days. While scale on the left side represents FBMKLCI index values.

Political and regulatory forces - The stability of political environment in Malaysia has always influenced the performance of the stock market. A stable political environment stimulates confidence for inflow of funds that will indirectly enhance the performance of the firm, the industry, and the economy in general (Ali, 1997). Historically, various political events both in local and international fronts have to a certain degree influenced the performance of Malaysian stock market (Ali, 1997) and in some cases, the effect on the stock market is very drastic (Yong, 1995) particularly for politically connected firms (Mitchell and Joseph, 2010). Political shocks can cause either overreaction or underreaction in the stock market (Ali,

Nassir, Hassan, and Abidin, 2010) and this will result in short-term non-linearity in prices (Lim and Hinich, 2005). Regulatory changes (amendments) have also been performed to promote further the efficiency and growth of the capital market in Malaysia (Yong, 1994). For instance, the Second Board was introduced in 1989 to encourage listings of small firms. The government had implemented a short-term capital control in 1994 and in 1998 (Ocampo and Stiglitz, 2008) to curb financial market excessive volatility due to speculative activities.

Economic forces - Generally, healthy economic development provides growth opportunities for the industry and the firms. In this respects, various economics cycles in Malaysia have influenced the stock market. In the early 1970s-1990s, Malaysia economy is concentrated on resources-based and export-oriented and has been known as the world's leading exporter of tin, rubber and palm oil (Kean, 1986; George, 1991). Accordingly, most of the quoted firms very much dependent on the export of primary commodities (Kean, 1986) and soaring commodities prices in the 1980s have been the main driver for stock market boom during this time (Yong, 1994). In line with the economic and capital market liberalization moves in 1990, Malaysia experienced rapid economic growth spurred by increased government spending, foreign direct investments and exports (Ocampo and Stiglitz, 2008). Capital market liberalization provides both opportunities and challenges to Malaysian stock market. Advocates of capital market liberalization beliefs that it will increase economic growth and market efficiency as well as reduce risk (Kim and Singal, 2000; Ang and McKibbin, 2007; Lim and Kim, 2011; Rejeb and Boughrara, 2013). However, empirical evidence revealed that capital market liberalization does not bring the benefits promised by the theory. Rather, it further contributes to the degree of financial market volatility (Chittedi, 2014) and instability

(worsening of market efficiency) especially in thin stock markets in developing countries with worldwide cross-boarders influx of irrational and rational exuberance and pessimism that created contagion of opinions and bubbles in financial markets (Ocampo and Stiglitz, 2008). Malaysian stock market has been very sensitive to both internal and external economic and financial crises (Lim, 2008). Those crises are as summarises in the following Table 1.4.

Table 1.4: Summary of the past bearish market sentiments in Malaysia

No	Triggering event	Event Date			Post Event Date		
		Date	Period (Days)	KLCI % Change	Date	% change from lowest to highest point	No. of days for KLCI to hit its highest level
1	Iran - Iraq War	30-Jun-81 17-Aug-82	278	-58.8%	17-Aug-82 11-Jul-83	+89.1%	224
2	Black Monday	10-Aug-87 7-Dec-87	82	-52.5%	7-Dec-87 20-Feb-90	+178.9%	543
3	US Recession	1-Aug-90 28-Sep-90	39	-27.4%	28-Sep-90 1-Apr-94	+109.1%	864
4	Mexican Financial Crisis	5-Jan-94 24-Jan-95	262	-36.0%	24-Jan-95 25-Feb-97	+51.2%	511
5	Asian Financial Crisis	28-Feb-97 1-Sep-98	373	-79.3%	1-Sep-98 18-Feb-00	+285.7%	363
6	911 Attacks / Technology Slump	9-Apr-01 23-Apr-02	279	-45.4%	9-Apr-01 23-Apr-02	+46.0%	255
7	SARS	23-Apr-02 11-Mar-03	218	-23.4%	11-Mar-03 31-10-07	+128.3%	1152
8	Subprime Crisis	11-Jan-08 17-Oct-08	189	-40.3%	N/a N/a	N/a	N/a
9	US Crisis/ Bankruptcy of Lehman Brothers	Oct-08 Dec-09	420	N/a	N/a N/a	N/a	N/a

Source: The Edge Malaysia, November 3, 2008 (No. 1 to 8) and Chong (2011) for (No. 9).

Notes: This table provides summary of stock market crashes in the Malaysian stock market history. The negative impact of these crises on stock market is paramount and it took longer periods for recovery.

Social forces - Various non-fundamental risks impacting the society psychology and health have been associated with stock market performance. The first racial crisis occurred on May 13th in 1969 which had slow down the private investments and consequently the economic growth in 1971-1972 (Kean, 1986). Other social risks reflected in Malaysian stock market include the Severe Acute

Respiratory Syndrome “SARS” (Ali *et al.*, 2010), panic due to terrorism effects (Drakos, 2010; Ramiah, 2012), poor consumer confidence during bubbles (Leger and Leone, 2008), herding contagion during financial crisis (Khan and Park, 2009) and believe on unlucky numbers (Auer and Rottmann, 2014). All of these factors have psychological connections to investors’ sentiment, emotion, and mood that will directly determine their trading strategies. Investors’ crowd influenced by exciting news or rumors and investors become irrational in their trading based on the impulse of emotion is also a normal phenomenon is seen in Malaysian stock market radar (Yong, 1995).

Technology forces - Revolution in information technology also influence the development of the stock market. Enhancement of technology used in the KLSE and stock broking companies has made it possible for the system to handle a significant increase in trading volume (Ali, 1997). In 1982, KLSE started to use computerization by setting up the data processing department in May 1982. However, the first daily business report was only started published in February 1983. Initiated the computerization of clearing system in November 1983 and was fully completed in March 1984. Installation of real-time share prices reporting and corporate announcements (MASA) was available in 1987 for brokers and subscribers that have enhanced the speed of information transmissions (Butler, Dhillon, and Thiagarajah, 1991). In May 1989, a semi-automated trading system called system on computerized order routing and execution (SCORE) was implemented to facilitate and improve the speed of shares trading through electronic systems (Nasir and Mohamad, 1993; Yong, 1994). In recent years, innovation of internet technology and computer savvy society has further enhanced retail participation in stock market investment (Bogan, 2008).

1.2.4 Malaysian Stock Market Efficiency

Review of literature on stock market efficiency studies in Malaysia is segmented into three clusters⁸ to take into account the different economic and market development stages. First cluster (1970-1990) is for pre-industrialization/liberalization/information technology revolution. In this period, trading activity in the stock market is relatively limited and slow (Arief, 1975) and the market characteristic has been noted to reflect the weak-form EMH. Second cluster (1991-1999) is for post-industrialization/liberalization/information technology revolution. In the post-1990, consensus on market efficiency in Malaysia has been generally in support for the weak form of EMH while acknowledging the present of temporary inefficiency. The third cluster is the new millennium era (2000-current). This period is associated with high degree of individual involvement in the stock market that increases trading and volatility (Sanderson, 1998; Harung, Heaton, and Alexander, 1999; Schwert, 2002; Hollifield, 2002). However, recent research provides evidence of multifractal market efficiency. Summary of these researches are summarized in Table 1.5.

To summarise the nature of stock market efficiency in Malaysia and consideration for future market efficiency research, the following authoritative opinions are re-emphasised;

“Given the world and the KLSE evidenced both collaborator and contradictory, market efficiency and behavioural finance co-exist just as God created us and many observations in pairs. Chaotic (irrational) and rational behaviours co-exist in any market be it efficient, moderately efficient and inefficient. At times, we may act rationally, at other times irrational. It is a matter of degree” (Nassir, 2002, p. 15)

“...we cannot maintain (EMH) in their pure form as accurate descriptors of actual markets...we have to distance ourselves from the presumption that financial markets always work well and that price changes always reflect genuine information...” (Shiller, 2003, p. 102)

⁸ Post industrialization/liberalization (i.e. 1990 – 1999) and new millennium era (i.e. 2000 – current year). Post industrialization and liberalization in Malaysia started in 1990 (Ocampo and Stiglitz, 2008). As such, pre industrialization is assume by the author to occur before 1990. The new millennium era started in January 1, 2000 (Source: <http://en.wikipedia.org>).

Table 1.5 : Summary of Malaysian stock market efficiency research

Authors (Year)	Data used	Data frequency/ (timeframe)	Theory	Methods	The State of Efficiency
<i>The first cluster (Data: 1960-1990) - Pre-industrialization/liberalization/information technology revolution.</i>					
Arief (1975)	60 firm stocks	Monthly 1965-1968	RWH/ Information theory	Information inaccuracy model	Information inaccuracy is higher
Nassir (1983)	101 actively traded stocks	Monthly (1974-1980)	EMH/ RWH	Serial correlation, Run test	Weak-form
Kean (1986)	n/a	n/a	EMH/ RWH	Historical discussion	Not at all efficient
Laurence (1986)	16 firms stocks prices	Daily (1973-1978)	EMH/ RWH	Serial correlation and Run test	Weak-form
Barnes (1986)	30 firms stocks prices and 6 sector indices	Monthly (1973-1980)	EMH/ RWH	Serial correlation, Run test, and Spectral analysis	Weak-form
Saw and Tan (1989)	6 sector indices	Weekly & Monthly (1975-1982)	EMH/ RWH		Weak-form
Yong (1994)	All 170 firms stocks traded in KLSE	Weekly (1977-1985)	EMH/ RWH	Serial correlation, Run test, and Normal distribution test	Weak-form
Nassir and Mohamad (1993)	All stocks traded in KLSE	Monthly (1975-1989)	EMH/ RWH	Serial correlation, Box-Pierce Q-Statistics	Weak-form
Jerrett (2010)	Individual stock prices, trade volume, trade value	Daily (1977-2001)	EMH/ RWH	Ordinary least squares	Weak-form does not hold
<i>The second cluster (Data: 1991-1999) - Post-industrialization/liberalization/information technology revolution.</i>					
Cajueiro and Tabak (2004)	KLSE Composite Index	Daily (1992-2002)	Long memory	Hurst exponent	Time-varying weak-form
Lim, Liew, and Wong (2005)	KLSE Composite Index	Daily (1990-2002)	AMH	Hinich & Patterson (1995) windowed test for correlation and serial dependency	Weak-form
Hoque, Kim, and Pyun (2007)	KLSE Composite Index	weekly (1990-2004)	EMH/ RWH	Variance ratio tests	Weak-form
Jiang, Ma, and Cai (2007)	KLSE Composite Index	Daily (1984-2005)	EMH/ Nonlinear/ Multifractal	Detrended fluctuation analysis.	Multifractal efficiency
Kim and Shamsuddin (2008)	KLSE Composite Index	Daily & Weekly (1990-2005)	EMH	Variances ratio tests (Chow-Denning test, Wild bootstrap test, Joint sign test, Small sample VR test)	Inefficient
Lim (2007)	KLSE Composite Index	Daily (1992-2005)	AMH/ Nonlinear	Portmanteau bicorrelation test	Non-static weak-form market efficiency
Lim (2008)	KLSE Composite Index	Daily (1992-2005)	AMH/ Nonlinear	Portmanteau bicorrelation test	Non-static weak-form
<i>The third cluster (Data: 2000-Current) – The new millennium</i>					
Zunio <i>et al.</i> (2008)	KLSE Composite Index	Daily (1995-2007)	Multifractal	Multifractal detrended fluctuation analysis.	Multifractal efficiency
Kristoufek and Vosvrda (2013)	KLSE Composite Index	Daily (2000-2011)	Multifractal	Hurst exponent, Detrended fluctuation analysis, Detrending moving average, Height-height correlation analysis, Fractal analysis	Less efficient
Rizvi <i>et al.</i> (2014)	KLSE Composite Index	Daily (2001-2013)	Multifractal	Multifractal detrended fluctuation analysis.	Multifractal efficiency

Source: summarized from the respective authors' papers mentioned in the table.

Notes: This table provides summary of research findings concerning the Malaysian stock market efficiency from 1970s to 2014.

1.3 Problem Statements

Behavioural asset pricing model, which is based on behavioural finance paradigm, is offering an alternative theory and evidence of investors' behaviours, financial markets functioning, and stock prices formation in reality. Behavioural finance views those investors and the markets are not fully rational and efficient (Shiller, 1981; Shefrin and Statman, 1985; De Long, Shleifer, Summers and Waldmann, 1990; De Bondt, 1998; Shleifer, 2000; Baker and Nofsinger, 2002; Ritter, 2003; Statman, 2008; Jagric and Strasek, 2011; Aggarwal, 2011) which is in contrast to conventional finance philosophy of investors' full rationality and market efficiency assumption. Due to the element of irrationality in investors' decision making, systematic and significant deviations from market efficiency are expected to persist for long periods of time (Shleifer, 2000). Accordingly, in behavioural asset pricing modeling, fundamental and behavioural factors have been acknowledged as a source of systematic risks in stock prices formation. Since 1990s, behavioural asset pricing research has been gaining momentum but still incomplete and have been criticized for some limitations as elaborated in the following sub-problems. These problems are inter-related in modeling and testing for behavioural asset pricing.

Sub-Problem 1: Theoretical drawback in behavioural asset pricing modeling

First, the current behavioural asset pricing models (as explained in chapter 2) have been criticised for some theoretical drawback. The behavioural assumptions are not grounded in any theory and little has been explained pertaining to the origin of the behaviour that causes the anomalies in the market (Burnham, 2013). This causes a loophole in the theoretical linkages between investor behaviour and asset price dynamics (Goetzmann and Massa, 2008). In addition, the existing models of decision

making including expected utility theory, bounded rationality, prospect theory and their variants assumes a single system of human thought (Mukherjee, 2010) which only partly explained the real human thinking and behaviour. Finally, there are relatively little empirical evidence exists to directly support behavioural theories and assumptions (Coval and Shumway, 2005). Due to these theoretical drawback, investors' behaviours as source of risk in behavioural asset pricing modeling is still remain disputable.

Sub-Problem 2: What are behavioural biases and what are the behavioural factors to be included in the model?

The second issue is related to lack of theoretical understanding on the origin of behavioural biases in investment (Cronqvist and Siegel, 2014). This fundamental problem leads to the problem of identifying; What behavioural factors to be included in the stock-pricing model? Most of the existing behavioural asset pricing models are only factoring investor's sentiment as the behavioural factors but still with some limitations. Burghardt (2011) noted that a unified theory of investor sentiment that brings together theory and empirical both in short- and long-term is still missing. In addition to this, Baker and Wurgler (2007) argued that, the main issues on sentiment are on how to measure and quantify its effects, to understand the foundations and variations in investor sentiment over time, and determine which stocks that have limited arbitrage potential. Some scholars suggested investors' emotion as one of the behavioural factors in the model. Acket, Church and Deaves (2003) argued that little attention is given to the role of emotion in behavioural asset pricing modeling. In support to this, Lucey and Dowling (2005) suggested the influence of investor emotion be integrated into modeling of equity pricing. Finally, the looseness in theoretical foundation leads to confusion in the literature with regards to the use of

behavioural factors namely “sentiment”, “feelings”, “emotion”, “mood” and “affect” (Lucey and Dowling, 2005).

Sub-Problem 3: Dynamism and complexity of investors’ behaviour

The third issue is related to the dynamism and complexity of investors’ behaviour. Fenzl and Pelzmann (2012) argued that “*nonmean reverting dynamism in financial markets may be produced by mass psychological dynamics in the pattern of human aggregate behaviour*” (p. 56). Specifically, empirical evidences showed that investors’ behaviour are not homogeneous across firms, industries, investor’s group, and culture group. In contrast to modern finance perspectives, growing empirical evidences showed that both institutional and retail investors are subjected to and portraying irrationality behaviours in their trading decision-making. This is because both group of investors are normal human being who are affected by cognitive and affective biases in their investment decision making process (Statman, 2005). Evidence of irrational actions of retails investors includes; anchoring on past price, holding a non-diversified portfolio (De Bondt, 1998), correlated trading among retail investors (Kaniel, Saar and Titman, 2008; Barber, Odean and Zhu, 2009; Kumar, 2009c), style preference in investment strategy (Kim and Nofsinger, 2007; Kumar, 2009a), preference towards stock with lottery features (Kumar, 2009b), and influence by past experience (Nicolosi, Peng and Zhu, 2009).

Similarly, empirical evidence also provides support for institutional investors irrationality behaviours, which includes; trends follower (Alti, Kaniel and Yoeli, 2012), momentum trading (Bae, Min and Jung, 2011), herding and cascading (Hirshleifer and Teoh, 2003; Liao, Huang and Wu, 2011; Kremer and Nautz, 2013). In addition, recent findings from finance literature evidence that local retail and

foreign investors in local stock market are recognized as the noise traders (Bauman, 1989; Lai, Low and Lai, 2001; Richards, 2005; Lai, Chong and Tan, 2010; Pitluck, 2013).

Empirical evidences also pointed to the ideas that investors' behaviour influence on stock prices formation are not homogeneous across different firm and industry characteristics. Firms that are speculative and difficult to value and arbitrage will be influenced more by behavioural factors and those are stock of companies that are newer, smaller, more volatile, distressed and extreme growth (Baker and Wurgler, 2007). Recent studies supports that industries characteristics also matter in explaining stock returns and asset pricing anomalies (Dash and Mahakud, 2013; Chen, Chen and Lee, 2013; Akhigbe, Larson and Madura, 2002; Chou, Ho and Ko, 2012; Akhigbe, Madura and Newman, 2006). However, behavioural explanation to this issue is not justified.

Sub-Problem 4: Divergence in Western and Asian perspectives

People around the world have different culture which psychologically explain the heterogeneity in risk-taking behaviour among investors (Beckmann, Menkhoff and Suto, 2007; Hens and Wang, 2007). Culture influence investing attitudes in a way that different cultures affect investors' perceptions, expectations, cognition, and emotions differently (Statman, 2008; Statman and Weng, 2010). This cultural differences has been conceptualized in the individualism and collectivism model of Hofstede (1980). Where, in individualist culture (Western countries) group dependency are loose. While in collectivist culture (Asian countries) group ties are strong. Another theoretical explanation is provided by Kearney (2012) where investors in emerging markets strongly rely on customary practices, social values and

ethics because of weaker institutions of legal and property rights in these countries. These provides the theoretical justification for high impact of behavioural factors in Asian compared to Western countries.

Only recently the connection between culture and finance has been explored but still limited. Based on empirical evidences, Asians are proved to be more prone to behavioural risks compared to Westerners (Statman, 2008⁹; Statman and Weng, 2010) and suffer more from cognitive biases in addition to gambling attitudes (Yates, Lee and Bush, 1997; Kim and Nofsinger 2008; Statman, 2008).

With specific reference to Malaysian stock market, Lai, Chong and Tan (2010) argued that studying investors and market behaviours in Malaysia is particularly important due to the fact that Malaysian stock market is still not fully developed and investors can easily overreact to market rumors and speculative issues. In contrast to western literature, growing new evidence of higher returns are in the month of February not in January (Fountas and Segredakis, 2002; Pandey, 2002). Scholars argued that significant higher average returns for February is driven by the Chinese new year (cultural factors) which mostly has been in the month of February (Wong, Neoh, Lee and Thong, 1990; Yen, Lee, Chen and Lin, 2001; Ahmad and Hussain, 2001).

⁹ Statman (2008) provides discussion on theoretical role culture in behavioural finance and empirical synthesis of Hofstede's culture theory to propensity for risk taking among people in 22 countries including Malaysia. Malaysia is categorized under low individualism (high collectivism). This study confirmed the prediction of Hofstede's culture theory that low individualism (high collectivism) is associated with higher propensity for risk taking and high individualism (low collectivism) is associated with low propensity for risk taking in investment. This is also in accordance with Hofstede's cultural dimensions for emerging financial markets provided in Kearney (2012).

1.4 Research Questions

The research questions that are aim to be addressed in this research arising from the theoretical and empirical gaps related to behavioural asset pricing determinants.

1.4.1 Theoretical Questions

Being a new paradigm, the behavioural theory and factors in stock price determinants remain unclear. This issue raises the following questions related to theoretical perspectives. *Firm fundamental factors* - The firm fundamentals are not popularly used as risk factors in asset pricing models because of the ideas that this risks component can be diversified fully through holding a well-diversified portfolio. However, some scholars have pointed that retail investors are not holding a portfolio (Barber and Odean, 2000; 2011) and even institutional investors' portfolios are not free from firm systematic shocks (Bennett and Sias, 2006; Campbell, Lettau, Malkiel and Xu, 2006). This issue raises the following theoretical question:

- i. Should firm fundamentals represent as a source of risks in stock pricing model?

Economics fundamental factors - Theoretically macroeconomic and financial variables have been acknowledged as a source of risks in a multifactor asset pricing. However, there are no specific variables have been identified as a permanent risk factors. In addition, empirical evidences revealed long lists of macroeconomic factors that statistically and significantly influence returns. However, putting all these in model framework would affect the model statistical efficiency. This issue raises the following theoretical question.

- ii. Can a broad economic indicators represents the priced risks in stock pricing model?