THE IRRATIONAL BEHAVIOUR OF INVESTORS AND ITS IMPACT ON STOCK PRICE MOVEMENTS : EVIDENCE FROM BURSA MALAYSIA

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by

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KELAKUAN TAK RASIONAL PELABUR-PELABUR DAN IMPAKNYA TERHADAP PERGERAKAN HARGA SAHAM : BUKTI DARIPADA BURSA MALAYSIA

ABSTRAK

Adakah Hipotesis Pasaran Efisien (EMH) masih wujud dalam dunia nyata sekiranya andaian rasionaliti tidak lagi bertahan? Oleh sebab pasaran terdiri daripada manusia, adalah logik bahawa penjelasan yang berakar pada sifat psikologi pelabur dapat menerangkan kelakuan pasaran saham. Penyelidikan ini cuba menggunakan kaedah kajian peristiwa untuk mengkaji sama ada kelakuan tak rasional pelabur dapat menerangkan pergerakan harga saham. Terdapat empat dapatan utama daripada kajian ini. Pertama, pelabur Malaysia adalah berpacu perhatian. Kelakuan pelaburan mereka adalah bias kepada peristiwa "rebut-perhatian" iaitu volum dagangan harian tak normal dan perubahan ekstrim dalam harga saham harian. Kedua, keputusan pelabur memperlihatkan sifat rujukan bersandar. Mereka menggunakan harga 52-minggu tertinggi dan harga 52-minggu terendah sebagai titik rujukan untuk membantu mereka membuat keputusan dagangan pelaburan. Walau bagaimanapun, pelabur tidak bias kepada "heuristik perwakilan" ataupun "heuristik kesediadaan". Ketiga, strategi berasas-perhatian tidak menjana pulangan tak normal positif kecuali bagi strategi pembelian portfolio saham jenis rugi. Akhir sekali, harga 52-minggu tertinggi dan harga 52-minggu terendah boleh mempengaruhi pulangan portfolio. Portfolio yang harga sahamnya lebih (kurang) daripada harga 52-minggu tertinggi (52-minggu terendah) berpretasi rendah (tinggi) berbanding pasaran dalam tempoh berikutnya. Dapatan kajian ini memberi beberapa implikasi terhadap teori kewangan. Pelabur adalah tidak rasional. Sifat psikologi pelabur cenderung membawa kepada dagangan pelaburan berlebih-lebihan dalam pasaran. Keadaan ini mencabar andaian rasionaliti EMH. Strategi asas-perhatian

terutamanya pembelian portfolio saham rugi menghasilkan pulangan tak normal positif dalam jangka pendek, tetapi pulangan prospektif lesap secara otomatik dalam jangka masa yang lebih panjang. Dengan ini, disimpulkan bahawa pasaran saham Malaysia kekal cekap dalam jangka masa panjang.

THE IRRATIONAL BEHAVIOUR OF INVESTORS AND ITS IMPACT ON STOCK PRICE MOVEMENTS : EVIDENCE FROM BURSA MALAYSIA

ABSTRACT

Is the Efficient Market Hypothesis (EMH) still alive in the real world if the rationality assumption does not hold? Since markets consist of human beings, it seems logical that explanations rooted in the psychological attributes of investors would shed some light on stock market behaviour. This research attempts to use the event study methodology to investigate whether investors' irrational behaviour could explain stock price movement. There are four main findings of this study. Firstly, Malaysian investors are attention-driven. Their trading behaviour is biased toward attention-grabbing events, namely daily abnormal trading volume and daily extreme price changes. Secondly, investors' judgement exhibits reference dependence. They use 52-week high and 52-week low as a reference point to guide them in making trading decisions. However, investors are not biased by representativeness and availability heuristics. Thirdly, attention-based strategies do not generate positive abnormal returns except for the strategy of buying portfolios of loser-stocks. Lastly, 52-week high and 52-week low seem to affect portfolio returns. Portfolios whose current stock price exceeds (fall below) its 52-week high (52-week low) underperform (outperform) the market in the subsequent period. The results of this study have some implications on financial theories. Investors are irrational. The psychological attributes of investors tend to cause excessive trading in the market. This could give a serious challenge to the rationality assumption of the EMH. Attention-based strategies, especially that of buying portfolios of loser-stocks yield positive abnormal returns in the short-run, but the promising returns automatically disappear in the longer horizon. Hence, we conclude that Malaysian market remain

efficient in the long run.

Chapter 1

INTRODUCTION

1.1.   Background of the Study

The stock market is an important component of a country's capital market. It is the place where stocks are traded with a view of generating long-term funds for corporations to make future investment and expansion. According to Toporoswki (2000), the stock market encourages the efficiency and profitability of firms, thereby supporting the country's economic development and progress in general. In addition, the performance of the stock market has a direct wealth effect not only on the investors' expenditure decisions but also their confidence level. As the value of stocks goes up, wealth as well as the confidence level of investors goes up, which in turn encourages investors to increase their expenditure and investment that can reduce unemployment and boost the economic growth. Conversely, if the stock market is performing poorly, this tends to lower investors' wealth and confidence level, and this eventually has an adverse impact on the economy.

In practice, the stock market is an extremely exciting place. The Malaysian stock market is of no exception. It attracts people from all walks of life despite the fact that investing is a difficult process. These people include businessmen, professionals, executives, clerks, odd job workers, retirees, hawkers as well as housewives. Some of them have the knowledge of investing while others are ignorant about the stock markets. However, there is one significant similarity among these investors. All of them are attempting to maximize profits.

In view of the importance of the stock market, we have seen a voluminous amount of finance literature attempting to search for clues as to why the market behaves

as it does around the world for the past three decades. Most of the theoretical and empirical studies in financial economics are carried out based on the concept of market efficiency. The efficient market hypothesis (EMH) states that stock prices fully reflect all the available information. When information arises, the news is transmitted very speedily and instantaneously and is incorporated into the stock prices without much delay. EMH rules out the possibility of making abnormal returns using trading strategy that are based on currently available information. The efficient market hypothesis (Fama, 1970) is also associated with the idea of a "random walk" where price changes are random and unpredictable. If EMH holds, investors are encouraged to hold well-diversified portfolios and thus, adopt passive money management.

Shleifer (2000) stresses that EMH, basically, rests on three major assumptions. Firstly, investors are assumed to be rational. Secondly, even if some of the investors do not behave in a rational manner, their actions are assumed to be random and uncorrelated, hence offsetting each other without affecting stock prices. Thirdly, if investors are irrational in the same manner, they would cause the stock to deviate from its equilibrium value. Rational arbitrageurs would then take advantage of this temporary profit making opportunities and eventually, stabilize the stock prices.

Early studies provide evidence favouring Efficient Market Hypothesis [e.g. Fama (1965), Jensen (1978)]. Stock prices seem to follow a random walk model. Even if there are predictable variations in the stock returns, they were found to be statistically and economically insignificant. This implies that passive money management is the most appropriate approach investors should adopt.

However, in the last twenty years, EMH has been challenged on its empirical grounds because of the accumulating evidence on the stock return predictability. For

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instance, high volume return premium where stocks experiencing unusually high (or low) trading volume tend to appreciate (or depreciate) in subsequent periods [Gervais, Kaniel and Mingelgrin (2001); Hiemstra and Jones (1994); Hoontrakul (1995); Kaniel, Li and Starks (2003); Parisi and Acevedo (2001)], winner-loser effect where winner-stocks (or loser-stocks) tend to underperform (or outperform) the market in subsequent periods [Ahmad and Hussain (2001); Ariffin and Power (1996); DeBondt and Thaler (1985, 1987); Dissanaike (1997); Iihara, Kato and Tokunaga (2004), Mun, Vasconcellos and Kish (2000)], momentum effect where winner-stocks (or loser-stocks) continue to outperform (or underperform) the market in subsequent periods [Chan, Jegadeesh and Lakonishok (1996); Grundy and Martin (2000); Jegadeesh and Titman (1993); Shefrin (2000)] and post-earnings-announcement drift anomaly means stocks tend to earn abnormally high (or low) returns following positive (or negative) earnings surprises [Abarbanell and Bernard (1992), Ball and Brown (1968); Bernard and Thomas (1990); Cheung and Sami (2000); Sun (2005)].

Recent accumulating evidences suggest that stock prices can be predicted with a fair degree of reliability. Two competing explanations have been offered for such a phenomenon. Proponents of EMH [for instance, Fama and French (1995)] continue to hold on to the notion that stock markets are efficient. They claim that such predictability is the result of the time-varying risks where higher expected returns are required to compensate for the higher level of risks undertaken. Critics against the EMH [for instance, La Porta, Lakonishok, Shliefer and Vishnu (1997)] argue that the predictability of stock returns are due to the irrational component of investors such as psychological biases, social movements, noise trading and fads in a speculative market. In fact, some of these anomalies can be explained by elements of prospect theory [see Camerer, C.F.

(1998)].

In addition to the empirical challenges, EMH has also been subjected to critical re-examination on its theoretical grounds. The rationality assumption of EMH does not seem to hold in practice. Black (1986) provides evidence that investors do not make trading decisions based on fundamental information. Instead, they trade on noise. In reality, they fail to diversify [Barber and Odean (2000); Goetzmann and Kumar (2002); Lease, Lewellen, and Schlarbaum (1974); and Scharbaum, Lewellen, and Lease (1978)]. They actively identify certain stock price patterns and churn their portfolios accordingly, for instance, they sell winner-stocks and hold on to loser-stocks [Dhar and Zhu (2002); Grinblatt and Keloharju (2001); Jackson (2003); Odean (1998a); Shapiro and Venezia (2001) and Shefrin and Statman (1985);]. They tend to buy stocks that catch their attention [Barber and Odean (2003); Hirshleifer, Myers, Myers and Teoh (2002); and Lee (1992)]. In short, investors do not seem to pursue the passive strategies as is expected by the efficient markets theory. They appear to invest in a manner that is inconsistent with the paradigm of rationality. According to Shefrin (2000), investors commit errors in the course of making investment decisions and these errors cause the stock prices to deviate from what they would have been in an error-free environment.

From the behavioural perspective, Bernard Baruch in Tvede (1999) states that what registers in the stock market's fluctuations are not solely the events themselves but also the reactions of investors toward these events, playing an important part in the stock markets. How millions of individual investors perceive these happenings will determine their beliefs, which in turn shape their emotions and influence their demand which may then affect the future movements of the stock market. After all, the stock market is made up of people (i.e. investors). Thus, the stock prices do not just express

simple supply and demand equilibria which reflects their fundamental values. They also include a psychological element (i.e. the behaviour of investors participating in the stock price formation) which should not be neglected.

The existing studies often view event as an exogenous factor and assume that investors are rational and can process the event or information speedily and instantaneously without bias. Whenever events occur in the market, the information is public. However, its effect will not be incorporated into stock prices until the information reaches investors with certain strength and enters their mind which ultimately affects their beliefs and influences their trading behaviour. Therefore, this research attempts to fill this gap by treating investors' information structure as endogenous factor and analyzing investors' decision making process, the way investors react to event and process information before a decision is made as a result of their limited cognitive abilities.

Nofsinger (2002) has stressed in his book entitled "The Psychology of Investing" that psychologists have known for a long time that people in general, and investors in particular often act in an irrational manner and make predictable errors in their forecasts. This, indeed, can affect investors' investing and ultimately their wealth. He also highlights that the human brain does not work like a computer. Rather, it analyses information through shortcuts and emotional filters whether with or without their realisation in order to shorten analysis time and make quicker decision. He has termed these filters and shortcuts as psychological biases. Through this process, the resulting decision is no longer rational as what the traditional theories expect. As a result, a new branch of capital market analysis, behavioural finance has emerged, attempting to enrich our understanding of financial markets by adding human element into the asset pricing

models.

The proponents of behavioral finance including Shefrin (2000) contend that a few psychological phenomena, for instance, heuristic-driven bias and framing effects, pervade the entire landscape of finance. Investors depend on heuristic or rule of thumb to process data. Rules of thumb are generally imperfect. Therefore, investors hold biased beliefs which predispose them to make mistakes. In addition, investors do not view the investment decisions through the transparent and objective lens of risk and returns. Their perceptions of risk and returns are highly influenced by how decision problems are framed. The heuristic-driven bias and framing effects cause stock prices to deviate from their fundamental values, thus making the financial markets inefficient. These explain how behavioral finance differs from the traditional finance.

So far, the modern capital market theories, for examples, the modern portfolio theory, the capital asset pricing model and the arbitrage pricing theory, have failed us because they have not admitted that human behaviors are irrational and emotional. They have also neglected the psychological elements (for instance, reference dependence, representativeness heuristic, availability heuristic, herding and etc.) which play a crucial role in the stock markets. In fact, the best way to deduce the market's movement in the future is to identify the degree of disequilibrium between market prices and participants' psychological biases. Shefrin (2000) believes that investors can make handsome return by estimating the errors of others in the stock markets. The proper study of markets is, in fact, the study of human behaviour.

Logically speaking, the stock price movements cannot be merely attributable to events themselves, but also the irrational component of the investors. In a market consisting of humans, it would be logical to suggest that explanations rooted in human

and social psychology would enhance our understanding of stock market behaviour.
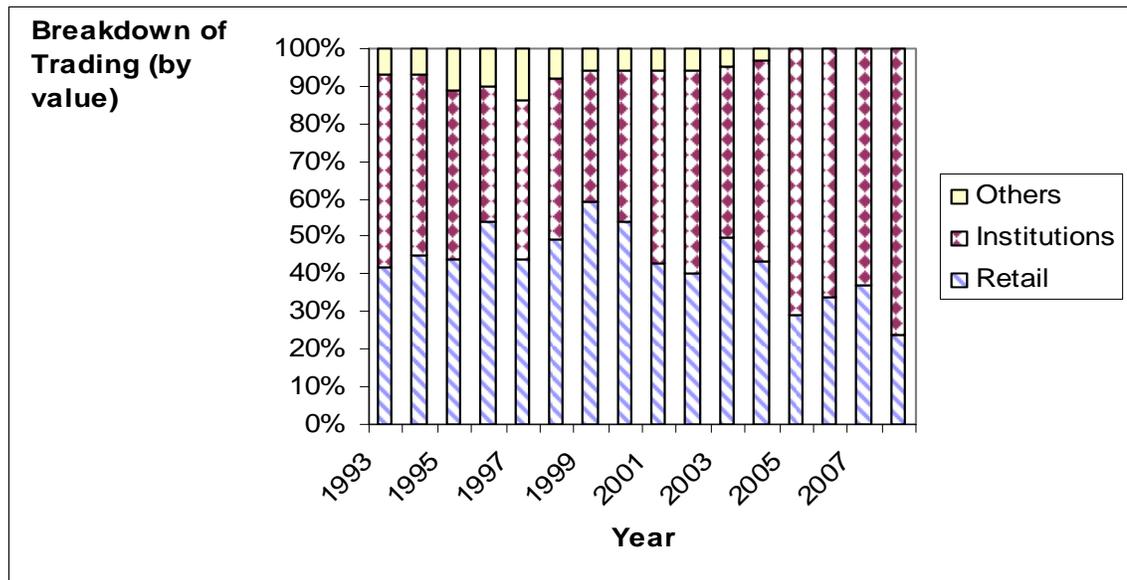
Figure 1.1
Investor Base of Bursa Malaysia for the Year 1993 to 2008.
Source : Bursa Malaysia Berhad (2009) Financial Results for 2008, p.31.

According to the survey conducted by Bursa Malaysia in 1998 on the equity distribution of companies as listed on its Official List as at 31 December 1997, individuals represent the largest group of investors (which account for 87.9% of total investors) in the Malaysian stock market, followed by nominees and institutions which represent only 9.1% and 2.8% of total investors respectively. In the development discussion paper of Harwood (1993), he presents the investor base of Malaysian stock market for 1991 and shows that institutions (44 percent) and nominees (36 percent) were the dominant shareholders in terms of value of equity held, while individuals held only 16 percent. According to Figure 1.1, statistics in the financial results of Bursa Malaysia Berhad for the year 2008 demonstrate that retail participation in terms of value of equity held has been increasing from year 1993 till year 2003. Subsequently, there is a drop in retail participation due to weak investor sentiment. Based on the statistics here, we have

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sufficient evidence to support that retail investors are the major and significant group of investors in Bursa Malaysia in particular during the study period from 1993 till 2004.

In view of this investor profile, many professional analysts believe that Malaysian stock market is dominated by many irrational "noise traders" who respond to sentiment and fads. Furthermore, they also believe that the investors in Malaysia are less sophisticated compared to their counterparts in developed markets mainly due to the limited access to information pertaining to the stock market. In addition, there is also a number of studies [for example, Grinblatt and Keloharju (2000); Hand (1990); and Lee, Shleifer and Thaler (1991)] that state that individual investors are less sophisticated compared to institutional investors and individual investors' trading behaviours could be a source of market inefficiencies. Thus, there have always been questions about whether the Malaysian stock market is manipulated and dominated by rumours. In line with this opinion, Md. Isa and Lim (1995) conduct a survey pertaining to the investors' demographics and investment characteristics in Kuala Lumpur and Petaling Jaya area. The survey was conducted over an eight week period in the beginning of 1992 through personal interviews and self-administered drop-off method. The results show that investors in Malaysia are those in the middle and upper economic class with a respectable level of education, career and income. However, Md. Isa and Lim (1995) in their study highlight that majority of the investors are in fact speculators in the market.

Moreover, most recent studies [see Ahmad and Tjan (2004); Hameed and Ting (2000); Husni (2005); Lai (2002), Lai, Krishnan and Mat Nor (2003); Mohd Arifin and Power (1996) and Nam, Pyun and Kim (2003)] document that the phenomena of overreaction and momentum do exist in the Malaysian stock market and they interpret this evidence as a manifestation of the irrational behaviour of Malaysian investors.

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1.2. Problem Statement

There seems to be two groups of academic researchers, in which one continues to support the efficient market hypothesis [see Dimson and Mussavian (1998); Fama and French (1995); and Malkiel (2003)] which assert that stock markets are efficient and rule out the possibility of trading strategies based only on the currently available information that could yield excess returns. The other criticises the rationality assumption of the EMH [see La Porta, Lakonishok, Shleifer and Vishnu (1997)] and suggests that stock returns can be predicted with a fair degree of reliability due to the irrational behaviour of investors.

Since markets consist of human beings, it seems logical that explanations rooted in the psychological attributes of investors would shed some light on stock market behaviour. Moreover, the assumption of rationality under the EMH paradigm seems to be too "ideal" to be applicable in the real world. In many occasions, it failed to explain the behaviour of stock prices. The evidence in many psychology studies show that humans possess many psychological biases which prevent them from being fully and truly rational. When evaluating risky investment, investors do not look at the final wealth, instead they determine the possibility of a gain or loss relative to some reference points [see Kahneman and Riepe (1998)]. In addition, loss aversion also influences investors to make irrational decisions [see Shefrin and Statman (1985)]. In view of the limited mental processing abilities, investors use heuristic to simplify the complexity of decision making situations and in many cases, it leads investors to arrive at inaccurate conclusion and subsequently, make investment decision which is not optimal [see Kahneman and Tversky (1979), and Tversky and Kahneman (1974)]. Furthermore, many investors exhibit herd behaviour [see Christie and Huang (1995) and Chang, Chen

and Khorana (2000)]. They make investment decisions according to the feel of herd rather than the rigours of formal analysis.

The traditional theory assumes investors are rational. Thus, it makes sense to study only the events that are happening in the stock market and view the information as an exogenous factor in order to understand stock price movement. However, investors are found to be irrational in real life. As such, it seems logical to view investors' information structure endogenously to shed some light on stock price behaviour. Whenever events occur, the information is public. Its effect will not be incorporated into stock prices until the information reaches investors with certain strength. It then enters their mind and influences their beliefs which eventually determine their trading behaviour. Therefore, stock prices do not just reflect public information, but also investors' behaviour, in particular, the irrational behaviour of investors.

The problem associated with irrational behaviour of investors is that stock prices do not reflect their fundamental value as the market valuation is distorted by the irrational thinking of investors. This is well-demonstrated in the prevailing market scenario. As was reported in The Edge newspaper dated 16 February 2009, we witnessed the freefall in the stock market during the current global economic crisis as investors shy away from the market. In view of the panic selling of investors and the negative market sentiment, stock prices have continued to drop and they do not reflect the fundamental values anymore. As a result, some companies with strong fundamental ground, for instance IOI Properties Berhad, become victims of the irrational behaviour of investors where its stock price no longer reflects a fair value.

The Malaysian stock market has been on a roller coaster ride. In 1993, the benchmark Kuala Lumpur Composite Index (KLCI) surpassed the 1,000 mark hurdle

(i.e. 1,275.32 points). Due to the 1997 Asian Financial Crisis, the KLCI slumped by more than 500 points within six months. In August 1998, the KLCI slumped to its lowest ever level (261.33 points). By the end of 2000, the KLCI rebounded to 974.38 points. In November 2006, the KLCI succeeded to exceed the 1,000 mark hurdle (1,090 points) for first time since 2000. At the end of 2007, the KLCI reached an all time high of 1,466.67 points. After the March 2008 General Elections, the KLSE fell below 900 points for first time since 2006.

Events such as the 1998 stock market crash and the current demise in the stock market have raised doubts about the traditional assumption that the stock market is efficient in the sense that actual prices correspond to fundamental prices. Dramatic fluctuations in the stock market raise questions about whether actual asset prices correspond to the expected present value of future cash flows, and whether or not, the stock market is always efficient in pricing securities. If stock market inefficiencies do occur, what, if any, are the possible real consequences?

Studies looking at the behavioural aspects of the markets are still very lacking particularly in the developing countries like Malaysia. This could be even more applicable in Malaysia given the low level of market sophistication as well as the characteristics and profile of Malaysian investors.

1.3.   Research Questions

The central research question being investigated is : "Could Malaysian investors' irrational behaviour explain stock price movement?" This question can be investigated under four specific questions, namely :

1. Are Malaysian investors attention-driven ?

2. Do the psychological attributes of Malaysian investors (such as reference dependence, representativeness heuristics, and availability heuristics) influence their trading behaviour?

3. Do attention-based strategies provide profitable investment opportunities for Malaysian investors?

4. Do psychological attributes explain stock price movement?

1.4. Research Objectives

Accordingly, the research objectives are :

1. To investigate whether or not Malaysian investors are attention-driven.

2. To determine whether the psychological attributes of Malaysian investors influence their trading behaviour.

3. To examine whether attention-based strategies provide profit making opportunities for Malaysian investors.

4. To analyse the effect of psychological elements on stock price movement.

1.5. Significance and Contributions of Study

The results of the research have both their theoretical and empirical significance. Firstly, they build on research in behaviourial finance which is still very young even in the developed markets and especially in the emerging markets, where this area of research is very much lacking.

Secondly, if the results of the study demonstrate the existence of psychological attributes in the market, they help to increase awareness among investors (whether

individuals or institutions) about specific behaviourial tendencies and how they can skew their decision making. Thus, investors will be better off in dealing with such psychological biases and improve their investment strategies. For fund managers and financial advisers, they will be more effective at giving advice to the clients if they have a better grasp of investor psychology.

Thirdly, exploring different psychological attributes may also help to determine the psychological attribute which is more predominant in the market. Thus, policy makers of corporations will be better off in handling public announcement on earnings information or other corporate exercises to avoid negative impact on the market sentiment. It also helps to prevent unnecessary turmoil from happening.

Fourthly, the results of the research may also provide evidence on the role of behaviourial factors in influencing trading volume. It helps to extend our understanding of the causes of the generally high level of trading volume as well as the well-documented winner-loser effect and post-earnings-announcement drift (PEAD).

Fifthly, the results of the study may help to determine whether the rationality assumption holds in the real world. If the rationality assumption does not hold, the results of the study may also provide evidence whether the Efficient Market Hypothesis is still applicable in the real world.

Sixthly, the results of the study may also help to determine whether human psychology could explain the behaviour of markets better and help to gauge the validity of the Prospect Theory.

Finally, by incorporating short-selling prohibition in the study may provide evidence on the role of short-selling prohibition in influencing investors' trading behaviour. It helps to extend our understanding of the impact of short-selling prohibition

on market liquidity.

1.6.   Chapter Scheme

This research is organised as follow: Chapter 1 provides an introduction of the study. It contains the problem statement, research questions, objectives of the study, scope of study and the significance and contribution of the study. Apart from this introductory chapter, there are in total six other chapters. The related literature and previous research that are relevant to the study are discussed in chapter 2. Thereafter, the research framework and the hypotheses, which are constructed from the research problems formulated are presented in Chapter 3.

Chapter 4 explains in detail the steps taken to empirically examine the research. The results of the finding are presented in Chapter 5. Chapter 6 discusses the findings and provides the potential explanation of the findings. Finally, Chapter 7 recapitulates the study by briefly reviewing the objective and the findings of study. The conclusions are then given. The limitations and the implications of study are also presented. The chapter ends with a suggestion of further research needed in this area.

Chapter 2

LITERATURE REVIEW

2.1. Introduction

The literature review related to the research objectives of this study will be discussed in this chapter. This chapter reviews literature on efficient market hypothesis and the behavioural aspects of investors. The rest of this chapter is divided into eight sections. Section 2.2 briefly discussed the definition and the different levels of EMH. The underlying assumptions of EMH and how it has been challenged on its theoretical ground are presented in Section 2.3. Section 2.4 describes the empirical evidences in favour of EMH, followed by the market anomalies that were detected by researchers in recent years. Empirical studies relating EMH and the anomalies that were detected on Bursa Malaysia are presented separately in Section 2.5. Section 2.6 briefly reviews the prospect theory developed by Daniel Kahneman and Amos Tversky (1979). The theory describes the way how decisions are actually made by investors under conditions of uncertainty. It also highlights the major similarities and differences between prospect theory and expected utility theory. Literature on the psychology of real-world investors is presented in Section 2.7. It discusses a number of psychological biases that are exhibited by investors and the decision-making process of investors. Lastly, Section 2.8 summarises the chapter.

2.2. The Definition and the Different Levels of EMH

As mentioned in the previous chapter, the EMH is associated with the idea of random walk where all successive price changes represent random departures from previous prices. In other words, tomorrow's price change will only reflect tomorrow's news and

will not depend on today's price changes. By definition, the news is unpredictable and thus, the resulting price changes must also be unpredictable and random in character. The term "efficient capital market" was first mentioned in Fama's (1965) paper. Generally, it is believed that stock markets are efficient in reflecting information [which include good or bad news] pertaining to the individual stocks. When information arises, the news will be transmitted very rapidly and eventually incorporated into the stock prices without interruptions and delay.

The EMH is traditionally divided into three levels [see Fama (1970)]. The first level i.e. the weak-form of EMH suggests that past market data cannot be used to predict future stock price movements. Rather, stock prices follow what is known as a "random walk". In other words, price movements will not follow any particular patterns or trends. Thus, past stock information cannot serve as a basis for making above-average risk adjusted return. It implies that technical analysis [which uses past sequence of stock price and the volume information as the basis for predicting future stock prices] will not be able to produce abnormal returns. The semi-strong form efficiency states that any publicly available information is rapidly transmitted and processed by the market. Thus, no investor can make above-average risk adjusted return on the basis of public information. It implies that fundamental analysis [which involves using market information to determine the intrinsic value of stocks in order to identify those stocks that are undervalued (or overvalued) and are expected to rise (or fall) in the future] will not be able to produce abnormal returns. The strong-form of EMH asserts that any information, whether privately or publicly held, provides no basis for making abnormal return. The implication of this is that not even insider knowledge can be used to outperform the market.

In short, the EMH implies that investors cannot predictably outperform the market either with stock selection or with market timing. Changes in stock prices are expected to be random and unpredictable. This has very important implications for many investment strategies. EMH asserts that none of the investment strategies are effective. Even if the investment strategies yield capital gains, the gains will not be economically sufficient to cover the transaction and research costs incurred. Thus, investors are advised to follow a passive investment strategy which makes no attempt to outperform the market. In order to optimise returns, investor should have a superior strategy which is randomly diversified across stocks, incurring minimal information and transaction costs. In addition, even portfolio managers would not be able to help adding value to investors.

2.3. The Underlying Assumptions of EMH

As documented by Shleifer (2000), EMH, basically, rests on three major assumptions. Firstly, investors are assumed to be rational and thus they value the stocks in a rational manner. Investors value each stock based on its fundamental value. They would discount the stock's future cash flows at a rate which reflects their risk characteristics. Investors would quickly respond to the new information pertaining to the fundamental values of the stocks. Their actions of either buying or selling would exert pressure on the stocks by pushing the stock prices up (or down) when the news is good (or bad). Secondly, even if some of the investors do not behave in a rational manner, their actions are assumed to be random and uncorrelated, hence they would offset each other without affecting stock prices. Thirdly, if investors are irrational in the same manner, they would cause the stock to deviate from its equilibrium value. Thus, the stock would either

be undervalued or overvalued. This temporary profit making opportunity would attract rational arbitrageurs who will then stabilize the stock prices. If these assumptions are not met, the dominant paradigm in the financial market research (i.e. EMH) will no longer be valid.

In the first decade after its conception in the 1960s, the EMH has achieved enormous theoretical and empirical success. Many asset pricing theories were subsequently developed on the basis of the EMH and its applications. However, in recent year, EMH has been subjected to critical re-examination on its theoretical grounds. First of all, the rationality assumption of EMH does not seem to hold in practice. Black (1986) provides evidence that investors do not make trading decisions based on fundamental information. Instead, they trade on noise. Ideally, investors are advised to follow strictly to the guidance of financial gurus. However, in real life, they fail to diversify [Lease, Lewellen, and Schlarbaum (1974); Barber and Odean (2000); Goetzmann and Kumar (2002); and Scharbaum, Lewellen, and Lease (1978)]. They actively identify certain stock price patterns and churn their portfolios accordingly, for instance, they sell winner-stocks and hold on to loser-stocks [Dhar and Zhu (2002); Grinblatt and Keloharju (2001); Jackson (2003); Odean (1998a); Shapiro and Venezia (2001); Shefrin and Statman (1985)]. They tend to buy stocks that catch their attention [see Lee (1992); Hirshleifer, Myers, Myers and Teoh (2002); and Barber and Odean (2003)]. In short, investors do not seem to pursue the passive strategies as what is expected by the efficient markets theory. They appear to invest in a manner that is not compatible with the paradigm of rationality.

As summarised by Kahneman and Riepe (1998), investors tend to deviate from the standard decision making model when making investment decisions. Firstly,

individual investors do not look at the final wealth they attain when evaluating any risky investment. They instead look at gains or losses relative to some reference points. A reference point is the stock price that investors compare with the current stock price. The possible reference points are the purchase price, the mean and median price of the past year, the 52-week high and 52-week low price and etc. The investors' choice of a reference point plays an important role because it determines whether they feel the pleasure of obtaining a profit or the pain of a loss. The reference point may vary from time to time according to the situation without any regard to the 'true' value of the stocks. Investors also display loss aversion which was first described and modelled by Kahneman and Tversky (1979) in their 'Prospect theory.' Prospect theory is a psychologically realistic alternative to expected utility theory. It describes how people make choices under conditions of uncertainty. Starting from empirical evidence, the theory describes how individuals gauge potential losses and gains. Odean (1998a) provides evidence which demonstrates that investors are reluctant to sell stocks that lose value. This finding is consistent with the notion of loss aversion.

Secondly, investors systematically deviate from the principles of Bayes rule when making future prediction [see Kahneman and Tversky (1973) and Tversky and Kahneman (1974)]. Under the conditions of uncertainty, investors often make prediction on future events by taking a short history of data and using this shortcut to attempt to describe the composite picture. It can be representativeness- or availability-heuristic. Under representativeness heuristic, investors judge the probability of an event by finding a 'comparable known' event and assuming that the probabilities will be similar. On the other hand, availability heuristic suggests that investors make judgement based on recent event that they can remember rather than complete data. Such heuristics are very useful.

They help investors in identifying specific patterns in the data, as well as saving on computation. Nonetheless, heuristic has its flaws. It may lead investors to deduce inaccurate conclusion and subsequently, make investment decision which is not optimal. For instance, when investors are biased by representativeness heuristics, they may overprice the glamorous stocks which exhibit a history of rapid earnings growth. Such overreaction lowers the returns in the future as the past growth rates fail to repeat themselves and thus, the stock price falls to a more plausible valuations. On the other hand, if investors are biased by availability heuristics, they may overreact to the recent event (either an extremely large positive or negative earnings surprises). They then demonstrate disproportionate amount of buying (or selling) activity following an extremely large positive (or negative) earnings surprises.

The second assumption of EMH is that while irrational investors may exist, their actions are random and hence cancel each other. In fact, the noise traders would not trade stocks randomly, but rather many of them would be keeping their eyes and ears open to what other investors are doing. They follow each other's mistakes by listening to rumours and imitating the actions of other investors. This is known as "herding behaviour". The problem associated with moving with the herd is that it magnifies the psychological biases (Shiller 1984). It causes investors to act in an irrational manner (i.e. make the same buying or selling decision based on the observations of others, independent of their own knowledge and beliefs). Practically, the investment decisions are made based on the 'feel' of the herd rather than analysing the stocks' fundamental values deliberately. This is in contrast to the classical view that investors trade merely according to the fundamental information.

Finally, Shleifer and Summers (1990) posit that the assumption of riskless arbitrage is not realistic. In contrast to the EMH, real-world arbitrage is risky and hence limited. In real life, stocks do not have close substitutes. If for some reasons stocks are mispriced (i.e. either underpriced or overpriced), there is no riskless hedge for the arbitrageur. Arbitrage does not help to push down (or up) the stock price even if they are overpriced (or underpriced) (Figlewski 1979, Campbell and Kyle 1993). Arbitrageurs who perceive that stocks are overpriced, are unable to sell stocks short and buy a substitute stock, since such stock does not exist. Instead they may simply sell or reduce exposure to stocks attempting to get an excess market return. According to Siegel (1998), this arbitrage is no longer risk free. Moreover, if the arbitrageurs are risk-averse, their interest in such arbitrage will also be limited.

2.4.   The Empirical Studies Relating to EMH

The formulation of EMH has prompted considerable empirical research attempting to determine whether financial markets are efficient and, if so, to what extent are their information processing efficiency. Most of the earlier empirical studies on the EMH have been conducted using the US data as US markets are probably the most developed capital markets in the world where they can provide testing ground which is in favour of EMH. Interest in market efficiency of smaller stock markets outside the United States has rapidly increased in the 1970s. Despite the variety of works on the EMH, the discussion below indicates that the findings are far from unanimity. Especially in recent years, market inefficiencies or anomalies were documented by researchers and they are not explicable by the EMH. Thus, this raises the question of whether the EMH is still alive and also questions about the implications of these findings to the academicians as

well as the practitioners.

2.4.1. Evidence Supporting the EMH

The origins of the EMH can be traced back as far as the pioneering theoretical contributions of Bachelier (1900) and Nobel Laureate Paul Samuelson (1965). They postulates that speculative prices are generated by a random process. In other words, the successive price changes were essentially random in character. The earlier studies which provide the most significant contributions were Working (1964) and Kendall (1964). They conclude that past price changes do not provide any information about future price changes. Following the same line of thinking, other studies [eg. Alexander (1964), Moore (1964) and Robert (1964)] continue to provide evidence which is consistent with the findings of the earlier scholars. However, the early studies contain extensive empirical analysis without much underlying theory.

Since Fama published his work in 1965 and coined the term EMH, a vast majority of studies were carried out subsequently to investigate the behaviour of stock prices based on the EMH. Fama (1965) examines the correlation between the current and previous return of a stock, using a sample of thirty Dow Jones industrial stocks. He finds statistically significant serial correlation coefficients, but weak in economic significance as they were relatively too small to compensate the transaction costs incurred. In 1970, Fama provides a comprehensive review of the theory and evidence of market efficiency. In his paper, he proceeds from theory to empirical work but it is clearly noted that most of the empirical works, in fact, preceded the development of the theory.

Jensen (1968) examines the performance of the mutual funds for the period of 1945 through 1964 and provides evidence that mutual funds achieved approximately zero percent of risk-adjusted returns each year. This implies that they do not demonstrate any powerful ability in selecting valuable stocks.

Castanias (1979) questions the validity of stock market efficiency. He computes the volatility of the market factor and the forty-five stocks around the dates where the information about macroeconomic variables is released. The volatility is measured as a ratio of the variance of stock returns on the dates where information is released and the variance of stock returns on all the other days (i.e. the dates on which this information is not released). The results demonstrate that the market appears to incorporate specific macro information into the prices of all stocks, suggesting that markets in aggregate may be efficient in processing the information. Subsequent to the work of Castanias (1979), similar results were obtained by Dawson (1984) who examines the trend toward market efficiency in the Hong Kong stock exchange.

Cooper (1974) uses spectral analysis to examine the relationship between money and stock prices. His study is based on the monthly data over the period 1947 to 1970. His finding also provides evidence in support of the efficient market hypotheses. Hamburger and Kochin (1972) conduct a similar study on the relation between money and stock prices. Their results suggest that it is very unlikely that investors could earn excess returns in the stock market. The evidence provided by Cooper (1974) is consistent with the findings of Jensen and Bennington (1970).

Jensen and Bennington (1970) employ Levy's filter rule to investigate the validity of the efficient market hypothesis. They use data for the period 1931 to 1965 and divide their sample into 29 independent sub-samples. The evidence shows that the

filter rules do not significantly earn, on average, more than the buy and hold policy after making adjustment for transaction costs. This is contrary to Levy's findings.

Kraft and Kraft (1977) examine the causal relationship between stock prices and several variables namely money supply, rate of change of money supply, corporate interest rate, and a measure of risk. In their study, the Granger causality technique, Sim's filter and their own version of Sim's filter are employed. The results show that there is no causal relationship between stock prices and the abovementioned variables. This is in line with earlier works such as those by Hamburger and Kochin (1972).

Many research studies have also examined announcement of company-specific events, including mergers and acquisitions, seasoned equity offerings, spin offs, dividend and earnings announcement, etc to determine whether the market reacts as predicted by the efficient market hypothesis. Fama, Fisher, Jensen and Roll (1969) examine the stock price reaction around stock splits. Many investors believe that stock splits resemble good news because dividend may increase following the stock splits. However, they observe no evidence of abnormal stock price performance, This suggests that investors would not be able to earn abnormal profits by purchasing the stock on the split date. The evidence is consistent with the efficient market hypothesis. A similar study is conducted by Keown and Pinkerton (1981) but on a different event. In their study, Keown and Pinkerton determine the stock price changes of target companies around the announcement of takeover attempts. The findings show that there is a small upward shift in price prior to the announcement, suggesting that some information may leak out. However, the stock price changes are, on average, close to zero after the announcement. This result is consistent with efficient market hypothesis since it suggests that the effect of the information is absorbed immediately.