

**PSYCHOLOGY BIASES EXPLANATION ON MALAYSIAN DAY OF THE WEEK  
ANOMALY**

**by**

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**PENJELASAN BIAS PSIKOLOGI UNTUK ANOMALI HARI-DALAM-SEMINGGU  
DI MALAYSIA**

**ABSTRAK**

Andaian terutama dalam kewangan konvensional adalah tingkah laku yang rasional. Berdasarkan prinsip ini, pelabur dianggap tidak boleh mengalahkan pasaran kerana masing-masing pelabur mempunyai jumlah maklumat yang sama dengan kualiti yang sama. Walaupun demikian, anomali pasaran, seperti anomali Hari-dalam seminggu (DOWA), adalah bukti yang kukuh untuk menunjukkan bahawa andaian tadi tidak boleh lagi dipergunakan. Memandangkan pentingnya DOWA dalam strategi pelaburan dan teori kewangan, ialah penting untuk mengkaji faktor penentu Isnin yang tidak rasional dari perspektif tingkah laku pelabur. Ramai penyelidik telah mencadangkan tingkah laku perdagangan sebagai penjelasan Isnin yang tidak rasional atau DOWA ini, namun, ia masih dibiarkan tanpa bukti empirikal. Kajian ini bertujuan untuk menyiasat secara empirikal dengan pendekatan psikologi melalui cara penggunaan bias afeksi (mood yang disebabkan oleh cuaca, mood yang disebabkan oleh bulan purnama), dan bias kognisi (perhatian dan percanggahan kognitif). Untuk memeriksa hubungan tersebut, kajian ini menggunakan dua model regresi, iaitu model interaktif dan model hari-demi-hari. Kebelakangan fasa ini, peranan afeksi (suhu dan bulan penuh) diuji awal dengan menjalankan kuasi eksperimen seri masa. Kajian eksperimen yang bekerja pakai ujian psikometrik seperti Profil Mood, Indeks Gaya Kognisi, Kelakuan Risiko, Indeks Agresif, dan Gaya Membuat Keputusan dengan suhu

dan tempoh bulan purnama sebagai variabel manipulasi. Terdapat dua ratus tujuh belas empat responden dalam kajian eksperimen. Keputusan kajian eksperimen kuasi di 4 masa berbeza menyimpulkan bahawa terdapat rasional kuasi pelabur di mana sepanjang bulan purnama dan atau suhu tinggi, pelabur bertindak tidak rasional. Kemudian, kajian ini terus menyiasati hubungan antara bias psikologi pada DOWA oleh dua model yang telah disebutkan. Keputusan menunjukkan bahawa bias psikologi adalah faktor penentu untuk DOWA (Isnin yang tidak rasional) sepanjang tempoh tahun 1999 hingga 2011. Model interaktif dan hari demi hari model mengesahkan setiap keputusan lain. Bulan purnama, suhu tinggi, berita buruk, dan sentimen memainkan peranan penting pada DOWA. Menariknya, kajian ini mendokumenkan tingkah laku berkelompok (*herding*) bukanlah penyebab DOWA. Untuk analisis kekukuhan, kajian ini diuji sekali lagi pada 3 ciri-ciri yang berbeza, iaitu, saiz, buku-ke-pasaran, dan kecairan. Pertama, kajian ini dibina ulang dalam bentuk portfolio. Kemudian pembolehubah bersandar (pulangan pasaran) pada model interaksi dan model hari-demi-hari digantikan oleh pulangan portfolio. Temuan daripada kajian menunjukkan bias psikologi yang masih wujud sebagai faktor pengaruh untuk DOWA. Oleh itu, kesimpulannya adalah bahawa bias psikologi pelabur adalah penentu DOWA. Berdasarkan perihal tersebut, kajian ini memperkayakan teori kewangan dengan menunjukkan bahawa andaian rasional dalam kewangan konvensional tidak boleh digunakan. Psikologi pelabur memainkan peranan yang penting ke atas keputusan pelaburan. Ia adalah salingan kepada Teori Prospek Kahneman dan Tversky (1979) yang menganggap risiko pelabur akan berbeza dan melanggar fungsi utiliti jika terdapat bias psikologi. Bagi pengamal, ramalan suhu tinggi, hari bulan purnama, sentimen yang tinggi, dan atau pengumuman berita buruk pada sesi dagangan awal hari Isnin boleh menjadi penunjuk DOWA. Oleh itu, ia akan menjadi baik untuk pelaburan aktif. Kajian masa depan boleh meneroka lebih anomali di pasaran dengan mengukur psikologi pelabur.

# **PSYCHOLOGY BIASES EXPLANATION ON MALAYSIAN DAY OF THE WEEK ANOMALY**

## **ABSTRACT**

The main assumption in conventional finance is rational behavior. Based on this tenet, investor is presumed cannot beat the market because each investor has same amount of information with similar quality. However, market anomalies, such as Day-of-the week anomaly, are the dossiers to show that basic tenet cannot be longer hold. Considering the importance of DOWA in investment strategy and finance theory, it is imperative to study further the determinant of that Monday irrationality from the perspective of investor's behavior. Even though many researchers have proposed trading behavior as the explanation of the Monday Irrationality or Day-of-the Week anomaly, yet, it has still left without empirical evidence. This research aims to investigate empirically by gauging psychological approach whereas the affection bias (weather-induced mood, and moon-induced mood), and cognition bias (attention bias, and cognitive dissonance) are the factors. In regards of examining the relationships, this study employed two regression models, namely, interactive model and day-by-day model. Preceding this phase, the role of affection (temperature and full moon) was preliminary tested by conducting time series quasi experimental study. The experiment study employed adopted psychometric test such as Profile of Mood State, Cognition Style Index, Risk Behaviour, Aggressiveness, and Decision Making Style with

temperature and full moon periods as the manipulated variables. There were two hundred seventy four respondents in the experiment study. The results of the 4 periods quasi experimental study concluded that there was quasi rational of investor where during the high temperature and or full moon period the investor reacted irrationally. Then, this study continued to investigate the relationship between psychological biases on DOWA by the two earlier mentioned models. The results imply that psychological biases were the drivers for the DOWA (Monday's irrationality) over the period of 1999 to 2011. The interactive model and day-by-day model confirmed each other results. Full moon, high temperature, bad news, and sentiment played important role on DOWA. Interestingly, this study documented herd behavior as a non-driver for DOWA. For robustness analysis, this study tested it again on 3 different characteristic, namely, size, book-to-market, and liquidity. Firstly, this study constructed the returns of the portfolio formation of those characteristic. Then, replaced the market returns on the interaction and day-by-day model as the dependent variable. The findings showed the psychological biases still existed as the driver for the DOWA. Therefore, it can be concluded that the psychological biases of investor are the determinant of DOWA. Based on the findings, this study enriches the finance theory by showing that the rational assumption on conventional finance cannot be hold. The psychology of investor played important role on the investment decision. It is reciprocal to the Prospect Theory of Kahneman and Tversky (1979). The perceived of risk of investors will be different and violates the utility function if there is psychological biases. For the practitioners, the high temperature prediction, full moon day, high sentiment, and or bad news announcement on early trading session of Monday can be the indicator for DOWA. Hence, it will be good for active investing. Future research can explore more the anomalies on the market by gauging the psychology of investor.



# CHAPTER ONE

## INTRODUCTION

### 1.1 Introduction

The main assumption in conventional finance is rational behaviour (Thaler, 1990). It states that an investor has a rational choice in decision making, implying that the investor cannot be biased in their decision when choosing options in investments. This assumption argues that psychological factors of human beings are excluded and ignored as having a role in the decision making process.

However, economists such as, Robert Shiller, Richard Thaler, Meir Statman, Amos Tversky, and Daniel Kahneman, have found certain effects of attitudes, sentiments, expectations, and other psychological biases in human decision. People do not make their decisions based merely on the utility and disutility, explained by expected utility, but on what they feel and think.

An example is the role of advertisement in changing value of utility. People will buy a whitening lotion not because they need the utility of lotion but because they were influenced by the advertisement. Another example is going shopping abroad (see Shimp & Sharma, 1987; Piron, 2002). People from developing countries tend to buy clothes in London, Paris, or Milan, not because of the utility of the clothing but because of random buying or prestige.

In finance, the violation of rational behaviour can be found in the “random” choice of investors, such as going to the chaotic market without any sophisticated information. For example, the empirical research of, Meir Statman, a finance scholar well-known for his research on fear and regret investigated how often people refuse to sell loss stock due to regrets.

Several finance scholars have argued regarding the rational behaviour through anomalies investigation (Tvede, 2000). Anomalies in the market have indicated that investors tend not to follow the utility of stock trading. One of examples is long run return mispricing of DeBondt and Thaler (1995), who found that there is a pattern of return reversal in the financial markets. They argued that stock prices diverge from fundamental values because of overconfidence; indicates that investors tend to trade stock based not on its utility value but more for its heuristic value.

Another example of anomalies, which is the main subject of this research, is the Day-of-the Week Anomaly (DOWA). It is seasonality of high negative return on Monday while there is high positive return on other days. This anomaly shows how people tend not to follow the expected utility theory as different seasons can be observed occurring on certain days (*see* Rubinstein, 2000), where an investor is predisposed on only certain days. The literature in DOWA addressed the trading behaviour (Wong *et al.*, 1992), asymmetrical reaction (Chia *et al.*, 2006), and speculation (Yahyazadehfar *et al.*, 2006) as the causes of DOWA in the market imply a violation of rational behaviour.

Most research in the DOWA investigated the existence or diminishing existence of this anomaly in the market. Even though much research has suggested to investigate further DOWA with the view of investor behaviour (*see* Abraham & Ikenberry, 1994; Kok & Wong, 2004), it is rare to find further investigation on the causes of DOWA.

This thesis argues DOWA can be investigated by using a psychology approach using Ellis ABC Model (Activating Event, Core Belief, and Consequence). Based on this model, the activating event (high negative return in certain days) is causes a psychological bias. The psychological bias is the core belief that which causes the irrational behaviour consequence while the core belief is emotional and cognitive in nature.

Theoretically, psychological bias consists of affection and cognition, which implies moods, emotions, and thinking processes can affect human decisions in investment. This research investigates the driver of the DOWA by using this psychological bias perspective, and aims to address the driver of DOWA by using the psychology approach.

The study introduction gives a general point of view and problem surrounding the research topic. This introductory chapter starts with providing the background of the study including the explanation of rational behaviour assumption problems and the approach of behavioural finance which explain the problems. The background of the study also includes the role of moods in the financial market. Furthermore, it also addresses the role of the weather and moon phase on the financial market. With the effect on the moods of the market participants, the role of cognition in the market's participant is not neglected. The chapter then addresses the problem with its issues for further investigation followed by the research question and objectives. The contribution of the study, theoretically and practically, is also discussed in this chapter. The introductory chapter ends with defining the key terms and organization of the study. The setting begins with an introduction description, the chapters of literature reviews, methodology, discussion, and conclusion.

## **1.2 Background of The study**

Rational behaviour is the main assumption in finance. It assumes either individual or an organization having rational preferences and choices (Thaler, 1990), which distinguishes economics and finance from other social sciences. This belief is aligned with many theory assumptions in finance such as the Efficient Market Hypothesis (EMH), CAPM, Value-at-Risk, and Black-Scholes. Shleifer (2000) stressed that, basically, there are three major assumptions in finance. First, investors are assumed to be rational. Second, even if the

investors do not behave rationally their actions are assumed to be random and uncorrelated, hence offsetting each other without influencing the stock markets. Third, an investor would cause the stock market to deviate from its equilibrium value if investors are irrational in the same manner. Rational arbitrageur would take advantage of this temporary profit making opportunity and eventually stabilize the market. It strengthens the postulates of rational behaviour assumption in finance.

Empirical results have shown that investors are not always behave rationally in terms of decision making where most market behaviour falls into anomalous conditions justifying the irrationality of the market. Tvede (2002) emphasized market irrationality as the terrible truth in finance. He argued that the mood of market participants follows and discovers the prices and causes market irrationality<sup>1</sup>. Robert Shiller, distinguished a Finance Scholar from Yale University, and confirmed Tvede's statement by addressing the exuberance of the market. He argued that the market is overvalued because the irrationality behaviour of the participants<sup>2</sup>. Baruch in Tvede (2002) stated that an investor's reaction plays an important role in the stock market. Investors' beliefs, experiences, emotions, and learning processes influence the movement of the stock market. This indicates the stock market price equilibrium is not the result of a simple supply and demand of fundamental values, but includes investor psychology as well. These explanations are discussed in the new stream of finance called behavioural finance.

Behavioural Finance is a new field that has evolved to be a separate branch from finance. Its concerns are with human and social, cognitive, emotional and other factors, to

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<sup>1</sup> Lars Tvede's (2002) book entitles "The Psychology of Finance: Understanding the Behavioral Dynamics of Market. It proposes that investor behavior can be explained by using psychology.

<sup>2</sup> Robert Shiller's (2005) book entitles: Irrational Exuberance. Shiller states that the market weighted the information too much and Investor irrationality is the drivers of this phenomenon.

comprehensively understand decision making by market participants. It further explains how they affect market returns and the allocation of resources. Behavioural finance theories argue that the market is inefficient as not all information is reflected in asset prices instantaneously.

Richard H Thaler, finance professor from Chicago Graduate School of Business, proposed that the behavioural finance is due to the influence of market participant behaviour in making the market<sup>3</sup>. Goldberg and Nitzsch (2001) propounded that asset price and its movement is a mirror of the behaviour of the market participants. This behaviour is a reflection of investor interpretation of information and opinion formed after interpretation (Goldberg and Nitzsch, 2001). Some information is missing while others might be interpreted wrongly depending on the skill and knowledge acquired by an individual.

Behavioural finance attributes the misinterpretation and false conclusion in financial markets to a combination of overconfidence, overreaction, representative bias, information bias, and other predictable human errors in rationalization and information processing. Some scholars such as Tvede, Tversky, Kahneman, Hirshleifer, and Shiller emphasized this problem on the participants' psychology, better known as psychological finance.

Psychological finance is derived from behavioural finance. It emphasizes on the participants' psychology. DeBondt and Thaler (1995) stated that a good finance theory has to be based on evidence of the participants' psychology. A psychologist observes that an investor pays too much attention to extreme information and less attention on its validity when making investment decision (Griffin & Tversky, 1992). The anomalous events in the financial market can be caused by the psychology factors.

One of the anomalous events in the financial market is the DOWA. It is a situation where there is a high negative return in certain days. Empirically, studies have found the

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<sup>3</sup> Richard Thaler's (2005) book entitles: Advances in Behavioral Finance. In this book, Thaler addressed the roles of the behavioral approach in finance.

existence of DOWA. Some studies have also addressed psychology factors as the causes of DOWA. For instance, previous research such as, Abraham and Ikenberry (1994) suggested that the trading behaviour and liquidity needs of investors are the explanation of the day of week anomaly in the market. Berument and Kiyamaz (2001) also contended that the gain expectation of investors is the explanation of day of weekend anomaly. They surmised that investors are trading in the seasonality as they want benefits from it. This is aligned with Wong *et al.* (1992), who investigate the Singaporean stock market, and concluded that the anomaly occurred because of the trading behaviour of seasonality awareness. It has been noted that studies that extend to gauge the DOWA with psychology factors are rare.

Based on those literature gaps, this research proposes psychology biases as the driver of the DOWA. The psychological explanation on the DOWA is that humans react to certain events and results in a consequence. This concept is most known as the ABC model of Ellis. Certain events stimulate our consciousness and unconsciousness and infer some thought as a result of beliefs, affections, and cognition (See Gaulin & McBurney, 2004). However, the affection and cognition cannot always be rational or irrational (Strongman, 2003). It is the resulting biases; and its biases have consequences (See Ridgway, 2005).

This research aims to investigate the psychology biases, which are the affection and cognition that contribute to the DOWA. As this research is based on behaviourism psychology school of thought, affection can be measured by external driven mood disorders which are the weather and the moon. In terms of cognition, the psychology biases are attention, heuristic, regret, and cognitive dissonance.

Based on previous empirical and theoretical studies, this study investigates the role of psychology biases on the day-of-week anomaly. As the samples, this study chose Malaysia. The rationalizations are: (1) It is suitable as the proxy of a developing market based on the

market capitalization and amount of their GDP; and (2) Malaysia is suitable in terms of a developing market proxy because this particular country has emerged faster compared to other developing markets (Levy and Levy, 2002).

### **1.3 Statement of Problems**

The importance of the DOWA was addressed by many scholars. For instance, Bell and Levin (1998) related the DOWA to the efficiency of the market. Chen and Singal (2003) addressed speculative trading or active trading as the best point from the DOWA. Angel *et al.* (2003) mentioned that the best day trading for short selling is during the weekend effect. In short, the DOWA has practical importance for active investing, and academic importance as a dossier that the market is not rational. Based on this, an investor can beat the market (See Singal, 2006).

In practitioners' point of view, DOWA is important for active investing. In the issue of the Alamanac Investor Newsletter, Jeffrey Hirsch remind his reader about seasonality if Dow, S&P, and Nasdaq, where investor might end in a losses of 1.3%, 1%, and 0.8%. Sy Harding, analyst from street smart, urged seasonal timing strategy as one of important active investing strategy<sup>4</sup>. Andy Waldock from Commodity and Derivatives Advisor argue that to beat the market, investors have to learn about the seasonality in the market<sup>5</sup>. Those market players surmise the important of seasonality trading in active investing. To strengthen the facts, 14 brokers and analysts were interviewed to show how important is seasonality trading for them, and which seasonality is the most important seasonality. Depicted in Table 1.1, all of them

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<sup>44</sup> The news can be read from <http://www.forbes.com/2002/08/28/0828watch.html>

<sup>5</sup> The news can be read from <http://www.moneyshow.com/trading/article/33/TradingIdea-31542/Seasonality-Trades-Coming-Up/>

agreed that seasonality trading is an important tool for investing strategy. All of them also agreed that studying the determinants of seasonality will benefit financial industry.

The table showed 64% of brokers and analysts agree that seasonality trading is important for their investing strategy, and even 22% of them stated it as a very important strategy. Among the seasonality, all of the brokers and traders agreed that day of the week anomaly (DOWA) are important to cope, indicating the importance of DOWA for brokers and analysts to beat the market.

**Table 1.1 Preliminary interview with brokers and analysts**

No	Question	Answers				
		Not Agree	Agree			
1	Do you agree seasonality is important for investment strategy?		14 (100%)			
2	Do you agree studying the determinants/predictors of seasonality will benefit financial industry?		14 (100%)			
		Not Important	Less Important	Neutral	Important	Very Important
3	How important seasonality trading for your investing strategy?			2(14%)	9(64%)	3(22%)
		Day of The Week	Week of the Month	Month of The Year		
4	Which seasonality is the most important seasonality to cope with?	14 (100%)	2(14%)	8(57%)		

DOWA is an anomalous condition in the stock market where the returns on certain days significantly and negatively differ from other days indicating the irrationality of investor trading. This anomalous condition violates the main assumption in finance which is rational behaviour (see Dimson & Mussavian, 1998; Malkiel, 2003), implying the inability of conventional finance theory to explain the phenomenon.

Much research in DOWA has proposed investor behaviour as an explanation of anomalous conditions in the market in their conclusion and limitation section (see Abraham & Ikenberry, 1994; Clare *et al.*, 1995; Berument & Kiyamaz, 2001; Wong *et al.*, 2006; Yahyazadehfar *et al.*, 2006). Thus, research that has investigated it empirically, especially in the psychology point of view, is rarely found. Linking it with psychology, Krebs and Blackman (1999) addressed three stimulants in human behaviour, affection, learning, and cognitive in human psychology which can make biased decision making or irrational decision making.

Distinguished psychology scholar, Albert Ellis, proposed the ABC model to explain the relationship between stimulants, beliefs (affection and cognition), and the consequences. The stimulant in this research is the market behaviour for certain days. The emotional-cognition in this research is based on affection, attention, heuristic, regret, and cognitive dissonance, while the consequence is the day-of-week anomaly.

As it is rare to find research that tries to explain the DOWA in the psychology approach, this research attempts to investigate the role of psychological biases on the DOWA. Based on the consensus wisdom of the literature, the psychological biases consist of affection biases and cognition biases. Affection biases consist of weather-induced moods and moon-induced moods. Meanwhile, the cognition biases consist of attention bias, heuristic bias, and cognitive dissonance bias. In summation, the psychology biases consist of weather-

induced moods, moon-induced moods, attention bias, heuristic bias, regret bias, and cognitive dissonance bias.

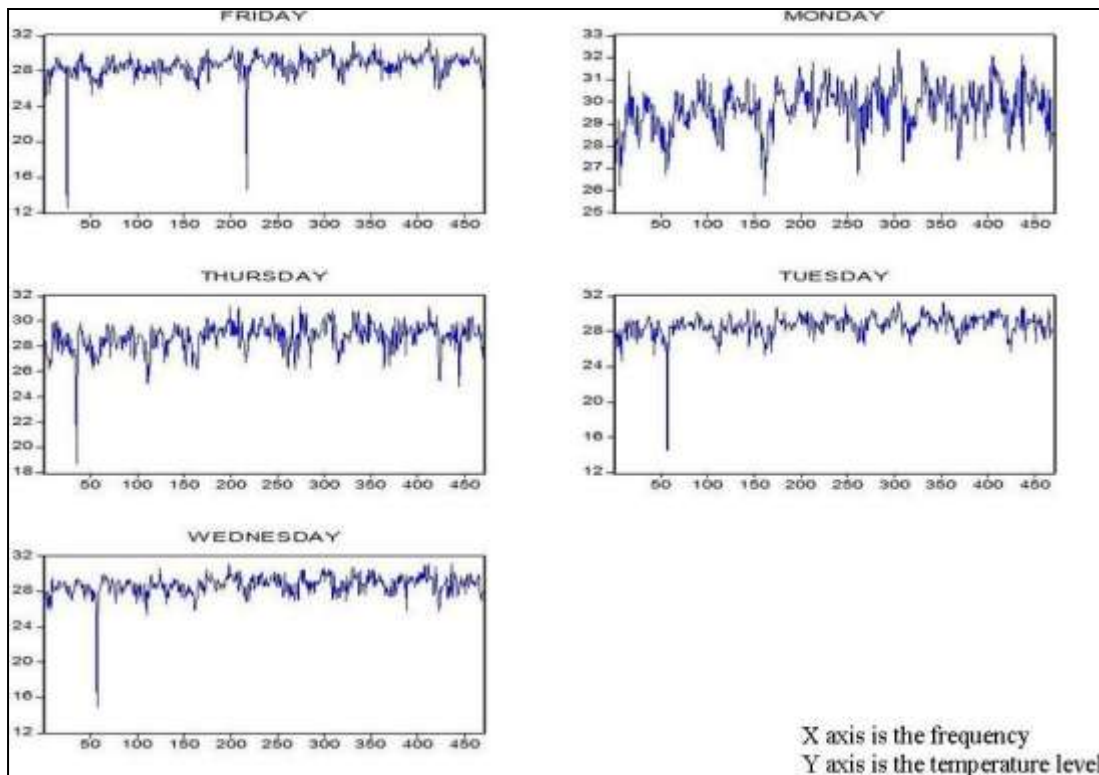


Figure 4.1 The Frequency Distribution in certain day

Source : Malaysia Meteorology Office Agency

Interestingly, the pre-investigation of this research found weather anomaly which is in line with weekend effect in finance. According to Forster and Solomon (2003), there is a weekend effect in global weather, whereby, from Saturday to Monday the weather is relatively hotter than other days. The plotted- data of this study found the same where Mondays temperature was averagely higher compared to other weekdays (see Figures 1.1). This is consistent with the DOWA concept where Monday returns relatively disperse higher than other days. Not to mention that some literature also indicates the relationship between weather conditions and the stock market (see Saunders, 1993; Dichev & Janes, 2001; Kamstra, Kramer & Levi, 2002; Hirsleifer & Shumway, 2003; Pardo & Valor, 2005; Cao &

Wei, 2005). Other plotted-data documented also seasonality in moon occurrences (see Figure 1.2), where the full moon has more occurrences and less new moon phase circumstances during Mondays compared with other days; reciprocating with the DOWA concept. Theoretically, the moon phase can affect investor behaviour (see Dichev & Janes 2001; Yuan, Zheng, & Zhu, 2001), which remarks moon phase can affect investor irrationality.

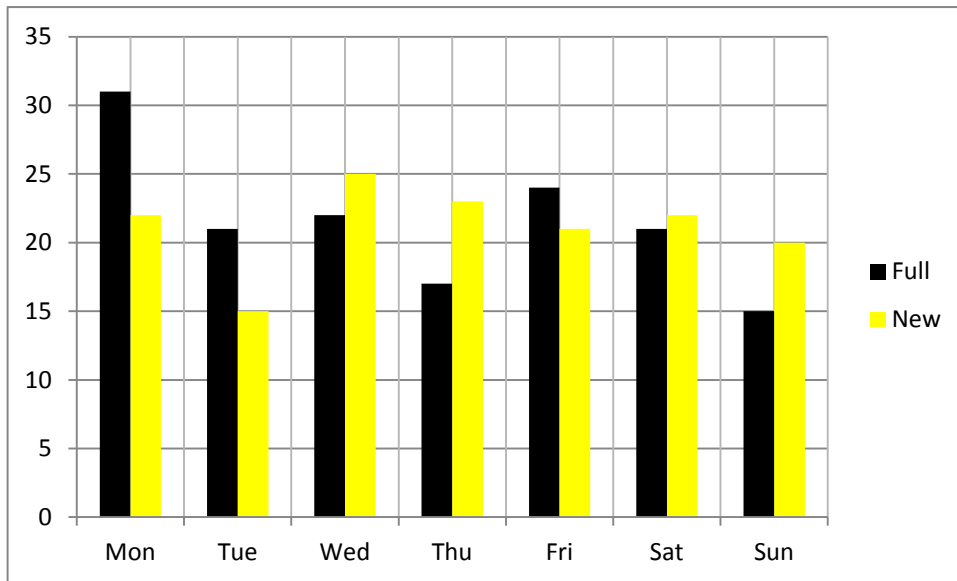


Figure 1.2 Distribution of Moon Phase  
Source: Compile from [www.moonconnection.com](http://www.moonconnection.com)

In terms of cognition, attention can hypothetically influence the DOWA. A large study has shown that people make decisions based on experience (Shefrin, 2000), memory (Cloitre & Liebowitz, 1991), anxiety (Bradley, Mogg, White, Groom, & Bono, 1999), fear (LeDoux, 1998), and happiness (Eysenck, 1992). In psychology, they called it as an attribution to attention and heuristic or “attention bias”. Attention bias is a psychological event of an individual because of the activity of the brain mechanism on the response and detection of stimulants such as threat-related, anxiety, curiosity, and emotion (LeDoux, 1998; Fox, Russo, & Dutto, 2002). In finance, the attention bias can be found as the investor behaves differently in the extremely high volume and extreme return situation (Barber & Odean, 2008). Attention

bias can come from bad news in the market. Previous studies have extensively provided evidence on these relationships i.e. Waud (1970), Castanias (1979), Schwert (1981), Daniel *et al.* (1998), Barberis *et al.* (1998), Hong and Stein (1999), and Barber and Odean (2008). The bad or good news has rung the attention of investor's to react towards. It is in line with Fama *et al.* (1969) who concluded that the stock prices are rapidly incorporated with information. In short, the news causes a market reaction. Interestingly, most companies released their bad news on Monday which might drive the market noise. Based on this logic, we hypothesize that the Monday effect was caused by the attention of the bad news more often released on Mondays. When managers prefer to announce bad news on certain days (usually Monday), it attracts the investor's attention. Hence, the news announced on Monday is more likely to be considered as it becomes the reference point for investor in decision making. In this manner, we propose that bad news is the attention that cause investors' irrational trading on Mondays. The plot documented that most bad news released on Mondays (Figure 1.3), converged with the Monday effect.

The heuristic bias is related to the sentiment of investor. Yantis (1998) divided attention to goal-driven and stimulus-driven, which is related to the perception of Mondays volume and knowledge about Monday effect among investors. If the market is opened with a low or a downtrend, investors tend to think that it is a result of Monday effect (see Wong *et al.*, 2006 ). Hence, investors follow their sentiment and cause DOWA.

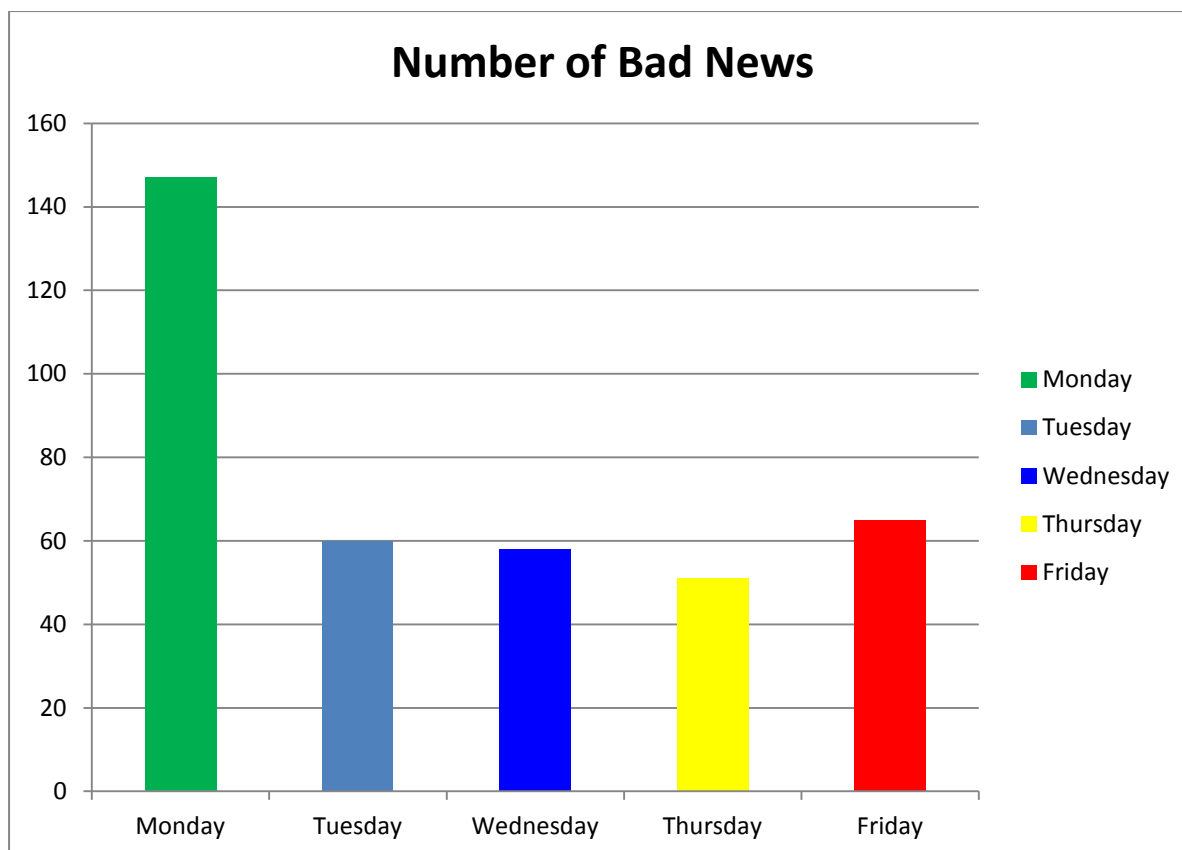


Figure 1.3 Number of Announced Bad News Day-by-Day  
 Source: Self-compilation from Bursa Malaysia Data

Another psychological bias affecting anomalous conditions in the stock market is cognitive dissonance by herding. Cognitive dissonance is the mental conflict that people experience when they are presented with evidence that their beliefs or assumptions are wrong (Montier, 2002). Herding means an event where under certain conditions most investors focus only on a subset of securities by flocking while neglecting other securities with identical exogenous characteristics (Hirshleifer, Subrahmanyam and Titman, 1994). Porter (1992) suggested that the weekend effect can be caused by the flocking behaviour of individual investor. Lakonishok and Maberly (1990) addressed the information dissemination as the explanation for day-of-the week anomaly. In a study by Scharfestein and Stein (1990), the information dissemination is the driver in herding. Therefore, a DOWA can be caused by investor cognitive dissonance which is shown in their herding behaviour.

After knowing the importance of DOWA as investing strategy tool, The plotted-data and literature review showed that hypothetically DOWA might be explained by psychology approach. Hence, it raises the question “Can a psychological point of view explain the DOWA?” If so, what is the explanation beyond the DOWA? Using a psychology perspective, the current study proposes psychology biases (affection and cognitive) to explain the DOWA in finance.

#### **1.4 Research Question<sup>6</sup>**

Based on the problem of the study, in general, this research aims to investigate two main questions, which (1) Do affection affect moods and explain the day-of-the week anomaly?; and (2) Do the cognition biases explain of the day-of-week anomaly? Specifically, this research gauges the psychology biases as the explanation for DOWA. Five research questions are detailed as follows::

1. Does Weather Condition (affection bias) influence the day-of-the week anomaly?
2. Does the Moon Phase (affection bias) influence the day-of-the week anomaly?
3. Does bad news (human attention) influence the day-of-the week anomaly?
4. Does market sentiment (heuristic bias) influence the day-of-the week anomaly?
5. Does herding behaviour (cognitive dissonance) influence the day-of-the week anomaly?

Note that for robustness reason, this research aims to investigate following questions:

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<sup>6</sup> The main issue in this thesis is the explanation of DOWA. Before investigating the role of psychology in DOWA, this thesis has to prove the existence of DOWA. We conducted preliminary research on DOWA by replicating French (1980) model. The result showed there is DOWA in Malaysian Stock Market. To make it more robust, we also investigated the diminishing of DOWA by replicating Wong et al (2006) works. We also found that the DOWA in Malaysian stock market is not diminishing. It implies that the thesis can proceed to next stage which is investigating the explanation of DOWA.

6. Does the Book to market-effect play role on the irrationality for the case of Malaysia stock market day-of-the week anomaly?
7. Does the size-effect play role on the irrationality for the case of Malaysia stock market day-of-the week anomaly?
8. Does the liquidity play role on the irrationality for the case of Malaysia stock market day-of-the week anomaly?

### **1.5 Research Objectives**

The main objective of this thesis is to examine whether physiology biases can explain the calendar effect. In this research, the psychology biases are affection and cognition. Meanwhile, the calendar effect is the day-of-the week anomaly. Specifically, this research mainly aims:

1. To examine the influence of weather on Day-of-the Week Anomaly
2. To examine the influence of moons on Day-of-the Week Anomaly
3. To investigate the role of bad news announcement on Day-of-the Week Anomaly
4. To investigate the effect of sentiment on Day-of-the Week Anomaly
5. To investigate the herding behaviour on Day-of-the Week Anomaly

For robustness reason, this research also aims to investigate those relationships in a more detail stock behaviour. Hence, this research also aims:

6. To investigate whether the Book to market-effect play role on the irrationality for the case of Malaysia stock market day-of-the week anomaly?
7. To investigate whether the size-effect play role on the irrationality for the case of Malaysia stock market day-of-the week anomaly?

8. To investigate whether the liquidity play role on the irrationality for the case of Malaysia stock market day-of-the week anomaly?

## **1.6 Scope of Study**

The scope of this research caveats 5 aspects: market anomalies, moods, weather, cognitive, and markets. First, this research limits the market anomalies on the day-of-the week anomaly. Other anomalies such as small cap anomaly, momentum anomaly, and passive active anomaly are not going to be observed. Day-of-the week is chosen as it fits the calendar and portrays the anomaly on time horizon.

The affection variables are limited to weather and moon phase. Theoretically, these two variables are the major cause of mood disorder from external (Power, 2004). Further, internal factor cannot be explored by using quantitative approach as it has to be conducted experimentally which is out of the scope of study. This research is limited to only one of weather condition: temperature level. It is aligned with previous research such as Kamstra and Runde (2003), and Cao and Wei (2005). Note that Temperature is another form of humidity and clouds cover. Hence, taking temperature is enough as the proxy of weather. Not to mention, psychology literature shows temperature is the variable that affects human behaviour mostly.

The last scope is the observable stock markets. This research is limited to one developing market which is Malaysia. This market is an emerging market and sophisticated stock market. Additionally, the chosen market has a more robust result as it is in the equatorial line. It means that the weather will be similar throughout the year.

## **1.7 Organization of the Study**

This thesis divided into 6 chapters. The first chapter describes the objective and rationale of this research. In this chapter, related research is also discussed. Then, it describes the scope of the research and the proposed hypothesis. Chapter 2 addresses the literature review. The literature review discusses theories related to the research, which addresses the behavioural finance theory, the market behaviour theory, the market anomalies, and the psychology factors. Chapter 3 describes the methodology of research, which tells us about the research data and object, and also the methodology used in this research. The purpose of this chapter is to give a comprehensive understanding about the research procedure that used to test the hypothesis and the process to make conclusion. Chapter 4 describes the findings of the preliminary research which is Time Series Quasi Experiment. The purpose of this experimental study is to show the mechanism of the external affection on investor behaviour. Chapter 5 addresses the findings of the hypotheses estimation, which includes the data analysis, the statistical method used, and including the analysis. In this chapter, there is also a robustness analysis where the role of psychological biases on DOWA was tested on three portfolio formation, namely, size, book-to-market, and liquidity.

The conclusion, the limitation and the recommendation are discussed in chapter 6, the last chapter in this research. This chapter disclosed the limitation of the research. At the end of this chapter, the recommendation is forwarded.

## **Chapter Two**

### **Psychological Finance on Day of the Week Anomaly**

#### **2.1 Introduction**

This chapter exposes significant contributions from previous studies of psychological finance. This chapter begins with the explanation of decision making model, and followed by conventional finance. Precede the behavioral finance and its psychology finance, the contrary findings and argument in conventional finance, including the anomaly, are addressed in this chapter. The anomaly section of this chapter addresses the day-of-the week anomaly as it is the evidence of the weakness in conventional finance; and it is also the main issue in this thesis.

In the Behavioral finance section, this chapter includes the prospect theory. To have comprehensive understanding, the behaviorism school of thought is also introduced in this chapter with the ABC model of Ellis in regard of gauging the relationship between the events, behavior, and consequences. The last section of this chapter addresses the relationship between psychology and finance. It ends with the hypotheses of the research.

#### **2.2 Conventional Finance versus Behavioral Finance**

This section addresses the two big arguments in finance namely Conventional Finance and Behavioral Finance. The purpose is to present comprehensive understanding of this research. As stated earlier in introduction chapter, this research aims to investigate the role of psychology biases in the day-of-the week anomaly (DOWA). The psychology biases approach is part of behavioural finance that hypothetically can reveal the explanation of DOWA which cannot be answered by conventional finance so far. This section firstly

introduces the conventional finance with its rational decision making. Then, the market anomaly is initiated as the evidence of the conventional finance failure. Later on, the research brings in the behavioral finance as the new approach to answer the failure of conventional finance.

### **2.2.1 Conventional Finance**

Conventional Finance can be described as the art and technique on finance managerial. Melicher and Norton (2003) describe the modern finance as the study of how individual, institution, government, and businesses, acquire, spend, and manage money and other financial assets. Danthine and Donaldson (2001) emphasize that the stressed of this stream of finance on the behavior of those mentioned entities is assumed rational in choices and preferences. The body of knowledge of conventional finance built portfolio principle of Markowitz, arbitrage principle of Mondigliani and Miller, Capital Asset Pricing of Sharpe, Lintner and Black, Efficient Market Hypothesis of Fama, and Option Pricing Theory of Black, Scholes, and Merton (Statman, 1999). These theories have the most important assumption which-so-called Rational Behavior Assumptions (Thaler, 1990; DeBondt and Thaler, 1995).

Thaler (1987, pp.187) addressed that:

“Finance can be distinguished from other social science by the belief that the behavior can be explained by assuming that agents have stable, well-defined preferences and make rational choices consistent with those preferences in market that eventually clear”

Thaler (1990) addressed that modern financial theory is assumed rational in two ways: (1) the decision making of market participants is aligned with the axiom of expected utility theory, and (2) the decision making is not biased in term of future forecasting. According to Nicholson (2007), expected utility theory is the behavior of market participants is risk averse and having concave utility function. It means pricing of assets is set by investor's rationality. Therefore, the rational based market equilibrium is achieved. If the asset prices achieved the rational equilibrium, it would confirm the market efficiency theory (Fama, 1970).

### *Traditional Decision Making*

Business Encyclopedia defined Decision making as the process of recognizing a problem or opportunity and finding a solution to it. Kahneman and Tversky (2000) mentioned that decision making is concerned with the logic of thinking and rationality and the invariant choice it lead to. For effective decision making, a person must be able to forecast the outcome of each option as well, and based on all these items, determine which option is the best for that particular situation (Reason, 1990).

When humans are confronted by a choice that affect him/her personally (e.g going to Paris or London for a holiday), there are nearly always benefits and costs associated with each choice. Where will we go for holiday? It depends on answering "How do we decide to go?". Von Neumann and Morgenstern (1947) propose straightforward approach called "Expected Utility". According to Expected Utility Theory, usually humans will try to maximize the utility which is the subjective value we attach to an outcome (see Nicholson, 2005). Further, based on this theory, human assess the expected utility by this following formula in choosing simple options:

$$\text{Expected Utility} = (\text{Given Outcome Probability}) \times (\text{The Outcome Utility})$$

In reality, the decision maker has to confront various factors associated with each option. For example, in deciding the place for holiday, Paris may be preferable to London because it is more interesting, better weather, good scenic, and loveable. However, holiday in Paris will cost more expensive and language constraints. In such circumstances, according to Expected Utility, people are supposed to calculate the utility or disutility of each factor in order to work out the overall utility of each option. When choice is an easy and simple one, then people tend to behave in line with utility theory. However, people's choices are often decided by factors other than simply utility such as: Gambles (Kahneman and Tversky, 1979), Joint Receipts (Luce and Fishburn, 1995), preferences and beliefs (Mellers, Schwartz, and Cooke; 1998), and Cognitive Bias (Yudkowsky, 2006). As the simply utility is diminished, the bias in decision making is occurred.

Eysenck and Keane (2000) address 5 factors that driving the bias decision making, which are: (1) Loss Aversion, (2) Framing, (3) Perceived Justification, (4) Anticipated Regret, and (5) Self-Esteem. The Loss aversion is people tend to much more sensitive to potential losses than to a potential gains. Early study by Dawes (1988) discussed about two people had paid \$100 non-refundable deposit for a weekend in a resort. Somehow, both of them became feel unwell, and felt they would probably have a more pleasurable time at home than at a resort. Interestingly, Dawes found most of participant in the research argued that the two people has to continue the holiday rather than wasting their \$100. This is what it called as loss aversion.

Eysenck and Keane mentioned Framing as the situation that caused irrelevant decision making. Tversky and Kahneman (1987) addressed an example of Asian Disease problem. The participants in the research were informed that there was likely to be an outbreak of an

Asian disease in the US. It was expected to kill 600 people. There are two programs of action that had been proposed. Firstly, Program A would allow 200 people to be saved. Another one would have a  $1/3$  probability that 600 people would be saved, and a  $2/3$  probability that none of the 600 would be saved. In their result, it showed that 72% of the participants favoured program A, although the two programs (if implemented several times) would on average both lead to the saving of 200 lives.

Other participants in the study by Tversky and Kahneman (1987) were told the same problem. But this time it was negatively framed. They were informed that program A would lead to 400 people dying, whereas program B carried a  $1/3$  probability that nobody would die, and a  $2/3$  probability that 600 would die. Even though, the fact of the problem was the same, 78% chose program B. The various findings obtained by Tversky and Kahneman (1987) can be accounted for in terms of loss aversion in the sense of avoiding certain losses.

Third bias in decision making is perceived justification, which addresses that people tend to choose one option over another by justifying their decision to themselves and to another people. The seminal paper of this perceived justification is conducted by Tversky and Shafir (1992). In their research, the sample (the participants) was asked to imagine about the opportunity to buy a cheap holiday in Hawaii, but the offer expired tomorrow. They had three choices: (1) Buy the holiday; (2) decide not to buy the holiday; (3) pay a \$5 non-refundable fee to retain the opportunity to buy the holiday the day after tomorrow. Further, all the participants were asked to assume that they had just taken a difficult examination. There are three group: the first group is those who already knew passed the exam, the second one is those who already knew they were failed the exam, and lastly the group that still has to find out the result a day after tomorrow. The result of the research showed interesting result. For the first group (already knew pass the exam) and the second group (already knew fail in the exam), majority of them decided to buy the holiday. However, there is 32% of third group

(have to wait for the result) decided to buy the holiday immediately. These findings can be explained by perceived justification.

Tversky and Shafir (1992) explained that those who have passed an examination deserve a holiday, and those who are failed “deserve” some kind of relief. If someone does not know whether or not they have passed an examination, there seems to be no compelling justification for going on holiday. The participants’ use of perceived justification sounds rational, but actually violates utility theory by not maximizing their utility (not using their opportunity to gain wealth)

The fourth bias in decision making that proposed by Eyneck and Keane (2000) is anticipated regret. It is related to emotion. Mellers *et al.* (1998) stated that anticipated regret influence choices between consumer products, sexual practices, gambles, and medical decision. Baron (1997) predicted that anticipated regret can produce an omission bias, in which a person prefers inaction over action. Ritov and Baron (1990) studied a situation in which people had to choose whether or not to have their child vaccinated. When the vaccine had potentially fatal side effects, many people chose not to have their child vaccinated, even though the likelihood of the vaccine causing death was much lower than the death rate from the disease against which the vaccine protects

The last bias in decision making that proposed by Eyneck and Keane (200) is self esteem. Joseph *et al.* (1992) address the relationship between high and low self esteem to the risk decision making. It indicates that people of low self esteem seem to focus on self protection and are concerned that negative or threatening events will reduce further their self esteem.

### *Economics Rational Decision Making Model*

As explained earlier, people tend to optimize their choice due to its utility in making decision. Despite of Expected Utility has been argued, scholars in economics and finance still use this postulate in decision making model (Neuman and Politser, 1992). The earliest model of expected utility is St.Petersburg Paradox (Nicholson, 2000). It was firstly investigated by Daniel Bernoulli by observing people that do not merely evaluate gambles by their expected utility (value). It states that there is paradox in people's willingness to pay only small amounts for the gambles. It hypothesize that people posses a utility function for wealth and that they value gambles based on the expected utility associated with the outcomes, not the expected value.

Another model of Expected Utility theory is Von Neumann and Morgenstern Model. They illustrated how the expected utility maximization principle derives from several underlying axiom. It can be interpreted as the principles for rational choice stipulating how people should formulate preferences among gambles (See Neuman and Politser, 1992). Scholars in rational choice called these axioms as completeness, transitivity, independence, continuity, and reducibility (refer to Coombs *et al*, 1970). Nicholson (2000) vigorously explained how the Capital Asset Pricing Model built based on this expected utility theory. Maghyereh and Al-Zoubi (2008) mentioned that most of major finance, such as Value at Risk, Black-Scholes, and CAPM, is constructed based on expected utility. It implies that rational decision making is the main assumption in economics and finance. This is in line with Thaler (1990) and DeBondt and Thaler (1995).

However, several scholars argue this model. Bray and Savin (1986) investigated whether agents can learn how to form rational expectation. By using standard econometrics of linear stochastic supply and demand, their research found that agents, assumed are