PRICE RANDOMNESS, CONTRARIAN AND MOMENTUM STRATEGIES: A STUDY OF RETURN PREDICTABILITY IN THE MALAYSIAN STOCK EXCHANGE

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PRICE RANDOMNESS, CONTRARIAN AND MOMENTUM STRATEGIES: A STUDY OF RETURN PREDICTABILITY IN THE MALAYSIAN STOCK EXCHANGE

by

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Kerawakan Harga, Strategi Kontrarian dan Momentum: Suatu Kajian Peramalan Pulangan Dalam Pasaran Saham Malaysia

Abstrak

Dengan menggunakan data harian daripada firma-firma yang tersenarai di Papan Utama pasaran saham Malaysia untuk tempoh Januari 1988 sehingga Oktober 2002, kajian ini berusaha untuk melihat peramalan pulangan dari pasaran saham Malaysia. Secara lebih khusus, kajian ini berusaha untuk mengkaji sama ada pasaran saham Malaysia dapat diramal (pulangannya) dengan menggunakan maklumat harga yang lepas. Ada tiga peringkat yang terlibat dalam kajian ini. Pertama, kajian ini menyiasat kebarangkalian harga-harga saham dengan menggunakan ujian nisbah varian. Kajian ini mendapati pulangan ke atas saham Malaysia tidak mengikut urutan rawak dalam jangka waktu pendek mahupun jangka waktu sederhana iaitu selama julat satu, dua dan tiga bulan. Dalam peringkat kedua, kajian ini meneliti kadar keuntungan kontrarian serta strategi-strategi momentum dengan menggunakan kaedah yang serupa dengan Jegadeesh dan Titman (1993). Kajian ini menunjukkan bahawa strategi kontrarian berhasil untuk jangka waktu pendek, iaitu satu bulan untuk “ranking” dan satu bulan juga untuk jangka waktu menguji strategi. Manakala, strategi momentum adalah lebih menguntungkan pada jangka waktu sederhana iaitu dua bulan untuk “ranking” dan pengujian strategi, juga tiga bulan untuk “ranking” dan tiga bulan untuk tempoh pengujian. Peringkat yang terakhir adalah meneliti ciri-ciri kesan kontrarian dan momentum, iaitu apakah faktor-faktor yang menetukan magnitud keuntungan kontrarian dan momentum. Ciri-ciri itu adalah saiz firma, nisbah B/M dan volum pusingganti dagangan, serta ciri-ciri bukan-firma seperti risiko pelbagaian masa, musim dan kitaran ekonomi. Kajian ini menemukan keuntungan kontrarian jangka pendek kekal menguntungkan walaupun selepas mengawal ciri-ciri bukan-firma, iaitu risiko pelbagaian waktu, musim, dan kitaran ekonomi. Berkenaan dengan ciri-ciri firma, keuntungan kontrarian hanya muncul dalam firma saiz kecil dan yang memiliki saham yang lebih menonjol serta B/M yang tinggi, dan volum pusingganti dagangan yang

tinggi. Sementara itu, keuntungan momentum adalah lebih menonjol untuk firma yang kecil, nisbah B/M rendah, pusingganti dagangan yang tinggi, serta keadaan ekonomi yang memberangsangkan. Keuntungan momentum akan hilang selepas kawalan ke atas perubahan dalam risiko dan kemusiman.

ABSTRACT

Using daily data of firms listed on the Main Board of the Malaysian stock market for the period January 1988 through October 2002, this study looks at the predictability of returns in the Malaysian stock market. More specifically, the study attempts to investigate whether the Malaysian stock market is predictable using past or historical price information. There are three stages in this investigation. First, the study investigated the randomness of stock prices by using the variance ratio test. The study finds that the stock returns in the Malaysian stock market does not follow a random walk in the short and medium terms i.e. one-month, two-month and three-month intervals, respectively. In the second stage, the study examined the profitability of contrarian and momentum strategies by employing a strategy quite similar to Jegadeesh and Titman (1993). The study reveals that a contrarian strategy appears to work for the short-term, i.e., one-month ranking and one-month testing period strategy. Whereas, momentum strategies are profitable at the medium term i.e. for both two-month ranking and two-month testing periods, and three-month ranking and three-month testing periods. The last stage was to further investigate the characteristics of contrarian and momentum effect, namely what factors determine the magnitude of contrarian and momentum profits. These factors include firm characteristics such as firm size, book to market (B/M) ratio and trading volume turnover, and non firm-characteristics such as time varying risk, seasonality and business cycle. The study found that the short-term contrarian profits remain profitable even after controlling for non-firm characteristics i.e. time varying risk, seasonality and business cycle. With regards to firm characteristics, contrarian profits only exist in small size firms and are more pronounced for stocks with high B/M, and high trading volume turnover. Whereas, momentum profits are more pronounced for firms of smaller size, low B/M ratio, and high trading volume turnover, and during upturn economy. Momentum profits disappear after controlling for change in risk and seasonality.

Chapter 1

INTRODUCTION

1.1 Research Background

A test of return predictability has important implications for asset pricing and market efficiency theories. Under an efficient capital market, equity prices reflect currently available information and therefore one should not be able to predict future returns using historical price data. On the other hand, if returns are predictable, it could imply market inefficiency unless the predictable variation can be reconciled with equilibrium asset-pricing models.

The theoretical support of the test for the predictability of security returns are based on the idea that security prices follow a random walk, whereby price changes cannot be predicted in an efficient market. A large body of empirical works has tested stock price randomness by using variance ratio test (VR). Lo and MacKinlay (1988) were the first to propose the variance ratio test to test for random walk, and argued that the variance ratio test was more powerful than the well-known Dickey-Fuller unit root and the Box-Pierce Q tests. This was supported by Campbell, Lo and MacKinlay (1997). If the variance ratio is equal to one, it implies that the returns follow random a walk. Otherwise, the random walk hypothesis will be rejected. In addition, if the estimated variance ratio is less than one, it implies negative returns autocorrelation or mean reversion of returns. Alternatively, if the values are greater than one, it implies positive returns autocorrelation or mean aversion of returns. (Grieb & Reyes, 1999).

Lo and MacKinlay (1988) and Poterba and Summer (1988) studied equity returns in the US as well as 17 other countries, and found that there is positive autocorrelation at medium horizon and negative autocorrelation over longer horizon using variance ratio test.

In emerging markets, Urrutia (1995) employed the variance ratio test to investigate the random walk hypothesis for four Latin American equity markets, namely, Argentina, Brazil, Chile and Mexico. His findings revealed that the random walk hypothesis could be rejected for the Latin American emerging markets. This result is in line with Claessen, Dasgupta and Glen (1993) who uncovered variance-ratios larger than one for emerging markets.

Some recent studies in the Malaysian stock market to test random walk by employing variance-ratio test were conducted by Mat Nor, Ming and Hussin (2002) and Salim and Ali (2002). They showed that the Malaysian stock market did not follow random walk.

When return autocorrelations are positive and statistically significant, investors could generate positive and significant profits by using the momentum strategy (Barberish, Shleifer & Vishny, 1998). Otherwise, if return autocorrelations are negative and statistically significant, investors could earn profits by using the contrarian strategy (Daniel, Hirshleifer & Subramahnyam, 1998). Thus, the variance ratio may also suggest that there exists profit opportunities for contrarian and momentum strategies (Pan, Liano, & Huang, 2004).

A contrarian strategy arranges stocks based on their performance over some previous period and suggests buying past losers and selling past winners. This strategy is based on the premise that the market overreacts to information. A momentum strategy makes an equivalent ranking but recommends buying past winners and selling past losers. This is based on the premise that the market underreacts to information.

The profitability of contrarian and momentum strategies has been tested in many equity markets. Contrarian strategies have been documented in the long-term and short-term periods for the UK, the US and other countries as well. One of the most important early test of contrarian strategy is by DeBondt and Thaler (1985) in the US. They based their research on the evidence in experimental psychology studies, suggesting that most people overreact to unexpected and dramatic events. They tested whether the same thing occurs in the stock market. Their study points out that portfolio of prior extreme “losers” dramatically outperform prior extreme “winners” even if the latter are more risky. In other words, the work of DeBondt and Thaler found a long-horizon reversal in stock return.

Profits generated by the long-term contrarian strategies are seen not only in the US market, but also in stock markets across the world such as the UK, the France, Germany, and Australia; (Clare & Thomas, 1995; Gaunt, 2000; Munt, Vasconcellos & Kish, 1999). There are also some studies that investigate the overreaction hypothesis in the securities of Pacific-Rim markets like Hong Kong and Malaysia (Ahmad & Hussain, 2001; and Kwok-Wah, 1999).

Some evidence of contrarian strategies are also documented in the short term. For example, Howe (1986), using daily stocks returns data from CRSP tape, finds that the evidence is strongly consistent with the overreaction hypothesis. Zarowin (1989) ranks common stocks according to their performance during a given month, and finds that in the subsequent month a portfolio of the past month losers outperforms a portfolio of the past month winners. Bowmen and Iverson (1998) find that the stock market significantly overreacts and the result is affected by risk, size, seasonality and bid-ask bounce. Schnusenberg and Madura (2001) investigate the short-term over-or underreaction of six U.S. stock market indexes and reveal that strong evidence of a stock market underreaction for winner but an overreaction for losers.

With regards to the Malaysian stock market, Arifin and Power (1996) found some evidence of short-run overreaction in share price, particularly in the first two weeks after portfolio formation date. Hameed and Ting (2000) found that there is a relationship between the short-term contrarian profits and the level of trading activity.

Subsequent studies of contrarian strategies have sought explanations for the return reversal. The followings are some of the explanations put forward in the literature: (i) overreaction (DeBondt & Thaler 1985, 1987); (ii) the size effect (Zarowin 1990, Clare & Thomas, 1995; Dissainake, 1997); (iii) seasonality effects (Chopra, Lakanishok & Ritter, 1992); (iv); trading volume (Condrad, Hameed & Niden, 1994; and Hameed & Ting, 2000); (v) change in risk (Chan, 1988, Ball & Kothari,1989) and microstructure biases (Atkins & Dyl, 1990; and Conrad, Gultekin & Kaul, 1997); (vi) behavioral aspects (Barberis et al.,1998; Daniel et al., 2001) and (vii) failing to account for transaction costs required to implement the strategy (Conrad, Gultekin & Kaul , 1997).

In contrast to contrarian studies, there are studies looking at the success of buying past winners and selling past losers. This so-called momentum strategy is the opposite of contrarian strategy described above. Jegadeesh and Titman's study (1993) is among the earlies studies to test the momentum strategy. They documented significant positive returns when stocks are bought and sold based on short-to medium-run historical returns. They found that the 6 x 6 momentum strategy (sixth-month ranking, sixth-month holding period) generates returns of about 1% per month. They documented that past winners on average continue to outperform past losers, so that there was momentum in stock prices.

The evidence of momentum in stock prices over the medium terms is well accepted and supported for the developed market in the US. For instance, see Chan, Jegadeesh and Lakonishok (1996, 1999), Chordia and Shivakumar (2002), Hong and Stein (1999), Moskowit and Grinblat (1999), O'Neal (2000), Lewellen (2002), Cooper, Gutierrez and Hameed (2004) etc. Similar results are found on other stock markets outside the US as well**;** see for example, Schiereck, Debondt and Weber (1999), Rouwenshort (1998, 1999), Liu, Strong and Xu (1999), Chan, Hameed and Tong (2000), Glaser and Weber (2001), Demir, Muthuswamy and Walter (2004), etc. However, these papers did not cover the same period of time and the methodologies used to detect momentum were not uniform.

From previous studies, the source of the profit and the interpretation of the evidence are also widely debated. One of the theory that explains momentum effect is behavioral or non-risk based. They argue that momentum profits provide strong evidence of market inefficiency, and are due to stock price underreaction to information. Some studies found that the source of profit is related to firm characteristics i.e. size (Chui, Titman & Wei, 2000; Hameed & Yuanto, 1999;), book to market ratio (Hong & Stein 1999; Lewellen, 2002), and trading volume turnover (Lee & Swaminathan, 2000; Rouwenhorst, 1999;). Another theory is provided by the efficient market supporters who argue that risk is the main source of momentum profits (Chordia & Shivakumar, 2002; Conrad & Kaul; 1998; Grundy & Martin, 2000; Jegadeesh & Titman, 2001).

The success of contrarian and momentum strategies above could actually be a test of the weak form efficient market hypothesis. These strategies may imply that the markets are not efficient as future price are predictable by using past prices.

1.2 Problem Statement

The evidence on return predictability is, as Fama (1991) notes, among the most controversial aspects of the debate on market efficiency. There has been a growing list of literature on whether these returns patterns reflect an improper response by market participants to information (Barberis et al., 1998; Daniel et al., 1998; Hong & Stein, 1999) or whether they can be explained by risk (Condrad & Kaul; 1998; Grundy & Martyn, 2001). According to the efficient market theory, investors cannot earn extra returns without bearing extra risk and that using information based on past stock prices does not help investors to earn extra returns. Therefore, momentum and contrarian strategies present a challenge to the efficient market theory in this perspective, i.e. by proving that abnormal returns could be earned by taking advantage of underreaction and overreaction of prices without bearing extra risk.

The contrarian and momentum strategies have been investigated in many equity markets but relatively very few research studies of the strategies have been carried out in the context of emerging markets. However given the special characteristics of emerging capital markets, namely thin trading, low liquidity, possibly less informed and rational investors, and having low correlation with other emerging markets and developed market, one would expect more return predictability in these markets (Harvey, 1995). He also concludes that emerging markets are less efficient than developed markets and that higher returns at lower risk can be obtained by incorporating emerging market stocks into investors' portfolios.

The central idea of the efficient market hypothesis is that information will unbiasedly and instantaneously be reflected into the prices of assets traded. This will require, among others, that the participants in the markets could obtain or get access to information costlessly, and that they know the implication of a piece of new information. Investors are equipped with basic investment knowledge so that they will make investment decisions rationally. Arguably, this is hardly very true in the case of the Malaysian stock market where the number of individual investors is significant. *Stock Market Investment in Malaysia*, a publication by the (former) KLSE, reported that individuals make up 83 % of investors in the Malaysian stock market (Ranawana, 2000). Arguably, many retail players here could base their investment on rumors and speculations, and some really follow what others are doing (herding). In addition, some characteristics of emerging market like the Malaysian stock market, such as their relative illiquidity, less regulation on disclosure, less investment publication, etc, will make it harder to achieve market efficiency (Campos, Newell & Willson, 2002; Freeman & Bartles, 2000). And given the argument that information dissemination is asymmetrical, some kind of misreaction to news events could be observed in the market.

Based on the above scenario, it is therefore reasonable to believe that prices of stocks traded in the Malaysian stock market may not fully reflect their true value. Hence, some degree of predictability should be possible. Furthermore, this study examines the predictability of daily returns by testing the random walk hypothesis, using variance ratio test (VR), and then tries to find the relation between the VR and the profitability of contrarian and momentum strategies in the Malaysia stock market. This study then examines whether these anomalies, i.e. contrarian and momentum effects, are rooted in investor behavior that can be explained by size, B/M ratio volume trading turnover, risk, business cycle and seasonality.

1.3 Research Question

This study tries to address the main issue of whether or not prices in the Malaysian stock market are predictable. Specifically, the study seeks to address the following questions:

1. Are the Malaysian stock returns predictable by rejecting random walk and showing the variance ratio (VR) is not equal to one?
2. Can the results of the VR<1 lead to the success of contrarian investment strategy?
3. Can the results of the VR>1 lead to the success of momentum investment strategy?
4. Are the magnitudes of contrarian profits due to firm characteristics i.e. size, Book to Market (B/M) ratio and trading volume turnover?
5. Are the magnitudes of contrarian profits due to non-firm characteristics i.e. changes in risk, business cycle and seasonality?
6. Are the magnitudes of momentum profits due to firm characteristics i.e. size, Book to Market (B/M) ratio and trading volume turnover?

7. Are the magnitudes of momentum profits due to non-firm characteristics i.e. changes in risk, business cycle and seasonality?

1.4 Objectives of the Study

The objective of this research is to examine random walk and investigate contrarian and momentum strategies, and to identify the factors affecting the profitability of contrarian and momentum strategies in the Malaysian stock market. Specifically the objectives are as follows:

1. To examine whether price changes in the Malaysian stock market show evidence of randomness
2. To investigate if the contrarian strategy works in the Malaysian stock market
3. To investigate if the momentum strategy works in the Malaysian stock market
4. To investigate the relationship between contrarian profits and firm characteristics i.e. size, B/M ratio and trading volume turnover
5. To investigate the relationship between contrarian profits and non-firm characteristics i.e. changes in risk, business cycle and seasonality
6. To investigate the relationship between momentum profits and firm characteristics i.e. size, B/M ratio and trading volume turnover
7. To investigate the relationship between momentum profits and non-firm characteristics i.e. changes in risk, business cycle and seasonality.

1.5 Significance and Contributions of the Study

Studies testing randomness of prices are not new, even in Malaysia. However, most of the previous studies done in Malaysia concentrated on the more traditional methods such as serial correlation, runs test, unit roots, etc. A more recent, arguably more powerful test of variance ratio to be employed in this study has been used by Mat Nor et al., (2002) and Salim and Ali (2002). But the first only covers indices and the latter only uses monthly return data. This study will cover more comprehensive (individual stocks) and higher frequency data (daily returns), covering a longer study period.

More importantly, this study will look at one emerging area of research, which would contribute to the literature on stock market irregularities in the Malaysian stock market, i.e., the contrarian and momentum investment strategies. So far, no study has been done on the success of both contrarian and momentum trading strategies that simultaneously occur in this market, and analyzed comprehensively the relation between contrarian profits, momentum profits and factors which affect them in the Malaysian stock market. The result will provide further evidence to the ongoing debate on the source of the profitability of these strategies, and on the reemergence of return predictability studies.

1.6 Outline of the Thesis

This thesis consists of seven chapters. Chapter 1 provides an overview of the study, the problem statement, research questions, objectives of the study, scope of study and the significance and contribution of the study. Chapter 2 focuses on a review of the related literature and previous research that are relevant to the topic of the study. Chapter 3 presents the research framework and the hypotheses, which are constructed from the research problems formulated. The research methodology is described in Chapter 4. This includes the data and the method to be used in this study. Chapter 5 is devoted to the analyses and findings of the study. The descriptive statistics and the result of hypotheses testing are presented. In addition, a short summary of the hypotheses testing is given at the end of the chapter. Chapter 6 discusses the findings and provides the potential explanation of the findings. Chapter 7 recapitulates the study by briefly reviewing the objective and the findings of study. The conclusions are then given. The limitations and the implications of study are presented too. The chapter ends with a suggestion of further research needed in this area.

1.7 Definition of Terms

Several terms are used extensively in this study. For easy reference, their definitions are given below.

1. Random walk - Random walk is as a theory that stock price changes from day to day are at random; the changes are independent of each other and have the same probability distribution. Many believers of the random walk theory believe that it is impossible to outperform the market consistently without taking additional risk (Fama, 1965).
2. Autocorrelation – It is a correlation coefficient. However, instead of correlation between two different variables, the correlation is between two values of the same variable at times X_i and X_{i+k}. Where K is the amount of lag that is analyzed for autocorrelation (Gujarati, 1995).

3. Price reversal – This is a movement in a backward direction in the price or returns of a share from one period to the next (DeBondt & Thaler, 1985; Jegadeesh & Titman, 1993).
4. Price continuation – This is a continuing increase (or decrease) in the price or returns of a share from one period to the next (DeBondt & Thaler, 1985; Jegadeesh & Titman, 1993).
5. Contrarian strategy – It is a trading strategy of buying past loser stocks and selling past winner stocks (DeBondt & Thaler, 1985).
6. Momentum Strategy- It is a trading strategy of buying past winner stocks and selling past loser stocks (Jegadeesh & Titman, 1993).
7. Winner stocks are stocks that have the highest returns within a certain study period (DeBondt & Thaler, 1985; Jegadeesh & Titman, 1993).
8. Loser stocks are stocks that have the lowest returns (DeBondt & Thaler, 1985; Jegadeesh & Titman, 1993).
9. Underreaction and overreaction are when prices respond to information or market events and do not adjust with the right intensity, either too little (underreaction) or too much (overreaction) (DeBondt & Thaler, 1985; Jegadeesh & Titman, 1993).
10. Ranking Period - the period over which the past returns are measured and ranked (DeBondt & Thaler, 1985; Jegadeesh & Titman, 1993).
11. Testing Period - the time period over which returns are calculated and analyzed (DeBondt & Thaler, 1985; Jegadeesh & Titman, 1993).
12. Size or the market capitalization is the price times the number of shares outstanding (Hameed & Yuanto, 1999).

13. B/M is book-to-market ratio that is computed as the ratio of the book equity of a firm at the fiscal year-end that fall in year t-1 to the firm’s market capitalization at the end of December in year t-1 (Hameed & Yuanto, 1999).
14. Trading volume turnover is measured as the number of shares traded on a particular day divided by the number of shares outstanding at the end of the day (Glaser & Weber, 2001; Hameed & Ting, 2000)
15. Business Cycle is a period of time that provides a picture of the state of the economic activity by looking at variables like changes in the real Gross Domestic Product (Bacman, Dubois & Isakov, 2001).
16. Time varying risk - generally means that risk are not constant and change over time (Chan, 1988).
17. Behavioral Finance – the field of finance that proposes psychology-based theories to explain stock market anomalies. Within behavioral finance it is assumed that the information structure and the characteristics of market participants systematically influence individuals' investment decisions as well as market outcomes (Shefrin, 2000).

Chapter 2

LITERATURE REVIEW

2.1 Introduction

In order to have a better understanding of the related literature, this chapter will review the following: (1) random walk in share prices, (2) evidence of previous studies of contrarian strategies, (3) evidence of previous studies of momentum strategies, (4) the efficient market hypothesis, (5) the behavioral models of overreaction and underreaction, (6) the psychological aspects in decision making, and (7) the profile of Kuala Lumpur Stock Exchange.

2.2 Random Walk in Share Prices

Early ideas of random walk model date back to the year 1900. A random walk model suggests that there is no difference between the distribution of returns conditional on a given information structure and the unconditional distribution of returns. In other words, the random walk implies that stock returns must be independent over time and characterized by normal distribution (Megginson, 1997).

If stock prices are found to follow a random walk process then equity market is weak form efficient (Fama, 1970). In this is the case, all information contained in historical stock prices is fully reflected in current stock prices and so returns on share would not be predictable. Since future returns cannot be predicted from past returns, trading rules based on the examination of the sequence of past prices are worthless. Hence past information contains nothing about the magnitude of the deviation of today’s returns from the expected return.

Many studies examine whether stock returns are predictable from the past. One hypothesis widely tested is that stock prices follow random walk, which imply successive returns are independent. To ascertain the degree of random walk, traditional and current tests can be employed. The traditional test of weak-form efficiency is the autocorrelation test, which is a test of independence of price changes. The most-recent tests include a test of randomness in the direction of prices changes, the Box-Pierce Q test which is a test of average serial correlation structure, and the unit-root analysis.

Since the work of Lo and MacKinlay (1988) the variance ratio test has been used widely as a test for the random-walk hypothesis. They demonstrated that the variance test is more powerful than the traditional tests that are mentioned above. Lo and MacKinlay (1988) employed variance-ratio test at various levels of frequencies and used the NYSE and the Amex stocks for the time period 1962-1985. They revealed that the random walk hypothesis in stock prices for weekly returns for both the entire sample period and all sub-periods for a variety of aggregate returns indexes and size sorted portfolios are rejected. They also found that portfolio returns exhibited significant positive first-order autocorrelation or mean aversion. They argued that the presence of mean aversion for index returns is primarily due to the presence of small stocks that show a greater degree of mean aversion than large stocks. However, they found no evidence against the random walk hypothesis for monthly returns.

Poterba and Summer (1988) showed that stock index returns might show positive autocorrelation if some of securities in the index trade infrequently.

They indicated that small stocks trade less frequently than larger stocks. Therefore, new information was incorporated first into larger stock prices and then into smaller stock prices with a lag. This lag induced a positive serial correlation. Jorge (1995), by employing variance-ratio test and using monthly prices, also suggested that stock returns of Latin American emerging market do not follow a normal distribution. In effect almost all of the variance-ratios are statistically and significantly larger than one as they increase with interval (q). The result also indicates that the rejection of the random walk process is due to autocorrelation and this evidence is in support of mean aversion in index returns. The result obtained by Urrutia (1995) for Latin American markets are consistent with random walk tests conducted for U.S securities by Lo and MacKinlay (1988) who find mean aversion for U.S. stock indexes.

Grieb and Reyes (1999) reexamined the presence of random walk in stock prices in Brazil and Mexico by using variance ratio test on weekly stock returns for indexes as well as individual firms. They revealed that individual stock returns in Mexico are more heavily influenced by the positive autocorrelation or mean aversion behavior. In contrast, individual stock returns in Brazil are influenced by negative autocorrelation or mean reversion behavior.

In the Malaysian stock market, some studies also employed the variance ratio test to investigate whether stock price follow a random walk or not. For example, Mat Nor et al.(2002), using twenty-three (23) years of daily data of Kuala Lumpur Stock Exchange Composite Index (KLSE CI) from 3rd January 1977 to 31st December 1999, found that the random walk hypothesis was rejected under the assumption of homoscedasticity, particularly on a daily and weekly basis. Monthly index returns are only rejected at shorter lags. In addition, their findings had been interpreted as evidence of mean aversion, rather than the mean reversion behavior of the market index. Meanwhile, Salim and Ali (2002) investigated the random walk hypothesis by using weekly data for individual stock prices over the time span from May 9, 1997 to May 4, 2001. They used a total of 45 out of the possible 303 companies listed on the main board of KLSE and believed to be representative of their respective sectors. They showed that the random walk hypothesis was rejected for all of the stocks under the assumption of homoscedasticity. Furthermore, both studies show that there is positive return autocorrelation for KLSE and they reported that variance-ratios are larger than one.

2.3 Evidence from Previous Studies on the Contrarian Strategy in Stock Market

Contrarian strategy buys stocks that performed poorly (prior losers) over the past periods and sells short stocks that performed well in the same period (prior winners) and earn positive expected returns significantly in the subsequent period. The notion of contrarian strategy over the long interval was conducted by DeBondt and Thaler (1985, 1987). In particular, companies which had earned poor returns in the past (losers) tended to improve their market performance while companies, which had performed remarkably well in the past (winners) tended to do less well in the future. Using monthly return data, as compiled by CRSP, for NYSE common stocks over the period 1926 to 1982, they formed two portfolios, consisting of 35 worst performing stocks (winners) based on the stocks' market adjusted excess return over the past three years. This 3-year period is described as the formation or ranking period. The excess returns in the subsequent 3-year period labeled the test period, are then calculated for both winners and losers portfolios. This process is repeated for sixteen non-overlapping 3-year period, starting January 1933. Their results show that the loser portfolio of 35 stocks outperformed the market by an average of 19.6 per cent in the 3-year after portfolio formation date. The winner portfolio, on the other hand, underperformed the market by more than 5.0 per cent. Thus, the difference in cumulative average residual returns between the two extreme portfolios equaled to 24.6 per cent. They also found that the excess returns in the 3-year test period was asymmetric, i.e. much larger for losers. Most of the winner loser effects occurred during the second and third years of the test period. The systematic price reversal patterns in the share return of the winning and losing firms, which are documented by DeBondt and Thaler may be inconsistent with an efficient market since investors can outperform the market using past share price information. In other words, stock returns may be predictable, and this may be due to excessive investor optimism and pessimism. They found evidence that US investors overreact to news. They applied their results based on a study of experimental psychology that has been pioneered by Kahneman and Tversky (1973). Kahneman and Tversky found that people tend to overreact to unexpected and dramatic events. Furthermore, DeBondt and Thaler interpret this evidence as a manifestation of the irrational behavior of market participants.

2.3.1 Contrarian Profits and Firm Characteristics

Zarowin (1990) found that the contrarian profits was not due to the overreaction hypothesis but due to the effect of size. Zarowin claims that loser firms are smaller, i.e. losers tend to be smaller by the end of the 3-year formation period because their prices were getting lower. When both winner and loser groups are matched by size, all return discrepancies disappear, except in January. Zarowin also analyses the periods when losers are smaller than winner and periods when winners are smaller than losers. The result indicates that when losers are smaller, they outperform the winners. When winners are smaller they outperform the losers. Therefore, Zarowin concludes that the losers superior performance over the winners during the 3-year test period is due, not to overreaction, but to size discrepancies. Using UK data, Clare and Thomas (1995) provide evidence which is consistent with Zarowin's conclusion that the difference in performance between the loser and winner portfolios is probably due to the size effect.

However, Chopra, Lakonishok, and Ritter (1992) reexamined the DeBondt and Thaler findings. They investigated the stock returns of NYSE issues from 1926 to 1986 and incorporate size and betas in their multiple regression model. Their findings reassert the overreaction hypothesis; they found that loser portfolios formed on the basis of prior five-year returns outperformed winners by 5 percent per year during the subsequent five years. Their findings also provide larger arbitrage portfolio returns for smaller firms and contrarian profits cannot be explained by the differential risk.

Assoe (2003) investigated the profitability of short-term contrarian in the Canadian Stock Market from January 1964 to December 1998, and found similar evidence as in the US market. Furthermore, he found that the contrarian investing was concentrated within the small firm groups. Chang, McLeavey and Rhee (1995), and Bowman and Iverson (1998) revealed empirical evidence on the short-term contrarian profit respectively in the Japanese stock market and New Zealand stock market that continue to be profitable even after controlling for the firm size. Kang, Liu , and Ni (2002) analyzing the stock market in China, found significant contrarian profits and concluded that the sole source is an overreaction to firm specific information i.e. size.

Brouwer, Put and Vels (1997) examined the overreaction hypothesis for the UK, France, and Germany based on several accounting ratios, such as book to market ratio. They found that high book to market past losers outperform that of past winners. This is in line with the result of Bildik and Gulay (2002) who revealed that the overreaction is significantly observed in the Istanbul Stock Exchange for the period January 1991 to December 2000. They found that loser portfolios are typically smaller and have high book to market ratio than stocks in the winner portfolios. Capaul, Rowley and Sharpe (1993) investigated B/M strategies for United States, Japan, and four European countries (France, Germany, Switzerland and the United Kingdom). They revealed higher returns for higher B/M in relation to lower B/M stocks for all six countries. However, the difference in returns turned out to be only significant on a global level. An important result of their study is that in most cases, the higher B/M stocks had lower betas than the lower B/M. Lakonishok, Shleifer and Vishny (1994) also provided evidence for the US which is higher B/M ratio (value stocks) outperformed lower B/M ratio (glamour stocks). They argued that investors overestimate the actual difference in future earning growth between glamour and value stocks. The consistent of higher B/M (value stocks) outperformed lower B/M ratio (growth stocks) that is also found in outside the US market. Bauman, Conover and Miller (1999) examined ten years of information in twenty-one international stock markets, which included the Malaysian stock market. They reveal that this difference between high B/M and low B/M stocks may reflect differences in investor behavior and accounting for Earning Per Share (EPS).

There may also be a relationship between short-term contrarian profits and trading volume. For example, Conrad et al. (1994) revealed that the contrarian strategy is profitable only for securities that are heavily traded. Chordia and Swaminathan (2000), using daily and weekly prices, found that returns of portfolios containing high trading volume stocks led returns of portfolios comprised of low trading volume stocks. They indicated that this effect is related to the tendency of high volume stocks to respond rapidly and low volume stocks to respond slowly to marketwide information.

With regards to the Malaysian stock market, Arifin and Power (1996) used weekly share price data that were obtained from *Datastream* for 47 individual shares registered on the Kuala Lumpur Stock Exchange over the period of January 1990 to December 1994. The companies in the sample were selected according to their market valuation as at May 30, 1995. They found some evidence of short-run overreaction in share price, particularly in the first two weeks after portfolio formation date. The trading strategy of buying a portfolio of underperforming shares and selling a portfolio of outperforming shares earns a significant profit. Hameed and Ting (2000), using weekly price of KLSE stocks, find that there is a significant relation between short-horizon contrarian profits and trading volume. They document that portfolios of heavily and frequently traded securities tend to generate substantially higher contrarian profits than low trading volume portfolios. This is related to the tendency of high volume stocks to respond rapidly and low volume stocks to respond slowly to marketwide information.

2.3.2 Contrarian and Non-Firm Characteristics

One possible explanation for the observed profits arising from the short-term contrarian strategy is the risk associated with undertaking the strategy. For example, Chan (1988) found only weak support for the overreaction hypothesis. He argues that stocks with a series of negative abnormal returns (losers) will experience an increase in their equity beta, and this increases their expected returns. This is because an equity beta is a function of gearing (i.e. the relative market values of debt and equity). With other factors remaining constant, a reduction in stock prices will lead to increased gearing and therefore, increased equity risk. Likewise, the winner stocks that experience a series of positive abnormal returns have their beta decreasing, and thus lower the expected returns. Therefore, the loser stocks, which experience a series of negative returns in the ranking periods, have their betas increasing and thus higher expected returns.

Chan (1988) also criticized DeBondt and Thaler's (1985) work, which used arithmetic averages of returns for constructing their portfolio of winners and losers. In addition, the squared value of the arithmetic mean is equal to the squared value of geometric mean plus the variance of underlying random variable. That is, the geometric mean equals the arithmetic mean when there is zero variance or risk associated with them. By the very nature of a risky asset, the geometric mean estimate will be more reliable and conservative when compared to the arithmetic mean.

DeBondt and Thaler’s (1987) expansion of their earlier work, by adding a dummy variable in the regression model to capture the time-varying risk coefficient, found that the January effect is significant and there exist a strong correlation between price reversal patterns and the month of January. They also documented that neither risk differences between the loser and winner portfolio nor differences in size of companies comprising the loser and winner portfolio could account for the reversal behavior.

Bowman and Iverson (1998), using weekly returns for the period 1967 through 1986, examine the behavior of stock prices in New Zealand after a large weekly change in price and found that the stock market significantly overreacts in the short- run, especially in the case of price declines and significant reversals are confined to the following week They observed that the result is affected by risk, seasonality and bid-ask bounce. This is in line with the result of Conrad et al. (1997) who find a bid-ask bounce in transaction prices can explain much of the price reversal of short-term contrarian strategies.

Jegadeesh (1990) and Lehman (1990) argue that the presence of the bid-ask bounce will induce reversal in observed returns of past winner and loser portfolios. As a result, any overreaction argument must either control for bid-ask bounce or present evidence of reversal of sufficient magnitude to exceed expected reversal induced by the bid-ask bias. Jegadeesh (1990) and Lehman (1990) find that even after controlling for the bid-ask bounce, short-term contrarian profits are statistically significant and economically meaningful. They suggest that the profits are due to inefficiencies in the market.

Ahmad and Hussain (2001) investigate long-run overreaction that yield excess returns in the Malaysian stock exchange (KLSE) during 1986-96, and also observe several factors which have been linked with the overreaction effect: firm size, time-varying risk, and seasonalities with regard to Chinese New Year Effect. They find that the result is consistent with the overreaction hypothesis that stocks in the best / worst performing decile experience a reversal of fortune in the following three years.

There is recent empirical evidence that contrarian profits are related to business cycle, Cooper, Guetierrez, and Hameed (2004) show that contrarian profits can be explained by macroeconomic variables that are common proxies for the state of the economy and find that contrarian profits exist only during downturn periods.

2.4 Evidence from Previous Studies on Momentum Strategies

There are some event studies, e.g. looking at long-term post event abnormal returns that suggest stock market under-reaction to information. The under-reaction studies argue that stocks prices take a long time to respond to information. This is related to the study of momentum in stock returns which refers to the tendency for well-performing stocks to continue to perform well and for poor performers to continue to perform poorly after initial movement, in contrast to the overreaction hypothesis.

A more specific consequence of under-reaction is the profitability of a momentum portfolio strategy, a strategy that exploits positive serial dependence in asset returns in particular. Momentum strategy is done by purchasing securities that have performed well in the past and selling of securities that have performed poorly. Buying the “winners” and selling the “losers” will earn positive expected profits in the presence of positive serial correlation because current