PRICE RANDOMNESS, FUNDAMENTAL FACTORS, AND STOCK MARKET CONTRARIAN STRATEGY: FURTHER EVIDENCE ON MALAYSIAN STOCK MARKET

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ABSTRACT

This paper investigates the price randomness, fundamental factors, and relationships of fundamental factors with stock returns for all stocks in the Kuala Lumpur Stock Exchange in three stages from January 1977 to December 1999. The ten fundamental factors encompass debt-asset ratio, debt-equity ratio, book to market value ratio, dividend yield, payout ratio, price to earning ratio, earning per share, earning growth, asset growth, and market capitalisation. The multiple-factor model revealed that both fundamental factors and beta could explain up to 72 percent of the variability in stock returns. Subsequently, the factors of market capitalisation and beta had been incorporated in implementing the contrarian investment strategy. The returns reversal of the loser portfolio are more significant and apparent in the smaller firms than the larger firms once the market capitalisation factor is controlled for. The profits gained from the investment strategy after control for market capitalisation and beta factors remain attractive.

1.0 INTRODUCTION

The emergence of the Asian equity markets provides great opportunities for local and global investors. Investors are striving hard to outperform the market by adopting viable investment strategies. Lo and MacKinlay (1988, 1999) had indicated that stock prices did not completely follow the random walks and thus had induced the market players to search for strategies to exploit the profit opportunities. Other researchers hold that the market is not totally inefficient. This is because there is no evidence to indicate that any person knows the market better than any one else. Does the stock prices reflect its fundamental values? Many studies have revealed that stock returns are explained more by fundamental factors rather than beta factor as discussed in the Capital Asset Pricing Model. For example, Chen, Roll, and Ross (1986) have examined economic forces influence on asset pricing. They concluded that stock returns are exposed to systematic economic news, that they are prices in accordance with their exposures, and

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the news can be measured as innovations in state variables whose identification can be accomplished through simple and intuitive financial theory.

This paper focuses on a comprehensive investigation of price randomness and the impact of firm's fundamental factors on the expected stock returns for the public listed firms in the Kuala Lumpur Stock Exchange (KLSE). The ten fundamental factors encompass debt-asset ratio, debt-equity ratio, book to market value ratio, dividend yield, payout ratio, price to earning ratio, earning per share, earning growth, asset growth, and market capitalisation. We further investigated contrarian investment strategy by controlling market capitalisation of the stock (firm size) and beta of the stock. The findings would contribute to a more comprehensive understanding of the Malaysian equity market and it would be of great value to local and global investors in making their financial decisions.

2.0 LITERATURE REVIEW

The random walk model was first developed by Bachelier (1900) in which he asserted that successive price changes between the P_{t+k}, price at the period t+k, and P_t, price at the period t were independent with zero mean and proportional variance at the interval k. This means that the variance of monthly changes are four (4) times the variance of the weekly changes. This concept is later employed in the variance ratio test.

The variance ratio test was proposed by Lo and MacKinlay (LOMAC) in 1988 to test the random walk hypothesis. The study compared variance estimators derived from data at various levels of frequencies for weekly stock market returns in the New York Stock Exchange and American Stock Exchange. Their findings provided evidence to reject the random walk model for the entire sample period of 1962-1985 and for all sub-periods for a variety of aggregate returns indexes and size-sorted portfolios. Their results also indicated positive autocorrelation for weekly holding-period returns not only for the entire sample but also for all subperiods.

Ayadi and Pyun (1994) replicated the variance ratio test of Lo and MacKinlay (1988) on the Korean Stock Exchange (KSE). They investigated the early stage of the internationalisation program, which commenced in the early 1980s to see if any of the measures taken had a significant effect on market efficiency. The findings of Ayadi and Pyun (1994) suggested that the KSE did not follow a random walk model under the assumption of homoscedasticity. It was noted that they could not reject the random walk hypothesis for weekly, monthly, 60-day and 90-day interval data for the Korean stock market when accounting for the presence of heteroscedasticity.

Lo and MacKinlay (1989) had also indicated that the variance ratio test was more powerful than the well-known Dickey-Fuller unit root or the Box-Pierce Q tests. It was further re-confirmed by Ayadi and Pyun (1994) in which they asserted that the variance ratio test had been used several times in the literature as it was more appealing as compared to other traditional tests for random walk. Nonetheless, they indicated that the single variance ratio test ignored the joint nature of the variance ratio test statistics. Hence, it would be better if the variance ratio tests can be complemented with additional test such as the multiple variance ratio test which was extended by Chow and Denning in 1993 based on variance ratio test of Lo and MacKinlay (1988).

According to Chow and Denning (1993), under the random walk hypothesis, the unity of variance ratio holds for each of lags, q. Thus, it is necessary to examine the variance ratio of several selected values of q and only fail to reject the random walk hypothesis if it is not rejected for all of the q selected. With respect to q, the values of aggregation parameter, q, are potentially selected differently by researchers in conducting empirical investigation when using the variance ratio test. Hence, a control for size is needed. Chow and Denning (1993) indicated that failure to control for test size would cause an inappropriately large probability of Type I error.

Grieb and Reyes (1999) employed variance ratio on weekly stock returns to re-examine the Brazilian and Mexican stock markets. The findings revealed mean reversion behaviour in the Mexican market whereas the Brazilian market indicated evidence in favour of the random walk. Kok and Goh (1994) tested the random walk hypothesis by extending the framework of Cochrane (1988) on Malaysian stock indices. The results revealed that the Malaysian stock market followed random walk in the long run.

After discussing the price randomness, we review the factors that explained the stock returns. Many studies had been extensively conducted in both the international and local stock markets. Estep (1985) developed a new method (T model) for valuing common stocks. The T Model expressed total returns in term of company's growth rate, its return on equity, and its price to book ratio. It is a general statement of which simple formulas like the Gordon model (return = yield + growth) are special cases. The results suggested that the model could rank stock portfolios according to its relative future performance. The model was considered to be better and appealing than the just dividend discount model. In addition, many studies had indicated that value of a firm was influenced by multifactor rather than a single factor, beta as advocated in Capital Asset Pricing Model (CAPM).

Fama and French (1992, 1993, 1997) had revealed that the beta was insufficient to explain expected stock returns. On the other hand, Ariff and Loh (1993) had used six fundamental factors such as dividend yield, payout ratio, debt to asset ratio, asset growth, firm size, and earning volatility on the United States, Japan, Singapore, and Malaysian stock markets. They found that these six factors had relationships with individual stocks and indicated that these fundamental factors explained better the stock returns in the United States stock market followed by the Japan stock market. Only 25 percent of stock price changes can be explained by the fundamental factors in the Singapore and Malaysian stock markets due to speculation activities.

Chui and Wei (1997) had investigated the impact of multifactor such as book to market value ratio, firm size, and beta on stock returns in five stock markets, namely Hong Kong, Malaysia, Korea, Taiwan, and Thailand. The results showed that size and book to market value ratio had greater impact on the stock returns but not the beta.

Ariff and Nassir (1998) examined stock returns with beta, debt to asset, book to market value ratio, and earning price ratio on the Malaysian stock market. The findings showed that these three fundamental factors and beta would be able to explain 33.51 percent of the stock returns.

This study examined 10 firm's specific factors: Debt-Asset Ratio (D/A); Debt-Equity Ratio (D/E); Book to Market Ratio (B/MV); Dividend Yield (DY); Pay Out Ratio (POR); Price-Earning Ratio (P/E); Earning Per Share (EPS); Earning Growth (EG); Asset Growth (AG) and Market Capitalisation (MV) in Kuala Lumpur Stock Exchange (KLSE). These factors were divided into four main categorises based on T-model: capital structure, dividend policy, earning and capitalisation, which can then explain total returns of stock. The total returns consist of two components, returns based on fundamental factors and unexpected returns due to valuation change. In the short run, the unexpected returns dominantly influence the differences in total return among individual stocks.

Based on the results on firm's fundamental factors on the expected returns, the factors of the beta and firm size were incorporated in implementing the contrarian investment strategy, which is also known as winner-loser anomaly. The contrarian investment strategy refers to the buying of stocks that had performed badly in the past and selling stocks that have been performing well over the same period.

The discovery of the winner-loser anomaly (overreaction hypothesis) was mainly attributed to the work

time by De Bondt and Thaler in 1985. De Bondt and Thaler (1985) observed that the loser portfolio tended to outperform the past winner portfolio after thirty-six months of portfolio formation. The returns earned by the loser portfolio were 25% higher than the winner portfolio. This reflected the overreaction phenomenon in the stock market where price reversal patterns were found. De Bondt and Thaler (1987) examined the impact of firm size and risk factors in explaining the profits gained from the contrarian investment. They provided further evidence and support for the contrarian investment.

Evidence regarding the impact of the firm size on the contrarian investment strategy had been documented but mixed results were found so far. Zarowin (1990) pointed out that on the average the loser portfolios were smaller in size as compared to the winner portfolios. After controlling for firm size effect, the winner-loser anomaly disappeared. Thus, he demonstrated that when the winner portfolio involved small sized firms, the winner portfolio outperformed the loser portfolio. This was consistent with the study done by Clare and Thomas (1995). Both of them argued that the firm size effect was the manifestation for the reversal pattern of loser and winner portfolios when tested with data from the United Kingdom. On the contrary, Chopra, Lakonishok, and Ritter (1992) had controlled for firm size and they found the existence of overreaction.

Schiereck, De Bondt and Weber (1999) examined the contrarian investment strategy on the Frankfurt stock market from 1961 to 1991 and their findings indicated that arbitrage process in the contrarian investment strategy was able to beat a passive investment approach. Factors like beta, firm size, and risk were not attributed as the reasons for the profits.

3.0 DATA AND METHODOLOGY

This study involves three stages of investigations on the stock price behaviour in the KLSE. First stage, we examined the randomness of market index by using both the variance ratio and multiple variance ratio tests. The tests conducted on the twenty-three (23) years daily data of Kuala Lumpur Stock Exchange Composite Index (KLSE CI) from 3rd January 1977 to 31st December 1999. To this extent, it is worth noting that 3rd January 1977 was the first trading day of KLSE CI. It should be noted that the KLSE CI is the most popular market barometer in Malaysia. The raw data is obtained from the Thomson Financial Datastream database.

The second stage of study examines the relationship between the fundamental factors and stock returns by using seemingly unrelated regression (SUR). The ten fundamental factors are: debt-asset ratio (D/A),

debt-equity ratio (D/E), book to market value ratio (B/MV), dividend yield (DY), payout ratio (POR), price to earning ratio ((PE), earning per share (EPS), earning growth (EG), asset growth (AG), and market capitalisation (MV) and they are collected from Bloomberg from January 1990 to December 1998. With respect to this, 71 individual stocks listed on the main board in the KLSE were selected based on financial year-ended 31st December. The three-month interbank rate was used as proxy for risk free rate and it was collected from Quarterly Bulletin published by Bank Negara Malaysia, the central bank of Malaysia.

The results of the price randomness and fundamental factors is further extended and integrated into the third stage, i.e., contrarian investment strategy in which the firm size and risk[1] are incorporated. The long run (2 years) contrarian investment was investigated by adapting the market model framework of De Bondt and Thaler (1985, 1987) which compares the returns of the ten portfolios during the formation period with the average performance for each of the ten portfolios in each month (t =1, ..., 24) with the corresponding portfolios over all the five non-overlapping test periods.

The investigation of the contrarian investment is then further extended by controlling for beta and market capitalisation of the stock (firm size) to ascertain whether the contrarian profits are just due to the small firm size effect or time-varying risk. Firm size was controlled for by constructing three size-sorted groups based on the market capitalisation of the stocks at the end of the ranking period (portfolio formation) rather than the test period. Then the three size-sorted groups are divided accordingly and defined as large (L), medium (M), and small (S) firms. The ten portfolios are then formed in each of the three size-sorted groups. In each of the groups, the ten portfolios are ranked and formed from high to low based on the rank period performance. The integration is presented in the following Figure 1:

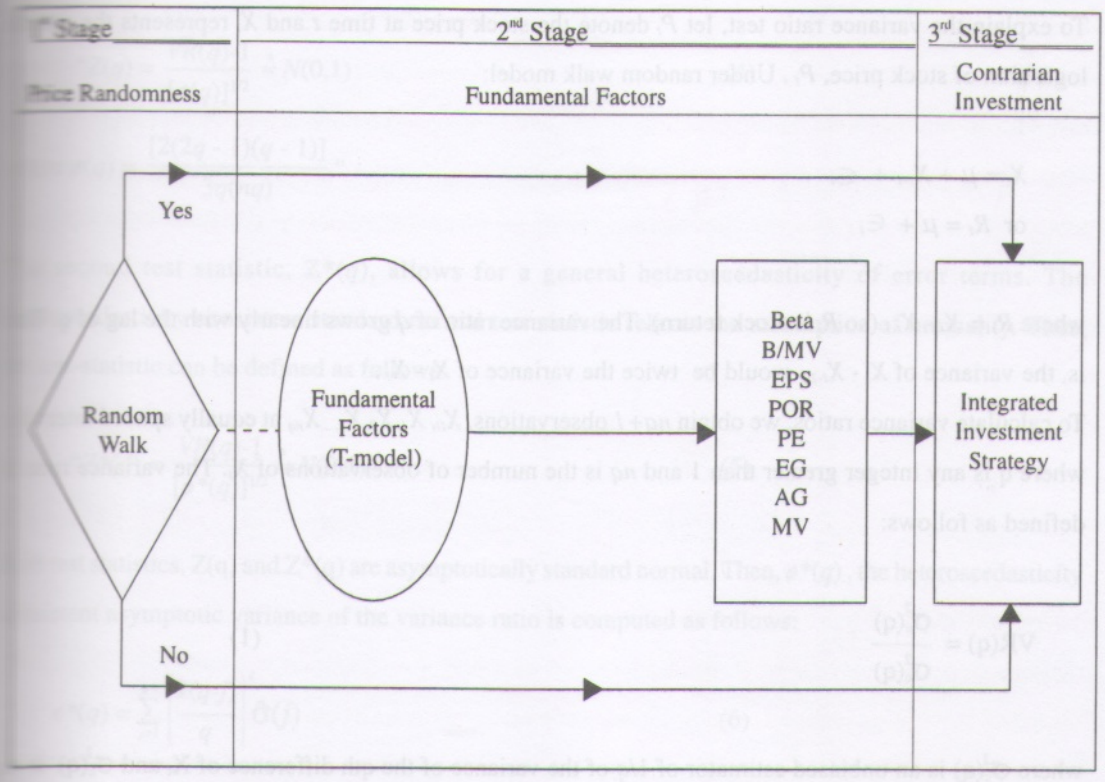


Figure 1: The Integration of Three Stages of Investigations on the Stock Price Behaviour in the KLSE

3.1 Variance Ratio and Multiple Variance Ratio Tests

This study re-examines the random walk hypothesis for the price randomness in the Malaysian stock market by using the robust variance ratio test developed by Lo and MacKinlay (1988). The null hypothesis is stated as follows:

Ho: The variance ratio at lag q, VR(q) equals to unity (one) when the ratio of the variance of the q period return to the variance of the one-period return divided by q

If the variance ratio, VR(q) equals to one, it implies the returns follow random walk. Otherwise, the random walk hypothesis will be rejected. In addition, if the values of VR(q) are less than one with the increased of lag q, they imply the mean reversion behaviour of the returns. Alternatively, if the values obtained are greater than one with the increased of lag q, thus imply mean aversion behaviour of returns.

To explain the variance ratio test, let P_t denote the stock price at time t and X_t represents the natural logarithm of stock price, P_t. Under random walk model:

$$X_t = \mu + X_{t-1} + \in_t$$

or $$R_t = \mu + \in_t$$

where $R_t = X_t - X_{t-1}$ (so R_t is stock return). The variance ratio of q grows linearly with the lag of q. That is, the variance of $X_t - X_{t-2}$ would be twice the variance of $X_t - X_{t-1}$.

To calculate variance ratios, we obtain $nq+1$ observations, $X_0, X_1, X_2, X_3, \ldots X_{nq}$ at equally spaced intervals, where q is any integer greater than 1 and nq is the number of observations of X_t. The variance ratio is defined as follows:

$$VR(q) = \frac{\sigma_c^2(q)}{\sigma_a^2(q)} \qquad (1)$$

where $\sigma_c^2(q)$ is an unbiased estimator of $1/q$ of the variance of the qth difference of X_t and $\sigma_c^2(q)$ is an unbiased estimator of the variance of the first difference of X_t.

The estimates of an unbiased variance for a single period $\sigma_c^2(q)$ and $\sigma_a^2(q)$ variances are calculated as follows:

$$\sigma_c^2(q) = \frac{1}{m}\sum_{t=q}^{nq}(X_t - X_{t-q} - q\hat{\mu})^2 \qquad (2)$$

where $m = q(nq - q + 1)(1 - (q/nq))$

$$\sigma_a^2(q) = \frac{1}{nq-1}\sum_{t=1}^{nq}(X_t - X_{t-1} - \hat{\mu})^2 \qquad (3)$$

where $\hat{\mu} = \frac{1}{nq}(X_{nq} - X_0)$

After deriving an asymptotic distribution of the variance ratios, two alternative test statistics are computed to test the null hypothesis for different specifications of the error terms behaviour.

The first test statistic, $Z(q)$, is computed based on the assumption that the error terms are independent, identical, and normally distributed. Thus, the test-statistic can be defined as follows:

$$Z(q) = \frac{VR(q)-1}{[\phi(q)]^{1/2}} \overset{a}{\approx} N(0,1) \qquad (4)$$

where $\phi(q) = \frac{[2(2q-1)(q-1)]}{3q(nq)}$

The second test statistic, $Z^*(q)$, allows for a general heteroscedasticity of error terms. The heteroscedasticity consistent standard normal test statistic relaxes the assumption of normality. Thus, the test-statistic can be defined as follows:

$$Z^*(q) = \frac{VR(q)-1}{[\phi^*(q)]^{1/2}} \overset{a}{\approx} N(0,1) \qquad (5)$$

Both test statistics, Z(q) and Z*(q) are asymptotically standard normal. Then, $\phi^*(q)$, the heteroscedasticity consistent asymptotic variance of the variance ratio is computed as follows:

$$\phi^*(q) = \sum_{j=1}^{q-1} \left[\frac{2(q-j)}{q}\right]^2 \hat{\sigma}(j) \qquad (6)$$

To find $\hat{\sigma}(j)$,

$$\hat{\sigma}(j) = \frac{nq\sum_{t=j+1}^{nq}(X_t - X_{t-1} - \hat{\mu})^2(X_{t-j} - X_{t-j-1} - \hat{\mu})^2}{\left[\sum_{t=1}^{nq}(X_t - X_{t-1} - \hat{\mu})^2\right]^2} \qquad (7)$$

In this study, we present the variance ratio, VR(q), homoscedasticity test statistic, Z(q) and heteroscedasticity-robust test statistic, Z*(q). As discussed earlier, it would be better if the variance ratio tests are complemented with an additional test, namely the multiple variance ratio tests which was extended by Chow and Denning (1993).

Based on the results presented by Chow and Denning (1993), the control for the size of a multiple variance ratio test is done simply by comparing the Lo and MacKinlay's (1988) test statistics with the Studentized Maximum Modules (SMM) critical values. The SMM table can be obtained in Hahn and Hendrickson (1971) and Stoline and Ury (1979).

3.2 Fundamental Factors and T-Model

The T-Model (Estep, 1985) was adapted to estimate stock returns. The T-Model expressed total return in terms of a company's growth rate, its return on equity and its price-book ratio. The fundamental factors

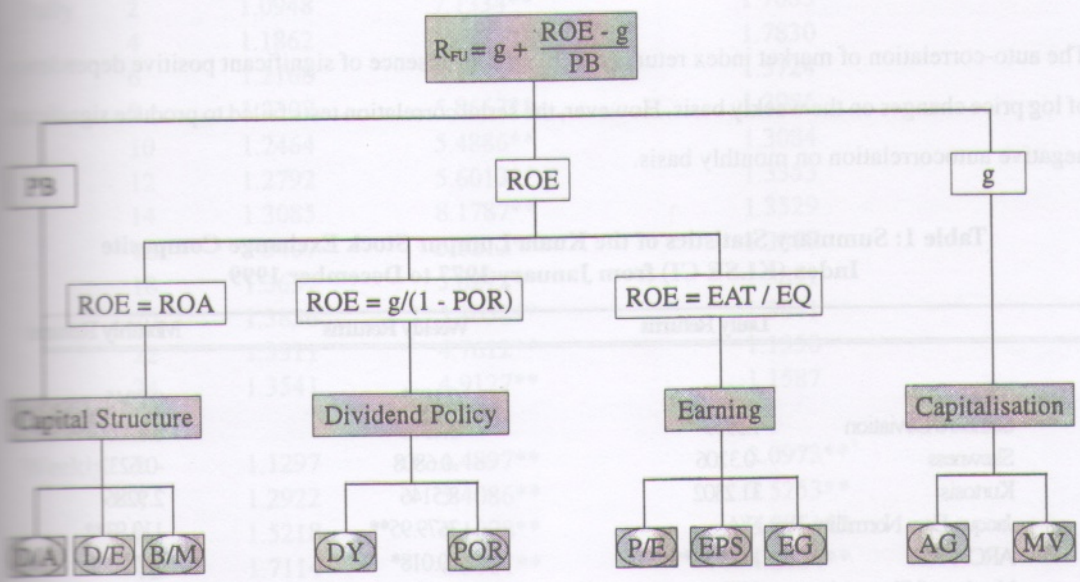
were divided into four main categorises based on T-model: capital structure, dividend policy, earning and capitalization, which can then explain the total returns of stock. The total returns consist of two components, returns based on fundamental factors and unexpected returns due to valuation change. In the short run, the unexpected returns dominantly influence the differences in total return among individual stocks. But, in the long run, the fundamental return would determine the total return, as unexpected valuation changes from one period to another would cancelled out to become zero over time. The relationship between stock return and fundamental factor as illustrated in the T-model is very few been highlighted by earlier researchers. However, there are many theories and models, which explained the relationship between stock return and each component in the model. With the economic and environment situation always changing, it causes the explaining power of stock return becomes more complicated and uncertain.

The second stage of this study involves the observations that consisted of 71 stocks selected from companies continuously listed on the main board of KLSE from the period January 1990 through December 1998. We examined relationship between stock return with beta and 10 fundamental factors. The multiple-factor model based on Seemingly Unrelated Regression (SUR) model was performed.

The relationships between stock returns and the ten fundamental factors: Debt-Asset Ratio (D/A); Debt-Equity Ratio (D/E); Book to market value Ratio (B/M); Dividend Yield (DY); Pay Out Ratio (POR); Price to Earning Ratio (P/E); Earning Per Share (EPS); Earning Growth (EG); Asset Growth (AG) and Market Capitalisation (MV) in Kuala Lumpur Stock Exchange (KLSE). The T-model of Estep (1987) is depicted in the Figure 2.

Figure 2:

Relationship between stocks return and fundamental factors based on T- Model (Estep, 1987)



Where:

R_{FU} : Stock return from fundamental factors;

g : Growth;

ROE : Return on equity; and

PB : Price- book ratio

4.0 ANALYSES AND DISCUSSION

All the results on the variance ratio and multiple variance ratio tests and the impact of the ten fundamental factors on stock returns will be reported in this section. The abnormal returns and excess returns from all the fundamental factors model and selected fundamental factors model in this study are presented and discussed in section 4.2. The results of the incorporation of selected fundamental factors with the contrarian investment strategy are reported and discussed in section 4.3.

4.1 Results of the Variance Ratio and Multiple Variance Ratio Tests

The summary statistics of market index returns reported in Table 1 indicate non-normality of returns computed on a weekly and monthly basis. The results of Jacque- Bera normality tests reject the null hypothesis of normality for the changes in the log price indices. The values of skewness and kurtosis indicate that the distributions are not normal. The distributions of index returns are characterised by

leptokurtosis on weekly and monthly basis. Furthermore, the ARCH (AutoRegressive Conditional Heteroskedascity) test detected successive periods of volatility followed by successive periods of stability.

The auto-correlation of market index returns exhibited the presence of significant positive dependency of log price changes on the weekly basis. However, the serial correlation tests failed to produce significant negative autocorrelation on monthly basis.

Table 1: Summary Statistics of the Kuala Lumpur Stock Exchange Composite Index (KLSE CI) from January 1977 to December 1999

	Daily Returns	Weekly Returns	Monthly Returns
Mean	0.0378	0.1802	0.7945
Standard Deviation	1.5959	3.4978	8.8205
Skewness	-0.3206	-0.6808	-0.6232
Kurtosis	31.2302	8.5146	2.9286
Jacque-Bera Normality Test	N/A	3679.95**	110.93**
ARCH Test	1413.26**	20.018*	4.788**
Number of Observations	5658	1200	276

Lag	Autocorrelation	T-stat	Autocorrelation	T-stat	Autocorrelation	T-stat
1	0.0950	7.3077**	0.1060	3.6552**	0.1120	1.8667
2	0.0310	2.3846*	0.0950	3.2759**	0.1500	2.5000*
3	0.0260	2.0000*	0.0750	2.5862**	-0.1180	-1.9667*
4	-0.0450	-3.4615**	0.0110	0.3793	-0.0570	-0.9500
5	0.0630	4.8462**	0.0660	2.2759*	-0.0290	-0.4833
6	-0.0320	-2.4615*	0.0040	0.1379	-0.0830	-1.3833
7	-0.0050	-0.3846	0.0970	3.3448**	0.0890	1.4833
8	0.0050	0.3846	0.0190	0.6552	-0.0080	-0.1333
9	0.0300	2.3077	0.0730	2.5172*	0.0600	1.0169
10	0.0330	2.5385*	0.0200	0.6897	0.0690	1.1696
11	0.0370	2.8462**	-0.0710	-2.4483*	0.0340	0.5769
12	0.0030	0.2308	0.0240	0.8276	-0.0460	-0.7797
13	-0.0050	-0.3846	-0.0640	-2.2069*	-0.0390	-0.6610
14	0.0430	3.3077**	-0.0320	-1.1034	-0.0580	-0.9831
15	0.0010	0.0769	-0.0050	-0.1724	-0.0330	-0.5690
16	-0.0100	-0.7692	-0.0100	-0.3448	-0.0530	-0.9138

* denotes $p < 0.05$
** denotes $p < 0.01$
N/A denotes not available

Table 2: Variance Ratios of KLSE CI Returns From 1977 to 1999

	Lag	Variance ratio	Homoscedasticity Z (q)	Heteroscedasticity Z*(q)
Daily	2	1.0948	7.1334**	1.7005
	4	1.1862	7.4877**	1.7830
	6	1.2168	6.5958**	1.5724
	8	1.2307	5.8667**	1.3986
	10	1.2464	5.4886**	1.3084
	12	1.2792	5.6013**	1.3353
	14	1.3085	8.1787**	1.3529
	16	1.3407	5.8212**	1.3877
	18	1.3637	5.8272**	1.3891
	20	1.3836	5.8058**	1.3841
	22	1.3311	4.7612**	1.1350
	24	1.3541	4.9127**	1.1587
Weekly	2	1.1297	4.4897**	3.0973**+
	4	1.2922	5.4086**	3.5253**
	8	1.5218	6.1078**	3.9811**
	12	1.7114	6.5701**	4.2824**
	16	1.7776	6.1250**	3.9873**
	24	1.7912	4.9996**	3.2587**+
	32	1.7717	4.1944**	2.7304**+
	52	1.8921	3.7640**	2.4535*+
Monthly	2	1.1182	1.9605* +	1.5305
	4	1.2827	2.5059* +	1.9562
	6	1.2645	1.7742	1.3851
	8	1.2350	1.3174	1.0285
	10	1.2442	1.1995	0.9365
	12	1.2995	1.3247	1.0342
	18	1.2604	0.9198	0.7181
	24	1.1331	0.4029	0.3148

Z*(q) denotes the heteroscedasticity test statistics. The variance ratios are statistics different from 1.

* denotes $p < 0.05$

** denotes $p < 0.01$

+ denotes an interference error in which the variance ratio is statistical significantly different from 1.0 according to the standard normal distribution but is not significantly diffrent from 1.0 under the Studentised Maximum Modulus (SMM) distribution as indicated in Stoline and Ury (1979) critical value of 3.117 and 3.569 at the 5% and 1% level.

Table 2 reports the variance ratio and multiple variance ratio tests on daily, weekly and monthly basis. This study conducted variance ratio tests for lags of 2 days to 24 days, 2 weeks to 52 weeks, 2 months to 24 months on a daily, weekly, and monthly basis, respectively. Thus, allowing us to analyse the random walk hypothesis across various time of horizons. It is noteworthy that the variance ratios are all found to be greater than one for the various lags examined even for all three different data interval. The value of the variance ratio increased with the increase of the number of lags. However, the magnitude of the Z statistic declined with increasing of number of lags.

The variance ratio values of greater than one mean positive serial correlations of market returns on daily, weekly, and monthly basis. It is interesting to note that the evidence is consistent with the findings of Lo and MacKinlay (1988). In addition, the finding had been interpreted as evidence of mean aversion, rather than the mean reversion of behaviour of the market index. As a result, 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. This is consistent with the results of Richardson and Stock (1989) and Chow and Denning (1993). Both of them failed to reject the random walk hypothesis for monthly market index returns.

4.2 Results on the Beta, Fundamental Factors, and Stock Returns

The seemingly unrelated regression was conducted on beta and fundamental factors. The results as shown in Table 3 indicate that beta and market capitalisation (MV) factors have important impact in explaining stock returns in general. Beta and market capitalisation factors tend to have negative relationships with stock returns.

The best model from the regression can be found in the average period 1, which reported the highest coefficient of determination (R2) of 72.12%, with eight fundamental factors, showed statistically significant. The model is consisted of the debt to asset, debt to equity, dividend yield, earning growth, earnings per share, market capitalisation, price to earnings, and payout ratio. The second best model is the model in the average period 2 with seven fundamental factors reported statistically significant.

Table 3: The Results of Fundamental Factors and Stock Returns Based on Seemingly Unrelated Regression (SUR)

	Period 1 (1/90 - 6/94)	Period 2 (1/91 - 6/95)	Period 3 (1/92 - 6/96)	Period 4 (1/93 - 6/97)	Period 5 (1/94 - 6/98	Average 1 (P1 - P3)	Average 2 (P2 - P4)	Average 3 (P3 - P5)	Average 4 (P1 - P5)
	0.6928	0.3176	0.0532	0.1026	0.4414	0.7212	0.3588	0.1944	0.5265
Constant	1.4616	0.6003	0.6840	-0.4604	-0.5144	0.5540	0.3719	-0.1281	0.2770
	(5.310)	*(2.741)*	*(1.702)*	*(-1.883)*	*(-2.419)*	*(3.683)*	*(3.084)*	*(-0.869)*	*(2.343)*
Factors	Beta	AG	*none*	Beta	Beta	D/A	Beta	D/A	AG
	0.0287	-0.0279		0.2436	-0.4064	0.0029	-0.1280	0.0000	-0.0319
	(-2.206)	*(-2.649)*		*(2.492)*	*-1.9520*	*(3.556)*	*(-1.860)*	*(-2.862)*	*(-1.834)*
	MV	B/M		AG	AG	D/E	AG	D/E	D/A
	-0.1713	0.0958		-0.0393	-0.0785	-0.0466	-0.0234	0.0002	0.0000
	(-3.900)	*(1.851)*		*(-2.471)*	*(-1.892)*	*(-3.406)*	*(-2.093)*	*(3.437)*	*(-2.445)*
	P/E	DY		B/M	MV	DY	D/A		D/E
	0.0528	-0.0580		0.1362	0.0504	-0.0751	0.0009		0.0002
	(10.591)	*(-2.457)*		*(2.827)*	*(2.231)*	*(-2.416)*	*(2.643)*		*(3.337)*
		EG				EG	D/E		EG
		0.0084				0.0199	-0.0130		0.0198
		(2.805)				*(2.890)*	*(-2.651)*		*(3.981)*
						EPS	DY		MV
						0.0659	-0.0698		-0.0250
						(2.354)	*(-3.340)*		*(-1.717)*
						MV	EPS		P/E
						-0.0590	0.1051		0.0600
						(-3.040)	*(5.016)*		*(5.402)*
						P/E	MV		POR
						0.0676	-0.0332		-0.0519
						(5.747)	*(-2.280)*		*(-2.340)*
						POR	POR		
						-0.0586	0.0466		
						(-2.873)	*(3.290)*		

Notes:
Debt-Asset Ratio (D/A); Debt-Equity Ratio (D/E); Book to Market Ratio (B/MV); Dividend Yield (DY); Pay Out Ratio (POR); Price-Earning Ratio (P/E); Earning Per Share (EPS); Earning Growth (EG); Asset Growth (AG) and Market Capitalisation (MV)

We had further examined the distribution-free test for ordered alternatives (Jonckheere, Terpstra) by Hollander and Wolfe (1973) on all the fundamental factors and the selected factor model as described in Table 3. Table 4 presents these results in terms of excess returns and abnormal returns. The results revealed that the null hypothesis is accepted for both all-fundamental factors and selected factor models in terms of excess returns.

In the case of abnormal returns, the average periods 3 and 4 had indicated abnormal returns in the selected factors model. However, for the full factors model, only average period 4 reported abnormal returns. Given these results, it can be concluded that the excess returns and abnormal returns were due to the both fundamental factors and beta (risk) factor.

These findings have important implications on returns gained when implementing investment strategies. In view of these, we have taken both the fundamental factors—market capitalisation and beta factors—

into account when implementing the long run contrarian investment strategy. Both factors are used as control variables in respect to this. The results are presented in section 4.3.

Table 4: Results of Based on Distribution-Free Test for Ordered Alternatives (Jonckheere, Terpstra) Hollander and Wolfe (1973)

Model	Test	Excess Return (ER) $ER = R_{it} - R_{ft}$				Abnormal Returns (AR) $AR = R_{it} - \alpha + \beta_{it} R_{mt}$			
		Avg 1	**Avg 2**	**Avg 3**	**Avg 4**	**Avg 1**	**Avg 2**	**Avg 3**	**Avg 4**
		(P1-P3)	(P2-P4)	(P3-P5)	(P1-P3)	(P1 - P3)	(P2-P4)	(P3-P5)	(P1-P3)
All Factors Model	Value J	36.5	51.5	47.5	41.5	46.5	48.5	48.5	56.5
	Value j	54	54	54	54	54	54	54	54
	Decision	Ho accept	Ho accept	Ho accept	Ho accept	Ho accept	Ho accept	Ho accept	Ho reject
Selected Factors Model	Value J	39.5	43.5	50.5	31.5	41.5	50.5	57.5	55.5
	Value j	54	54	54	54	54	54	54	54
	Decision	Ho accept	Ho accept	Ho accept	Ho accept	Ho accept	Ho accept	Ho reject	Ho reject

Notes:

1. Value j is at a = 0.05.
2. Full Factors model: β, D/A, D/E, B/MV, DY, POR, P/E, EPS, EG, AG, and MV.
3. Selected Factors model: β, B/MV, DY, POR, P/E, EPS, EG, and AG.
4. Ho reject when $J \geq j$ (α, K, $(n_1, \ldots, n_k)$)

   Ho accept when $J < j$ (α, K, $(n_1, \ldots, n_k)$)
5. Avg denotes average, p denotes period.
6. Period 1: (Period 1 to Period 3), Period 2: (Period 2 to Period 4),

   Period 3: (Period 3 to Period 5), Period 4: (Period 1 to Period 5)

4.3 Results of the Contrarian Investment Strategy with Control for Firm Size

The results of the five non-overlapping periods two-year contrarian investment with control for firm size are presented in Table 5. The returns reversal patterns were more apparent in small firms in general. In the case of the loser portfolio, the loser portfolio with medium and large firms showed average cumulative abnormal returns (ACARs) of 3.32% and 0.38% respectively in month-24, which definitely does not provide evidence of significant price reversal patterns. But, the loser portfolio with small firms indicated significantly high and positive ACARs of 16.64% after 24 months from the portfolio formation period. The loser portfolio had thus reversed and become a winner portfolio and price reversal pattern

were clearly observed in this case. To this extent, it is also useful to note that all the ten loser portfolios demonstrated positive ACARs in month 24.

In the case of the winner portfolio, the winner portfolio (portfolio 1) with large firms indicated ACARs of -25.52% at the end of the test period, namely, month-24. It should be pointed out that the winner portfolio with large firms had significantly negative ACARs starting from eight months after the portfolio formation period. On the other hand, the winner portfolio with medium firms had indicated statistically insignificant ACARs of –1.37 percent in month 24. However, the winner portfolio with small firms indicated a positive but statistically insignificant ACARs of 0.76% in month 24.

The mixed results as described above thus do not present clear and incontrovertible evidence to indicate that the anomaly is a manifestation of firm size effect since the returns reversal patterns and profits gained in the contrarian investment did not disappear after controlling for firm size.

4.4 Results of the Contrarian Investment Strategy with Control for Risk

As noted earlier, the different risk levels of the loser and the winner portfolios may be one of the possible reasons for the different returns earned by the loser and the winner portfolios. Thus, the study adopted the risk adjustment method applied by Chan (1988) for controlling risk differences over time. In addition, it would be of interest to examine if the risk as indicated by beta is constant from the rank period to the test period. Table 6 presents the risk-adjusted cumulative abnormal returns (CARs) and the aggregate risk adjusted returns for loser, winner, and arbitrage (loser-winner) portfolios for each rank and test period, respectively. The return reversals were found to be statistically significant in the winner and arbitrage portfolios, but not the loser portfolio.

Rank period abnormal returns of the winner portfolios had significantly reversed in the five non-overlapping rank periods from positive CARs to negative CARs as indicated by the test period abnormal returns. The risks of the loser and winner portfolios were not constant from the rank periods to the test periods. The beta of the winner portfolio had decreased by 0.7109 subsequently in the test periods on aggregate. This is consistent with the contrarian investment strategy. The winner portfolio exhibited -5.6092% CARs in the test period on average.

On the other hand, in the case of the loser portfolio, there was a significant reduction of abnormal returns in the test periods. With risk adjustment, the returns reversal patterns disappeared in the loser

portfolios. On the contrary, price continuation instead of price reversal patterns was found. In other words, loser portfolios continued to be loser portfolios. Thus, this implies that the loser stocks should be sold rather than be bought as suggested by the contrarian investment.

It should however be pointed out that the beta of the loser portfolio had decreased in the test period rather than increased as expected. This was somewhat contradictory with Chan's (1988) argument that the risk of the loser portfolio increased thus resulting in the test-period beta being greater than the rank period beta. The findings in this study tend to suggest that, the loser portfolios were less risky during the test period than the rank period.

However, the arbitrage portfolio produced positive returns as expected, with slight returns reversals being observed. The magnitude and significance of cumulative risk adjusted abnormal returns had reduced in general. The results also revealed a decrease in the beta of the arbitrage portfolio. Nevertheless, the arbitrage portfolio experienced significantly positive CARs of 0.7874, which was consistent with the expectation of the contrarian investment. Given the mixed results, the risk factor cannot completely account for the performance of the three portfolios in the test periods. It is also worth noting that these mixed results are consistent with the findings of Gaunt (2000) in the Australian stock market.

5.0 CONCLUSIONS

The behaviour of stock market index and dependency of successive price changes have generated considerable interest for investors. The variance ratio results under the assumption of homoscedasticity suggest that stock prices in the Malaysian stock market do not completely follow random walks. The multiple-factor model revealed that both fundamental factors and beta could explain about 72 percent of the variability in stock returns. The profits gained from the contrarian investment strategies after controlling for firm size and risk are appealing. We suggest that further research incorporating other fundamental factors other than market capitalisation and beta.

Table 5: Average Cumulative Market Adjusted Returns (ACARs) for Five Non-overlapping Two-Year Rank Period with Control for Firm Size

	Large Firms		Medium Firms		Small Firms	
	Winner Portfolio	Loser Portfolio	Winner Portfolio	Loser Portfolio	Winner Portfolio	Loser Portfolio
Average Market Value (RM Millions)	1930.18	1979.17	442.76	436.05	162.36	156.83
Month						
1	-2.45	-0.35	-3.56	-2.76	-4.74	-2.68
	(-0.53)	(-0.14)	(-1.58)	(-1.19)	(-1.71)	(-0.87)
2	-2.91	1.75	-2.16	0.16	-2.42	1.29
	(-0.63)	(0.70)	(-0.96)	-0.07	(-0.87)	(0.42)
3	1.03	3.08	1.36	6.45	1.16	6.80
	(0.22)	(1.24)	(-0.60)	(2.78)*	(0.42)	(2.22)
4	-1.59	6.70	0.76	3.96	2.98	4.72
	(-0.34)	(2.70)	(0.34)	(1.71)	(1.08)	(1.54)
5	-4.99	5.99	0.01	2.59	5.70	5.27
	(-1.08)	(2.41)	(0.01)	(1.12)	(2.06)	(1.72)
6	-5.95	4.53	0.49	1.49	1.75	4.89
	(-1.29)	(1.82)	(0.22)	(0.64)	(0.63)	(1.59)
7	-6.36	1.92	0.73	1.37	4.05	2.73
	(-1.38)	(0.77)	(0.32)	(0.59)	(1.46)	(0.89)
8	-5.53	4.86	4.29	2.77	6.55	6.95
	(-1.20)	(1.96)	(1.91)	(1.20)	(2.36)	(2.27)
9	-11.34	2.74	2.54	2.89	3.58	11.01
	(-2.46)	(1.10)	(1.13)	(1.25)	(1.29)	(3.59)*
10	-10.80	3.67	1.24	1.97	7.16	11.63
	(-2.34)	(1.48)	(0.55)	(0.85)	(2.58)	(3.79)*
11	-13.84	1.20	1.00	-1.15	5.80	13.74
	(-3.00)*	(0.48)	(0.44)	(-0.50)	(2.09)	(4.48)*
12	-20.36	-0.69	-1.54	-2.42	-0.50	14.44
	(-4.41)*	(-0.28)	(-0.69)	(-1.04)	(-0.18)	(4.71)**
13	-25.26	-6.04	-6.67	-7.16	-10.17	12.38
	(-5.47)**	(-2.43)	(-2.96)*	(-3.09)*	(-3.67)*	(4.04)*
14	-23.98	-5.53	-12.63	-7.02	-9.77	15.03
	(-5.20)**	(-2.23)	(-5.61)**	(-3.02)*	(-3.53)*	(4.90)**
15	-17.94	0.93	-8.05	-0.81	-4.04	27.70
	(3.89)*	(0.38)	(-3.58)*	(-0.35)	(-1.46)	(9.04)**
16	-22.11	-2.88	-10.01	-6.54	-3.98	20.37
	(-4.79)**	(-1.16)	(-4.45)*	(-2.82)*	(-1.44)	(6.65)**
17	-23.16	-7.50	-9.35	-8.67	-8.52	16.30
	(-5.02)**	(-3.02)*	(-4.15)*	(-3.74)*	(-3.08)*	(5.32)**
18	-25.51	-9.92	-9.43	-10.08	-11.85	10.50
	(-5.53)**	(-3.99)*	(-4.19)*	(-4.35)*	(-4.28)*	(3.43)*
19	-26.58	-10.21	-11.22	-12.32	-13.54	7.94
	(-5.76)**	(-4.11)*	(-4.99)**	(-5.31)**	(-4.89)**	(2.59)
20	-29.38	-10.46	-7.40	-9.19	-6.78	9.47
	(-6.37)**	(-4.21)*	(-3.29)*	(-3.96)*	(-2.45)	(3.09)*
21	-27.59	-9.37	1.04	-6.33	-2.26	13.39
	(-5.98)**	(-3.77)*	(0.46)	(-2.73)	(-0.82)	(4.37)*
22	-25.74	-6.57	0.83	-2.67	-5.05	20.67
	(5.58)**	(-2.64)	(0.37)	(-1.15)	(-1.82)	(6.74)**
23	-28.55	-5.24	0.24	-5.42	-7.70	14.40
	(-6.19)**	(-2.11)	(0.11)	(-2.34)	(-2.78)*	(4.70)**
24	-25.52	0.38	-1.37	3.32	0.76	16.64
	(-5.53)**	(0.15)	(-0.61)	(1.43)	(0.27)	(5.43)**

* denotes $p < 0.05$, ** denotes $p < 0.01$

(T-statistics are in parentheses)

Table 6: Risk Adjusted Cumulative Market Abnormal Returns for Five Non-overlapping Two-Year Test Period from 1987-1998

Winner Portfolio				
Period	**Abnormal Returns Rank Period**	**Abnormal Returns Test Period**	**Beta Rank Period**	**Change in beta from rank period to test period**
1987-1988	2.1251	-4.3457	1.0720	-0.8905
	(2.4883)**	(-5.8394)**	(15.3938)**	(-10.5511)**
1989-1990	6.8358	-6.8918	1.4173	-1.1126
	(6.8539)**	(-6.9378)**	(12.5307)**	(-9.0632)**
1991-1992	4.1397	-3.8339	1.2253	-1.0313
	(3.1650)**	(-5.5663)**	(7.5803)**	(-13.4193)**
1993-1994	2.2400	-5.9323	-0.2742	0.4848
	(0.4846)	(-4.7153)**	(-0.4114)	(2.7679)**
1995-1996	3.3105	-7.0425	1.1234	-1.0050
	(2.4861)*	(-2.5545)*	(6.0593)**	(-7.2593)**
Aggregate	3.7302	-5.6092	0.9128	-0.7109
	(6.6141)**	(-10.9452)**	(17.5857)**	(-16.0355)**
Loser Portfolio				
Period	**Abnormal Returns Rank Period**	**Abnormal Returns Test Period**	**Beta Rank Period**	**Change in beta from rank period to test period**
1987-1988	-4.8433	-2.7175	0.8717	-0.4277
	(-3.9689)**	(-1.3737)	(8.7607)**	(-1.9063)
1989-1990	-3.4915	-8.9901	0.7772	-0.8719
	(-4.4276)**	(-6.5923)**	(8.6906)**	(-5.1736)**
1991-1992	-3.1400	-0.7644	0.9320	-0.3450
	(-2.9434)**	(-0.5587)	(7.0759)**	(-2.2601)*
1993-1994	-1.4920	-5.6509	1.0744	-0.9722
	(-2.3916)*	(-7.1407)**	(15.4346)**	(-8.8232)**
1995-1996	-0.0583	-5.9861	1.5371	-1.3231
	(-0.0402)	(-1.7413)	(7.6113)**	(-7.6641)**
Aggregate	-2.6050	-4.8218	1.0387	-0.7880
	(-5.8850)**	(-7.4383)**	(20.3292)**	(-11.0368)**
Arbitrage (Loser-winner) Portfolio				
Period	**Abnormal Returns Rank Period**	**Abnormal Returns Test Period**	**Beta Rank Period**	**Change in beta from rank period to test period**
1987-1988	-6.9684	1.6281	-0.2003	0.4628
	(-11.9204)**	(4.1792)**	(-1.2547)	(2.8994)**
1989-1990	-10.3273	-2.0983	-0.6401	0.2407
	(-14.7530)**	(-4.6767)**	(-3.4911)**	(1.3127)
1991-1992	-7.2798	3.0695	-0.2924	0.6863
	(-8.4511)**	(4.9524)**	(-0.9423)	(2.2115)*
1993-1994	-3.7320	0.2814	1.3480	-1.4570
	(-4.6794)**	(0.4277)	(4.6757)**	(-5.0515)**
1995-1996	-3.3687	1.0564	0.4137	-0.3180
	(-4.2819)**	(1.7124)	(0.9177)	(-0.7055)
Aggregate	-6.3352	0.7874	0.1259	-0.0771
	(-18.8391)**	(2.8182)*	(-0.0405)	(0.2849)

* denotes $p < 0.05$, ** denotes $p < 0.01$ T-statistics are in parentheses

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