SHORT-TERM OVERREACTION:
IMPLICATIONS FOR STOCK MARKET EFFICIENCY IN MALAYSIA

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRAK

Kajian ini mengkaji kelakuan jangka pendek saham disenaraikan di papan utama Bursa Malaysia sepanjang tempoh Januari 2000 hingga Disember 2007. Kajian ini mempunyai tiga objektif, iaitu untuk menentukan sama ada fenomena saham-saham Malaysia bertindak melampaui batas pengembalian berlaku; menentukan jika para pelabur boleh mengaut keuntungan dari mengeksploitasi anomali ini, serta menentukan jika keuntungan yang berlebihan diperoleh sekiranya menggabungkan kos urusniaga.

Penemuan penyelidikan ini bercampur. Pembalikan harga saham diperhati apabila membandingkan tempoh secara keseluruhannya, tetapi keputusan statistik menunjukkan ia adalah tidak penting. Oleh itu, kajian ini membuat kesimpulan bahawa kelakuan saham melampaui batas pengembalian dalam satu kitaran normal dengan kurang pergolakan disebabkan oleh krisis pasaran, tidak berlaku. Kajian ini adalah relevan terhadap pelabur dan penganalisis yang mungkin ingin menkaji bagaimana pergerakkan pasaran saham dalam kitaran yang berlainan. Oleh itu, kajian ini menyediakan satu perbandingan dengan keputusan kajian lain dalam dua jangka waktu, iaitu pada dekad yang lepas yang melibatkan tempoh krisis kewangan dan tempoh masa kini, iaitu selepas tempoh krisis kewangan. Keputusan menunjukkan bahawa semasa tempoh bullis, hanya jangka waktu sebelum krisis kewangan menunjukkan saham bertindak melampaui batas pegembalian. Sebaliknya, ketika waktu bearis, hanya tempoh masa selepas krisis menunjukkan keuntungan yang berlebihan. Oleh itu, kajian ini membuat kesimpulan ketika kitaran normal dan jangka waktu bullis kitaran normal, pasaran Malaysia adalah efisien. Ketika jangka waktu berris kitaran normal, pasaran saham menunjukkan saham bertindak melampaui batas.

ABSTRACT

This study empirically investigates the short-term behaviour of stocks listed on the main board of Bursa Malaysia during the period of January 2000 to December 2007. The objectives were to determine whether the overreaction phenomenon occurs during this time frame as well as assert whether investors can profit by exploiting this anomaly and further extend the investigations to determine if the excess profits would be feasible after incorporating transaction costs.

The findings of this research provide mixed results. Price reversals were observed when comparing the period as a whole, but the results were not statistically significant. It was concluded that during a normal cycle with less turbulence caused by a crisis, the market did not portray traces of overreaction. As a matter of relevance to investors and analysts who might want to gauge how the market moves during different cycles, this research provides a comparison of the findings during two time frames, the past decade that involves the financial crisis period with the current post crisis period or normal cycle. The results signify that during the bullish period, only the loser portfolio exhibited reversals whereas the winner portfolio exhibited momentum during the pre-crisis period. On the contrary, during the bearish period, only the post crisis period seems to exhibit overreaction with significant excess profits. Thus, this study concludes that during normal cycle and the bullish period of a normal cycle, the Malaysian market can be considered to be weak form efficient. During the bearish period of the normal cycle, the market shows some signs of reversals for the winner and arbitrage portfolios and the study attributes these findings to overreaction.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Since the introduction of the efficient market hypothesis (EMH) by Eugene Fama in 1970, it has sparked a great deal of empirical research that supports and contradicts the notion that financial asset prices rapidly and fully reflect all available information. Most research conducted on market efficiency examined the validity of weak form efficiency prediction that prices follow a random walk (Megginson, Smart, and Gitman, 2007). One such cluster of research that received great review is return predictability.

The popular interpretation of return predictability emphasized by many researchers is the tendency for stock-price changes to continue from one period to the next, which means that positive returns tend to follow positive returns in subsequent periods and vice versa (known as momentum studies); as well as the tendency for stock-price changes to reverse direction, where positive returns tend to be followed by negative returns in subsequent periods and vice versa (known as price reversal or overreaction). If these anomalous patterns could be identified and exploited profitably, it would contradict the efficient markets hypothesis and imply that markets are grossly inefficient, allowing simplistic or mechanical trading rules to offer arbitrageurs a window of profit opportunities.

It should be noted that stocks movement in the short-, medium-, and long-return horizons differ. Underreaction (momentum strategy) is particularly pervasive during the medium horizons especially during the 6-month and 12-month period. For

1

example, Jegadeesh and Titman (1993) show that a momentum strategy, which selects stocks based on their past 6 month returns and holds them for 6 months, realizes a compounded excess return of 12.01% per year on average in the U.S. Overreaction on the other hand, has been found to be particularly pervasive in short horizons (weekly to monthly) and long horizons (3 to 5 years) (Iihara, Kato and Tokunaga, 2004).

Though both underreaction and overreaction phenomenon are an exciting area of research, this study attempts to analyze short-term overreaction in the Bursa Malaysia during the period of January 2000 through December 2007. Test for stock market underreaction though seems intriguing; is beyond the scope of this research. The following topics introduces the research outline of the study, which illustrates the background of the study, problem statement, research objectives, research questions, definition of key terms and concludes the chapter with significance of the study.

1.2   Background of the Study

For almost forty years, the efficient market hypothesis has been one of the most imperative and prominent themes in financial research. One of the major implications of the EMH is that stock prices are not predictable and information quickly assimilates into stock prices. In other words, the EMH view financial markets as being efficient and prices of securities should reflect their intrinsic values.

Lately, there have been proliferations of research questioning the validity of the EMH. These researchers believe security prices could diverge from their fundamental values especially due to evidence of return reversal behaviour of stock prices. Since

the most influential findings by De Bondt and Thaler (1985, 1987) on stock market overreaction, this area of research has gained great momentum over the years.

De Bondt and Thaler (1985) define the overreaction hypothesis as overresponse to new information. This means that investors tend to overweight recent information and underweight prior information. More emphasis is placed upon short-run economic developments that generate price movements beyond the new equilibrium level that is justified by the news (De Bondt and Thaler, 1985). As a result of this systematic investor overreaction, this hypothesis suggests that when prices overreact, stocks are pushed beyond their fundamental values and extreme movements in stock prices will be followed by subsequent price movements in the opposite direction to "correct" the initial overreaction. That is, when the market perceives the misevaluation of stocks in relation to their fundamental values and take corrective measures or actions, prices revert back to equilibrium in a predictable manner thereby showing a mean-reverting pattern on share returns. This implies that securities that have abnormally high returns in the past (winners) will subsequently experience relatively low returns in the future; whereas securities that have abnormally low returns (losers) in the past will later experience relatively higher returns. In addition, this hypothesis affirms that the more extreme the magnitude of initial price movement, the greater will be the subsequent adjustment (De Bondt and Thaler, 1985).

To test this conjecture, De Bondt and Thaler (1985) in their seminal study tested the empirical validity of the overreaction hypothesis using monthly returns of common stocks listed on the New York Stock Exchange during the period of January 1926 to December 1982. They found evidence of overreaction as the loser portfolio

outperforms the market by 19.6% and the winner portfolio earn about 5% less than the market. As a result, they found substantial weak form market inefficiencies where the contrarian strategy of buying loser shares and selling winner shares short, investors can earn significant return of 24.6%. Their findings suggest that the stock market overreacts to relevant news and provides arbitrageurs an opportunity to make abnormal profits.

The findings of De Bondt and Thaler (1985) contradicts the conventional school of thought in finance and caused a stir in the academic world especially hard core believers of the EMH, which then spawned two streams of literature. The first stream of literature supports the notion of market inefficiency due to the evidence of systematic reversal patterns in stock returns in the long-term as well as short-term.

For example, in the short-term, Lehmann (1990) employed a one-week contrarian strategy for securities listed on the New York and American Stock Exchanges from the year 1962 to 1990. He rejected the efficient market hypothesis due to evidence that portfolio of securities that had positive returns in one week had reversed to negative returns in the week after (−0.35 to −0.55% per week on average) and the opposite is true for portfolio of securities with negative returns in one week had reversed to positive returns in the week after (0.86 to 1.24% per week on average). Chou, Wei and Chung (2007) studied the performance of contrarian strategy across various ranking and holding horizons from 1 month (short-term) to 3 years (long-term) for stocks listed on the Tokyo Stock Exchange from 1975 to 1997. They found that contrarian strategies are profitable for very short (1 month) and very long (2 years or longer) ranking and holding horizons. Other literature that supports the

notion that the market is inefficient includes Bowman and Iverson (1998); Bremer and Sweeney (1991); Chiao and Hueng (2005); De Bondt and Thaler (1987); Dhouib and Abaoub (2007); Howe (1986); Iihara et al. (2004); Renshaw (1984); and Richards (1997) to name a few.

The second stream of literature supports the notion of market efficiency and argues that the reversal patterns are attributable to imprecise measurement of risk, size effect, seasonality, as well as failure to incorporate transaction cost (Assoe and Sy, 2003; Atkins and Dyl, 1990; and Chan, 1988; Jones, 1987; and Zarowin, 1990).

For example, Chan (1988) claims that the risks of winner and loser stocks are not constant over time where loser stocks become riskier at the end of the formation period due to increase in financial and operational leverage as well as loss of economies of scale. He replicated De Bondt and Thaler's (1985) research and showed that large changes in betas from the rank period to the test period where losers' betas increase with an average gain of 0.231; winners' betas decrease with an average of 0.222 and arbitrage portfolio (losers-winners) with an average gain of 0.453. Thus, when risk changes are controlled, they found only small abnormal returns of − 0.095%, –0.229% and 0.133% per month for the loser, winner and arbitrage portfolios which were not significant.

Zarowin (1990) claims that the superior performance of loser portfolio over winner portfolio in many of the overreaction literatures is not caused by investor overreaction but due to size discrepancies between winners and losers. He explains that losers are usually smaller firms since they have lost market value relative to

winners. Zarowin (1990) replicated De Bondt and Thaler's (1985) research with control for size differences between winners and losers during the period of January 1927 to 1977. His results revealed that losers outperform winners only in January with Jensen's alpha estimate of 0.017, which is consistent with the January phenomenon but not with the overreaction phenomenon because outside of January (February to December, Jensen's alpha estimate = −0.0001), there is no difference between the performance of losers and winners.

Atkins and Dyl (1990) examined the behaviour of three common stocks that exhibited largest percentage loss and three with largest percentage gain during a single trading day and found there is evidence of overreaction but the magnitude of overreaction is relatively small compared to transaction cost. The average bid-ask spread for the sample of stock for large price decline was 3.57%, which was much larger than the 2.26% two-day abnormal return found for these stocks. They concluded that the market is efficient after incorporating transaction cost.

So far the evidence discussed above is mainly from the U.S. It should be noted that "winner-loser" reversal is not restricted to the U.S., as evidence have been found in many Asian countries. For example, Iihara et al. (2004) who found significant short horizon (1 month) return reversals for stocks listed on the Tokyo Stock Exchange during the period of 1975 to 1997. Ratner and Leal (1998) examined daily index returns from 1982 to 1995 for ten of the largest emerging markets which include Argentina, Brazil, Chile, India, Korea, Malaysia, Mexico, Philippines, Taiwan and Thailand. They found reversals occurring in some emerging markets such as Korea,

Thailand, Argentina and Mexico with weak evidence of reversal at the 10% level of significance.

1.3   Problem Statement

The overreaction phenomenon provides an interesting area of research as it has implications towards the weak form EMH and argues informational inefficiency where past returns can be used to predict future returns. If this is the case, then the outcome of this hypothesis is that mechanical trading rules could be used to earn arbitrage profits.

In Malaysia, there have been several researches that documented the overreaction phenomenon and provide evidence that the financial markets are not completely efficient. Studies conducted by Ahmad and Tjan (2004); Hameed and Ting (2000); Lai (2002); Lai, Krishnan and Mat Nor (2003); Mohd Arifin and Power (1996) and Nam, Pyun and Kim (2003) found that overreaction does exist and attributes the phenomenon to investor sentiments such as overconfidence and irrationality.

However, the problem remains that most analysis conducted in Malaysia to test for market overreaction was conducted in the past decade, roughly during the period of 1989 to 1999. Most of the research conducted during this period was to gauge the effect of overreaction during the bullish period prior to the financial crisis (January 1992 to December 1993) and the bearish period during and after the financial crisis (July 1997 to July 1999). The movement of the KLCI before and after the financial crisis is captured in Figure 1.1 below. According to Okposin and Cheng (2000) as

cited in Lai (2002), the KLCI dropped by 75.65% to the level of 262.70 points over 1st July 1997 to 1st September 1998. Ahmad and Tjan (2004) reported that during July to December 1997, the reversals observed in the Malaysian stock market was much more pronounced especially for the winner portfolio that exhibited excess returns of −8.24% (t-statistic = 8.289). Due to the fact that the Malaysian stock market is less sophisticated compared to developed nations, speculations frequently occurs and price trends tend to be influenced by rumours and as a result exhibited overreaction.
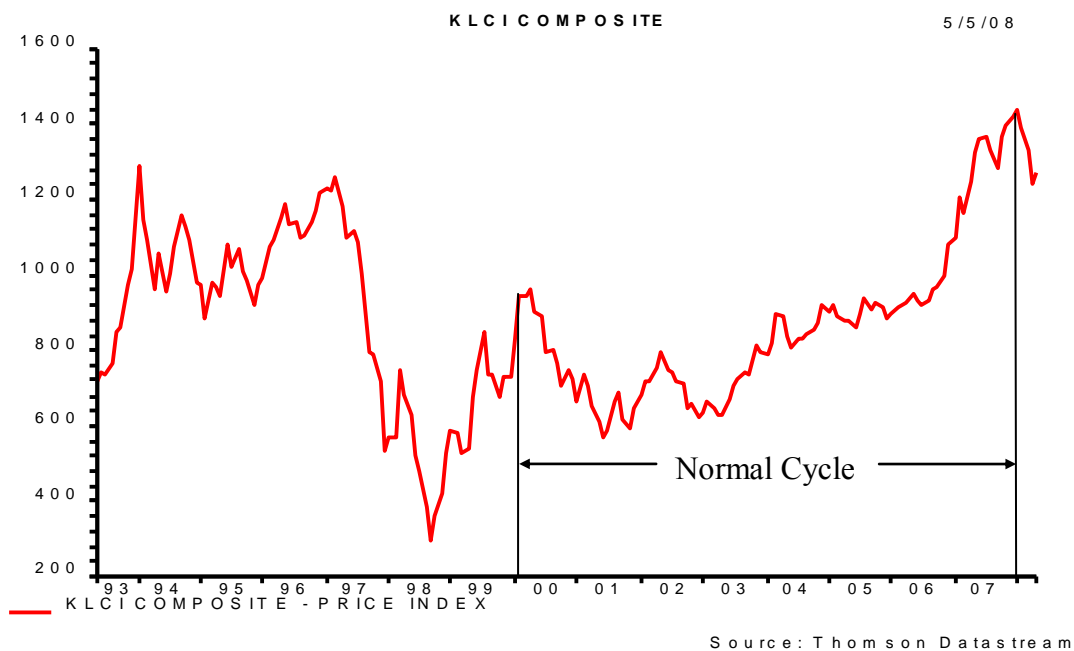
Figure 1.1. Kuala Lumpur Composite Index (KLCI) during 1993-2007
Source : Thomson Financial DataStream

But the question remains, how will the Malaysian market fair during a normal cycle as shown by the upward trend of the KLCI during the period of 2000 to 2007 in Figure 1.1 above? Would investors be able to find the same pattern of reversals as documented by research conducted during the 1990s?

It would be interesting to assess the market during a normal cycle where there is less disturbance created by a crisis. This is due to the fact that a crisis, especially the one experienced during the Asian financial crisis, does not occur very frequently and most of the time, the market portrays a normal cycle where prices do not show very rapid changes with the usual peaks and retracements of the KLCI. The information provided by this research can be used by investors and analysts alike to make decisions on how to go about investing during similar periods in the future.

Furthermore, in the aftermath of the Asian crisis, Malaysia is now entering the phase of readjustment and heading towards strong economic fundamentals. Thus, this research fills the gap by examining the overreaction phenomenon during the post-crisis period of 2000 to 2007. As a result, this research provides information to the average investor as well as analyst who might want to gauge how the market moves during a normal cycle as well as use the information provided to benchmark against other periods, not only the period covered by this study, to determine whether overreaction phenomenon occurs during a normal cycle. Thus, when a market falls into a crisis period or when the market recovers after the crisis in the future, investors can use the data from this research as well as data from prior research during the 1990s to provide an understanding of the movement of stocks and plan their investment strategy accordingly instead of plugging in based on pure instinct alone.

If the overreaction hypothesis holds true during a normal cycle period, another prevailing issue should be taken into consideration. Can investors make contrarian profits by simply observing the patterns in the market? Will these patterns be consistent over time? For an arbitrageur, the objective would be to discover patterns

and anomalies such as price reversals using simple trading rules to ensure the possibility to earn as much abnormal profits particularly in the short-term.

There have been some discrepancies in this area. Ahmad and Tjan (2004) examined the incurrence of short-term overreaction in the Kuala Lumpur Stock Exchange from January to December 1997. Their findings conclude that some degree of reversals do occur when comparing performance of winner and loser portfolios from the ranking period to the test period, but taking advantage of the reversals using contrarian strategy seems futile because it does not offer positive excess returns, which verifies similar findings by Mohd Arifin and Power (1996). Lai (2002) on the contrary, assert that contrarian strategy yield significant returns. For example, the arbitrage portfolio for the 12-month contrarian strategy revealed to be the most profitable with a return of 21.97%. It would be interesting to conduct more analysis during a more recent period to shed some light into this matter.

Another factor that should be considered when evaluating contrarian strategy is transaction cost which involves the bid-ask spread. As mentioned earlier, Atkins and Dyl (1990) found that there is evidence of overreaction but the magnitude of overreaction is relatively small compared to the bid-ask spread. They concluded that the market is efficient after incorporating the bid-ask spread. Assoe and Sy (2003) and Bhardwaj and Brooks (1992) came to the same conclusion. Assoe and Sy (2003) mentions that though the winner, loser and arbitrage portfolio show signs of reversals, but exploiting this anomaly does not yield excess profits after the incorporation of transactions cost. Hameed and Ting (2000) on the contrary, assert that the contrarian strategy yields significant trading profits in the Malaysian stock market of 0.12% per

month. It should be noted that Hameed and Ting (2004) used a different methodology proposed by Lehmann (1990) which is discussed in Section 2.2.2.

Taking into consideration all the factors mentioned above, therefore this study attempts to provide empirical evidence on the short-term overreaction phenomenon as test for market efficiency of stock prices listed on the Bursa Malaysia during the period of January 2000 to December 2007. Further, this research attempts to determine whether exploiting these anomalous patterns using simplistic or mechanical trading rules offer arbitrageurs abnormal profits as well as resolve the issue whether these profits will still be prevalent or diminish after incorporating transaction cost.

1.4   Research Objectives

As mentioned earlier, the occurrence of the overreaction phenomenon has been documented in Malaysia but most of the studies were focused towards the past decade especially during the pre-crisis and crisis period with little empirical research examining it during post-crisis period. It would be interesting to compare the results of more recent findings with those from the past to gain more understanding on price movements of stocks and market efficiency. Thus, the first objective of this study will look into the overreaction phenomenon by examining short-term behaviour of common stocks listed on the Bursa Malaysia over the period of January 2000 to December 2007.

If the overreaction hypothesis holds true during this period, the second objective of this study is to determine whether investors can exploit this anomaly to make contrarian profits by buying losers and short selling winners. The final objective that

this research desires to achieve is to determine whether contrarian profits are feasible after incorporating transaction cost.

1.5 Research Questions

In order to achieve the research objectives mentioned earlier, this study will try to answer the following research questions:

1. Does the Malaysian stock market exhibit overreaction in the short-term for the period of 2000 to 2007?

2. Could investors earn contrarian profits by exploiting the overreaction anomaly?

3. If investors could earn contrarian profits, will these profits be significant after incorporating transaction cost?

1.6 Definition of Key Terms

This section describes the definition of key terms used in this study.

1.6.1 Market efficiency

Market efficiency refers to the tendency of stock prices in a market to rapidly and fully incorporate new and relevant information (Megginson et al., 2007).

1.6.2 Anomalies

Patterns of returns than seem to contradict the efficient market hypothesis (Bodie, Kane, and Marcus, 2005).

1.6.3 Price reversal

The behaviour of stock prices where positive returns tend to be followed by negative returns in subsequent periods and vice versa (De Bondt and Thaler, 1985).

1.6.4 Abnormal return

Return on a stock beyond what would be predicted by market movements alone. Abnormal return for a given security is the difference between the return observed and the expected return (Atkins and Dyl, 1990).

1.6.5 Cumulative abnormal return (CAR)

The cumulative abnormal return is the total abnormal return for the period surrounding an announcement or the release of information (Bodie, et al., 2005).

1.6.6 Contrarian strategy

Contrarian strategy is the purchase of securities that have performed poorly in the past and the short sell securities that have performed well to earn positive expected profits (Lo and MacKinlay, 1990).

1.6.7 Bid-ask spread

Bid-ask spread represent the minimum cost of transacting which refers to the difference between a dealer's bid and asked price (Bodie, et al. 2005).

1.7   Significance of the Study

Academically, fewer propositions in economics and finance are held with more fervour than the view that financial markets are efficient. Much literature supports the notion that markets are efficient even with the evidence of overreaction phenomenon. In the broad sense this study is significant in determining if asset prices of the local financial market fully reflect all historically available information as presented by the weak form efficient markets hypothesis.

This study is also significant in a sense that it attempts to analyze the implications of price reversals, which is aimed at discovering arbitrage profits that could be earned if investors react in time by identifying anomalous patterns of prior "winners and losers". Investors could take a long-position from prior loser stocks that have previously exhibited abnormal negative returns in anticipation that the losers will subsequently yield higher positive market-adjusted returns; or a short-position from prior winners that have previously exhibited abnormal positive returns in anticipation of a subsequent fall in price.

In addition, as mentioned earlier, this research provides an opportunity to examine the Malaysian market during a normal cycle that is during the post-crisis period 2000 to 2007. The information can be used by the average investor who might want to gauge how the market moves during a normal cycle. Therefore, this study can be used as a guide by both analyst and investors to build their investment strategies accordingly.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

The efficient market hypothesis (EMH) was first introduced by Eugene Fama in 1970 with the notion that stock prices reflect all available information. Since then, the EMH provided the theoretical basis for many of the financial market research during the seventies and eighties which proved prices follow a random walk and the predictable variations in equity returns, if any, were found to be statistically insignificant.

The major implication of the EMH is that all available information is quickly assimilated into stock prices. Thus, past price information cannot be used to predict future prices because prices follow a random walk and can be expressed as follows:

$E(P_t) = P_0 + e_t$

Where, $E(P_t)$ is the expected price of an asset in the next period ($t>0$) and P_0 is the present price of the asset ($t<0$) and e_t is the random error term which has an expected value of zero.

Fama (1970) further distinguished between three forms of the EMH: the weak, semi-strong and strong form of the hypothesis based on the type of information market prices reflect. The most extreme version of the EMH is the strong form of the hypothesis which suggests that prices reflect all available information, both public and private.   The semi-strong form of the EMH asserts that security prices reflect all publicly available information. When new information is released, it is fully

incorporated into stock prices and thus, technical trading rules of searching for undervalued or overvalued securities are incapable of generating abnormal returns. The weak form of the hypothesis implies that stock prices already reflect all historical information including past trends and as a consequence, using these price trends to predict future trends is deemed futile.

Things took a turn lately, as there have been proliferations of research questioning the validity of the EMH. Recent developments in behavioural finance have given rise to alternative hypotheses that contradict the efficient market hypothesis. One such hypothesis is the overreaction hypothesis brought forth by De Bondt and Thaler (1985, 1987) as described in the previous chapter. The overreaction hypothesis suggests that stock prices moves in a predictable pattern and these patterns could be identified and exploited profitably by the average investor.

As a result of the revelation of the overreaction hypothesis, it initiated two streams of literature; those that support the notion of market inefficiency due to evidence of systematic reversal patterns in stock returns in the long-term as well as short-term; as opposed to those that support the notion of market efficiency and argues that the reversal patterns are attributable to imprecise measurement of risk, size effect, seasonality as well as failure to include transaction cost.

This chapter began with the introduction of the EMH as well as overreaction hypothesis. Next, this review attempts to analyze the substantive literature on overreaction phenomenon. It separates short-term from long-term effects of many market-based studies and considers the evidence of price reversals in a number of

countries. This review also attempts to examine the outcomes usually associated with the overreaction effect to considerations of size, risk, seasonality and transaction cost. Finally, the summary will conclude this chapter.

2.2   A Review of the Overreaction Phenomenon

The overreaction hypothesis is defined as overresponse to new information based on the notion that many investors are poor Bayesian decision makers (De Bondt and Thaler, 1985). The Bayesian hypothesis states that individuals use conditional probabilities for changing beliefs on the basis of new information (Arnold and Baker, 2007). In other words, when investors receive new information, they update their beliefs correctly, in a manner of using conditional probabilities. Kahneman and Tversky (1972) as cited in De Bondt and Thaler (1985) claim that such high levels of rationality are not an accurate characterization of how individuals behave when faced with new data.

De Bondt and Thaler (1985) connected the findings of Kahneman and Tversky (1972) with stock market movements especially the occurrence of price reversals. Thus, the authors provided a new avenue of incorporating behavioural characteristics to explain an anomaly in finance. The overreaction hypothesis suggests that individuals when revising their beliefs tend to overweight recent information and underweight prior data. As a result, they overreact to recent unexpected, dramatic and salient news. When this happens, prices tend to overshoot their fundamental values. When investors realize that they have actually overreacted, they make corrective measures and soon the prices would revert back to equilibrium. Due to this, the hypothesis suggest that stock prices actually portray a mean-reversion pattern; that is,

extreme movements in stock prices will be followed by subsequent price movements in the opposite direction to correct the initial overreaction as well as the more extreme the magnitude of initial price movement, the greater will be the subsequent adjustment.

De Bondt and Thaler (1985) in their seminal study tested the empirical validity of the overreaction hypothesis using monthly returns of common stocks listed on the New York Stock Exchange during the period of January 1926 to December 1982. During the portfolio formation period, they ranked order the performance of stocks based on their three-year cumulative market-adjusted excess returns. The 35 stocks with the largest positive excess returns are assigned to the winner portfolio and 35 stocks with the largest negative excess returns are placed in the loser portfolio. They then tracked the excess returns of both portfolios over the next 3-year period. They reported substantial weak form market inefficiencies as the simple strategy of buying loser shares and selling winner shares short, investors can earn substantial return of 24. 6% —of which 19.6% is attributable to the appreciation of loser shares and 5% was the gain from short selling winner shares. They believed that the return was not significantly diminished by transaction costs associated with the purchase and the sale of these shares.

Many issues regarding the overreaction effect in De Bondt and Thaler's (1985) research were left unresolved especially the seasonality effect where large positive excess returns earned by the loser portfolio every January as well as other factors that might contribute to the overreaction effect such as firm size and risk. To address

these issues, De Bondt and Thaler (1987) re-examined their 1985 research but this time incorporated the factors mentioned earlier.

To address the seasonality effect, they examined the portfolio formation periods and found that for losers, there seems to be seasonal patterns that resemble that of the test period. They conclude that this finding is consistent with the magnitude effect brought forth by the overreaction hypothesis where extreme initial winners and losers exhibit extreme subsequent price reversals. Using Spearman rank correlations, they test the magnitude effect between the entire formation period and first five years of the test period and found that for the loser, the correlations are significantly different from zero indicating magnitude effect but the opposite seems to be true for the winners. In response to the change in risk of winner and loser stocks that are not constant over time; they regressed the annual arbitrage portfolio that finance the purchase of losers by selling winners short ($R_{At} = R_{Lt}-R_{Wt}$) on the market risk premium, ($R_{At} = \alpha_A + \beta_A (R_{mt}-R_{ft}) + \varepsilon_{At}$) for each year of the trading strategy test period. The result of the study indicated that the coefficient on the market risk premium β_A was 0.220 which implies that the beta of loser portfolio was larger than the beta of winner portfolio over the test period but they argued that the difference in risk was not sufficient to explain all of the return on the arbitrage portfolio, since the Jensen performance index measure, α_A that measures the abnormal return on the trading strategy was statistically significant at 5.9% per month. As for the size effect, they formed portfolios based on quintiles and deciles and examined the performance of the portfolio in the test period. They conclude that even when portfolios are sorted based on size; the losers have positive excess returns whereas the winners have negative excess returns.

19

The stock market overreaction hypothesis has been investigated over a wide array of time horizons. There are two varieties of the overreaction phenomenon, those observed in long-term and those observed in the short-term. The findings for both horizons will be discussed in the following subtopics.

2.2.1 Long-Term Overreaction

Other than the findings of De Bondt and Thaler (1985, 1987) discussed above, there are several other researchers who examined the long-term overreaction. Gunaratne and Yonesawa (1997) conducted a test for overreaction on the Tokyo Stock Exchange (TSE) using monthly return data (including dividends) during the period of 1955 to 1990. They constructed 20 portfolios of equal number of stocks using a 2-year ranking period and analyzed the performance of the portfolios during the 4-year test period. They used the market model regression ($r_{pt} - r_{ft} = \alpha_p + \beta_p (r_{mt} - r_{ft}) + e_{pt}$) proposed by Black, Jensen and Scholes (1972) to compare the portfolios performance between the ranking period and test period. Their result indicated that return reversal behaviour is very strong phenomenon in the Japanese market. The highest performing winner portfolio (portfolio 1) showed a 3.573% decrease in its average monthly returns from the ranking to the test period. Conversely, the lowest performing loser portfolio (portfolio 20) showed a 2.727% increase. They further asserted that on average, ranking period losers have outperformed the ranking period winners by 1.105% (t = 4.921) per month during the test period. Over the four-year test period, losers outperform winners by about 54% in terms of total returns. Their research also revealed that a costless portfolio constructed with winners and losers at the beginning of the test period would earn 11.052% on average per annum in terms

of risk-adjusted abnormal returns. They conclude that the figure is substantial enough to justify economic significance of the overreaction effect.

Starting January 1929 to December 1985, Loughran and Ritter (1996) ranked monthly returns of stocks listed on the American and New York Stock Exchange (AMEX and NYSE) with 36 continuous prior months of returns. During the 58 overlapping three-year test period, the winner and loser portfolios include 35 firms each with the highest and lowest raw returns over the 36-month formation period respectively. The researchers used two different methodologies, CARs and holding periods returns to determine the ranking-period returns and to measure test period performance. Other than this, price and market capitalization data was also obtained on the last trading day of the formation period. Their results indicated loser stocks had reverted from –57% during the 3-year ranking period to 88.5% during the 3-year test period using the holding return method and 78.2% using the CARs method. The winner portfolio on the other hand, had reversed from 429.8% to 45.7% during the 3-year test period using the holding return method and 40.7% using the CARs method. They conclude that there is little difference in test-period returns whether CARs or holding period returns are used. They also found that low-priced stocks had reverted from 10.4% during the ranking period to 102.2% during the test period and the opposite is true for high-priced stocks where it had reverted from 104.9% during the ranking period to 35.5% during the test period.

Richards (1997) examined "winner-loser reversals" using end-of month data from Morgan Stanley Capital International (MCSI) indices during the period of December 1969 to December 1995. Sixteen national stock market indices where

examined that include Australia, Austria, Canada, Denmark, France, Germany, Hong Kong, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom and U.S. The methodology that they adopted is somewhat similar to De Bondt and Thaler (1985) but the focus was on return indices which were treated as 16 different assets. Their research also differed from De Bondt and Thaler (1985) in several aspects such as using buy-and-hold returns as opposed to CARs; average portfolio returns were calculated using geometric average of the return relatives of all test outcomes; they used overlapping data as opposed to non-overlapping data to increase the statistical significance of the test and finally they used simulated measures such as bootstrapping rather than theoretically derived critical values to asses the statistical significance of the returns on the contrarian portfolio.

Their results indicated that 3- and 4-year horizons show the highest returns to the contrarian strategy with average annual returns of 6.4 and 5.8%. These results are due to return reversals for both winners and losers. They also do not support the notion that the reversals are due to risk differentials. During the test period, there is no evidence supporting the fact that prior losers were significantly riskier than prior winners either in terms of their standard deviations and their correlations with the world market return. However, there is evidence that winner-loser reversals were larger for smaller markets especially Norway and Denmark with differentials of 23.5% and 16.8% per annum respectively.

2.2.2 Short-Term Overreaction

The short-run overreaction arises from investor's reactions to unanticipated company news which may be good or bad. The reactions of the investors cause

temporary overshooting of the equilibrium value of the share price of the affected company (Power and Lonie, 1993). Researchers who have analysed the short-term overreaction effect have used a variety of possible portfolio formation and test periods, namely, daily, weekly and monthly. Using daily, monthly or weekly data, Atkins and Dyl (1990); Bowman and Iverson (1998); Chiao and Hueng (2005); Howe (1986); Iihara et al. (2004); Lehmann (1990); Renshaw (1984); Wang, Burton and Power (2004); and Zarowin (1989) show that reversal pattern exists in the shorter periods as well.

Zarowin (1989) inspired by the long-run effect of size from his earlier research (but published later in 1990), investigated whether the same was true for the short-run. He examined short-term overreaction in the U.S. during the period of October 1927 to December 1985 by ranking stocks based on top and bottom deciles of their 1-month average risk-adjusted returns and formed ten portfolios with portfolio 1 representing the loser stocks and portfolio 10 representing the winner stocks. He then tested for price reversals in the subsequent month by calculating the abnormal returns for the winner and loser portfolios as well as the arbitrage portfolio (loser-winner). His result indicates that short-run contrarian strategy earned a statistically significant average abnormal return of 2.5% per month (t-value= 10.54) and concluded that the market is weak form inefficient in the short-run.

Wang et al. (2004) conducted a detailed test for overreaction using data from the Shanghai and Shenzhen markets over six years from 1_{st} August 1994 to 31_{st} July 2000. They first ranked the shares in descending order based on their abnormal returns in week t using the conventional market-adjusted model and assigned the top 25 shares

to the winner portfolio and bottom 25 shares to the loser portfolio and then averaged the weekly abnormal returns for both portfolios. Subsequently, the performance of the portfolios was observed for the next 20 weeks by computing the cumulative market-adjusted abnormal returns. They found during the rank period, winner shares outperformed the market by 10.74% whereas loser shares underperformed the market by –9.04%. During the test period, price reversals were observed especially during the first week as winners underperformed the market by 0.55%, while loser outperformed the market by 0.52% and the loser-winner portfolio earned a significant return of 1.07%.

Iihara et al. (2004) examined the winner-loser effect using stocks listed on the Tokyo Stock Exchange (TSE) from 1975 to 1997 using the framework proposed by Jegadeesh and Titman (1993) where five equally weighted portfolios ranked on past performance extending back to 1, 6, 12, 36 and 60 months prior to portfolio formation ($J = 1, 6, 12, 36, 60$) and held for five holding periods corresponding to each formation period ($K = 1, 6, 12, 36, 60$). They observed significant return reversal for all formation periods with average returns for the winner portfolio fall from 3.7% to 1.0% and average returns of the loser portfolio rise from 0.3% to 2.3%. The loser portfolio returns exceeded winner portfolio returns for all horizons.

Lehmann (1990) using all shares on the NYSE and the AMEX between July 1962 and December 1986, utilized a different research methodology to prove market inefficiency. He formed portfolios that involved taking short positions in shares that had experienced recent price increases and long positions on shares that had experienced recent price decreases. He set the weights $w_{i,t-k}$ so that they are negative