Title of the Study

Does the value investing strategy outperform the KLCI?

Background of the Study

A value strategist is a fund manager who seeks to buy stocks that are a discount to their fair value and sell them in excess of that value. Value strategists see value where many other market participants do not. Value investing strategy was popularized by Benjamin Graham and later, his protégé Warren Buffett. Graham, a finance professor, taught security analysis at Columbia University and retired a millionaire as a result of his investments in the NYSE. Together with David Dodd, he laid out the analytical framework for investing in stocks that are cheap on the basis of their underlying assets. His advice is to buy stocks when they are undervalued and sell them when they are overpriced.

Buffett, his student, is history's greatest investor – whose instinct for finding value has turned a 1956 investment of US$10,000 into US$250 million today – after taxes! He guided his investment company, Berkshire Hathaway from US$12 in 1967 to US$80,900 per share in 1999. He is listed as the third richest person in the world with assets worth US$29 billion, according to Forbes magazine. Buffett is very much aware of the extent to which his investment record constitutes a challenge to the efficient market hypothesis (EMH).

On the other hand, the EMH states that stock prices adjust rapidly to the arrival of new information and, therefore, they reflect all information about the stock. In principle, says the EMH, no one can systematically beat the stock market. Efforts by analysts and investors to analyze public information using fundamental analysis will not yield consistently superior returns. Like most hypotheses in finance and economics, the overall evidence, so far, from extensive academic research on capital market efficiency is best described as mixed since some studies support the hypothesis and some do not – resulting in some anomalies.

The implications of these diverse results have significant real world implications for investors and fund managers.

Objective and Significance of the Study

The objective of the study is to investigate whether value-investing strategy produce higher returns and outperform the KLCI and, if so, lies the significance in providing further evidence to refute the semi strong form of the EMH, vice versa.

Hypothesis of the Study

Investment managers classify firms that have high ratios of book-to-market equity (B/M) or earnings to price (E/P) as value stocks. For the purpose of our study, we will be using price-to-book value ratio, (P/BV) instead of book-to-market equity ratio (B/M) as the former ratio is readily extractable from the Investors Digest, published by the Kuala Lumpur Stock Exchange (KLSE). A high B/M ratio implies an inverse low P/BV ratio, vice versa. Similarly, a high E/P ratio implies an inverse low P/E ratio, vice versa. It is hypothesized that historical P/BV and P/E ratio cannot be used by investors to earn abnormal returns. Such information is publicly available and therefore, there should be immediate impounding on market prices upon announcement, thus eliminating the possibility of deriving a value investing strategy to earn abnormal returns.

Specifically, the following hypothesis is relevant:

H_0 : A portfolio consisting of stocks with low P/BV or P/E ratio, formed on the basis of value investing strategy, does not outperform the KLCI

H_1 : Otherwise

Implications of the Study

Our test would examine whether an investor could earn abnormal returns based upon value investing strategy that uses historical, public information. Simply,

does an investor, who purchases a stock after certain price-sensitive information became public, enjoy above-average returns? The EMH would imply that buying or selling after the information is public would not provide excess profits because the price would already reflect the new information. EMH also implies that no amount of fundamental research will give investors an edge

Another implication is whether a portfolio should be managed actively or passively? Efficient capital markets imply that portfolios should be managed passively so that their performance matches that of the aggregate market, thereby minimizing research and trading costs. Simply, it implies that if you are in the stock market, you should buy and hold as active trading increases your brokerage costs without increasing your expected return. Index funds were designed to duplicate the composition and performance of market indices, in this case, the KLSE Composite Index (KLCI).

Scope of the Study

The scope of this study covers all stocks listed on the KLSE over a period of 15 years, between 31st March 1986 and 31st March 2000. The primary source of our stock selection is obtained from the Investors Digest, published by the KLSE. Based on our stock selection criteria, detailed in the methodology section of this study, we formed 20 portfolios consisted a total of 240 stocks. Two portfolios, each consisted of 12 stocks, were formed each year beginning 31st March 1986 until 31st March 1995, which is a 10-year period. Thereafter, we examined the post-formation performance of these portfolios each for the subsequent 5 years.

Literature Review

The capital asset pricing model of Sharpe (1964), Lintner (1965) and Black (1972) have long shaped the way academics and fund managers think about average returns and risk. The efficiency of the market portfolio implies that expected returns on stocks are positively related to their market beta. In contrast, Reinganum (1981), Lakonishok (1986) find that the relation between market beta

and average return disappeared during the period of their tests, that is, during 1963 – 1990. Fama and French (1992) also concluded that their tests do not support the most basic prediction of the CAPM model, and average stock returns are not positively related to market beta.

They went further to say that size and B/M ratio capture much of the cross-section of average stock returns and seem to absorb the roles of leverage and E/P in average stock returns. Simply, if assets are priced rationally, their results suggest that stock risks are proxied by size and B/M ratio. The following year, Fama and French (1993) again confirmed that size and B/M are related to risk factors in stock returns.

For many years, academicians and investment professionals have argued that value strategies outperform the market (Graham and Dodd – 1934 and Dreman – 1977). In recent years, Basu (1977), Chan, Hamao, Lakonishok (1991), Fama, French (1992) have shown that stocks with high E/P ratio earn higher returns. Rosenberg, Reid and Lanstein (1984) have shown that stocks with high B/M ratio outperform the market. In explaining their findings, the researchers contend that value strategies might produce higher returns because they are contrarian to naïve strategies followed by other investors. These naïve strategies include extrapolating past earnings growth too far into the future, thus assuming a trend in stock prices even though the future does not warrant such extrapolation, overreacting to good or bad news, or simply equate a good investment with a well-run company irrespective of price. They overreact to stocks that have done badly, oversell them, and these out-of-favor value stocks become under-priced. Contrarian investors bet against such naïve investors. Haugen (1994) concluded that because contrarian strategists invest in stocks that are under-priced and under-invest in stocks that are overpriced, they outperform the market. Lakonishok, Shleifer and Vishny (1995) observed that value stocks have been under-priced relative to their risk and return characteristics, and investing in them

has earned abnormal returns. High B/M or E/P stocks have higher average returns than low B/M or E/P stocks.

An alternative explanation of why value strategies have produced superior returns, argued most forcefully by Fama and French (1992), is that they are fundamentally riskier. That is, investors in value stocks, such as high book-to-market stocks, tend to bear higher fundamental risk of some sort, and their higher average returns are simply compensation for this risk.

On the opposing perspective, most of the early work on EMH was based upon the random walk hypothesis (Bachelier – 1900) that contended changes in stock prices occurred randomly. Eugene Fama (1970), in his earlier study, made the first attempt to organize the growing empirical evidence and formalize the EMH. In addition, Fama divided the overall EMH, and its empirical tests, into 3 sub-hypotheses by their information sets: (1) weak – form EMH (2) semi strong – form EMH, and (3) strong – form EMH.

The weak-form EMH assumes that current stock prices fully reflect all security market information, including past price changes. As such, consequently, this hypothesis implies that past price changes should have no relationship with future price changes, that is, price changes should be independent. Meanwhile, the strong-form EMH contends that stock prices fully reflect all information from both public and private sources. Therefore, no investor should be able to consistently derive above-average profits.

Of relevance to the proposed study, the semi strong – form EMH asserts that stock prices adjust rapidly to the release of all public information. This hypothesis implies that an investor who base his decision upon important new information, after it is public, should not derive above-average profits from his transaction because the stock price already reflects the new public information. Numerous studies that examined specific events such as change in annual

earnings (Ball and Brown – 1968), stock splits (Fama, Fisher, Jensen and Roll – 1969), initial public offerings (Ibbotson – 1988) and world events (Reilly – 1973) have consistently supported the semi strong – form EMH.

It has often been said that large investors such as mutual funds perform better in the market than the small investor because they have better information. Interestingly, Jensen concluded that the mutual funds in his study were on average not able to outperform a simple buy-the-market and hold strategy. Therefore, it would seem that the mutual-fund studies lend some credence to the EMH. Later, Fama hypothesized in his subsequent research that the poor showing of mutual funds was really because they were not real value funds, instead he believes that fund managers are biased toward growth stocks and unlikely to limit themselves to true value stocks, with low P/BV ratio.

In contrast, a growing number of studies have tested anomalies and provided evidence that is inconsistent with this hypothesis. The evidence from studies that analyzed unexpected quarterly earnings surprises and performance of stocks with low P/E ratios does not support the hypothesis. The results have consistently shown that if you purchased stocks on the basis of strong quarterly earnings (Joy – 1979) or invest in stocks with low P/E ratios (Basu – 1977) after the quarterly earnings reports became public and held them for 6 months, you would receive above-average returns. Basu contended if historical P/E ratios provided useful information to investors in obtaining superior stock market returns, this would be a refutation of the hypothesis.

Overall, because these studies indicate that investors could enjoy abnormal returns using publicly available information on prices and earnings, these are anomalies that contradict the hypothesis. The evidence from studies that examined stocks of small (Banz – 1981) and neglected firms also does not support the hypothesis. Studies on the size effect indicated that small firms provided the investor with significantly superior returns than larger firms. Further

study by Brown (1983) on the size effect has cast doubts on its general validity. Two other heavily studied anomalies pertain to the "January effect" and the "weekend effect". Such seasonal happenings are supposed to be ruled out by EMH. However, in a recent study by Branch and Chang (1985), for the period 1979 – 1984, it was found that the January effect has subsided.

Research Methodology

The primary data for this study is obtained from the Investors Digest, Annual Companies Handbook, published by the KLSE and where applicable, annual reports of companies listed on the KLSE.

We will approach our study by forming two portfolios each year in the 10-year period covered by our tests, that is, between 31st March 1986 and 1995. Evans and Archer (1968) have estimated that 90 percent of the maximum benefit from diversification was derived from portfolios of 12 to 18 stocks. As such, we will be forming two portfolios every year, each comprising 12 stocks. The first portfolio will consist 12 stocks representing companies listed on the KLSE with the lowest P/BV ratio, whilst the second portfolio will consist another 12 stocks representing companies listed on the KLSE with the lowest P/E ratio. A total of 20 portfolios, representing 240 stocks, were formed for the 10-year period.

Another important stock selection criteria, which is consistent with the value investing strategy is that each selected stock must have positive net current assets, at the time of portfolio formation. Net current assets are defined as the company's current assets minus its current liabilities. This additional criteria of stock selection is important because we want to ensure the company selected has sufficient liquid funds or working capital to continue its operations in the near foreseeable future as we will be examining its stock performance in the post portfolio-formation period.

As we intend to examine post-formation performance of each of the 20 portfolios for the subsequent 5 years, the examination of such stock performance covered a 15-year period that lasted until 31st March 2000. Consequently, we look at portfolios formed every year starting at 31st March 1986 and thereafter, examined the subsequent performance of these portfolios for up to 5 years after their formation. Within each of our portfolios, we equally weight all the stocks and compute returns using the buy-and-hold strategy for years +1, +2, +3, +4, +5 years relative to the time of formation.

The company selected must have 31st December as its financial year-end. This is to eliminate the problem of non-uniform financial year. As most firms do not report their earnings and propose dividends until February or March, the price per share and the number of shares outstanding were collected as at the end of March each year. This would allow the information contained in the annual announcement to be impounded onto the stock prices. The holding period is defined as from 1st April to 31st March of the following year.

The P/BV ratio of each firm is calculated as price per share to book value per share on 31st March each year in order to reflect the price adjustment after the annual earnings announcement. The book value per share is obtained from Investors Digest, March issue of every year. If the P/BV ratio is not available, we will separately compute such ratio, using the closing price as at 31st March each year divided by the net tangible asset backing of the company for that month. As the P/BV ratio are computed as at end of March every year, the composition of each portfolio changes every year.

The price of each stock is adjusted, if any, for bonus issue, rights issue and capital reduction. For the purpose of this study, we will subscribe for all rights issue entitlement; however, we will not subscribe for any additional excess shares. Accordingly, the portfolio values in the 5 years post-formation period are

adjusted for such bonus and rights entitlements. The record of bonus, rights issues and capital reduction are summarized as Table-F in Appendix 2.

In view of the fact that value investing requires the "buy-and-hold" discipline, we do not compute and aggregate the mean monthly returns of the stocks in a portfolio. We believe that daily, weekly or monthly return statistics are more relevant for event studies. As we are more concerned with the long-term performance of value stocks in the portfolios, we will proceed to compute the gross and average-annual returns of the portfolios for each of the 5 post-formation years for purpose of examination and comparison of performance of the 20 portfolios against the KLCI. Gross portfolio return, R_{it} is computed as follows:

$$R_{it} = \frac{P_{it} - P_{it-1} + D_{it}}{P_{it-1}}$$

Where P_{it}, P_{it-1} = market value of portfolio at time t and time t – 1 respectively.

D_{it} = total dividends received by the portfolio during the time period t.

Thereafter, average annual return (AR) of the portfolio is computed using the gross portfolio return divided by its time holding period, that is, year +1, +2, +3, +4 or +5 years relative to the year of portfolio formation.

The same process is used to compute gross and average annual returns on the market index, R_{mt}. The performance of a fund manager is assessed on how well his portfolio is able to outperform the benchmark, in this case, the KLSE composite index, KLCI. Therefore, we are not required to redesign the composition and re-compute another index for the purpose of this study. The index we used as a proxy for the market portfolio is the KLCI.

For each portfolio, the gross and average annual (AR) returns in each of the five post-formation years are tabulated and compared with the gross and average annual market return, KLCI to determine whether there exists any excess return or out-performance.

In addition, we will run the SPSS statistical software package to perform the following statistical tests: paired samples t-test, regression analysis and non-parametric Wilcoxon test on the average annual return data. These tests will serve to investigate the statistical characteristics and whether there exists any significant differences between the performances of the P/BV portfolios, P/E portfolios and the KLCI.

Firstly, we shall conduct our statistical tests on the basis that the sampling distribution is normally distributed. Next, if the results of the tests indicate that the sampling distribution is not normally distributed, we shall proceed with the non-parametric Wilcoxon test, in which the assumption of normality does not need to be made of the sampling distribution.

In particular, we performed the paired samples t-test to investigate the null hypothesis, H_0 which stated that a portfolio consisting of stocks with low P/BV or P/E ratio, formed on the basis of value investing strategy, does not outperform the KLCI. Thus, it implies that the mean annual investment return of the P/BV or P/E portfolios as compared to the mean annual return of the KLCI is not significantly different. If proven otherwise, that is, the level of significance, p is lesser than 0.05, the null hypothesis, H_0 will be rejected. Thus, the alternative hypothesis, H_1 will be accepted, which implies that the mean annual investment return of the P/BV or P/E portfolios as compared to the mean annual return of the KLCI is significantly different.

Next, we shall perform the regression analysis, which is a technique for measuring the linear association between a dependent and independent

variable. Regression analysis assumes the dependent variable is linked to the independent variable and attempts to predict the values of a continuous, ratio-scaled dependent variable from the specific values of the independent variable. In the first regression analysis, the dependent variable is the average annual investment return of the P/BV portfolio and the independent variable is the average annual return of the KLCI. In the second regression analysis, the dependent variable is the average annual investment return of the P/E portfolio and the independent variable is the average annual return of the KLCI.

As explained earlier, if the results of the tests indicate that the sampling distribution is not normally distributed, we shall proceed with the non-parametric Wilcoxon test, in which the assumption of normality does not need to be made of the sampling distribution. The Wilcoxon test has a clear advantage, in that, the error caused by assuming a sample or population is normally distributed, when it is not, is avoided. However, if the sample or population distribution is normal, so that, both the parametric and non-parametric tests may be used, the former will generally give a smaller error than the latter. We performed the Wilcoxon test to investigate the null hypothesis, H_0 that implied that the mean annual investment return of the P/BV or P/E portfolios as compared to the mean annual return of the KLCI is not significantly different. If proven otherwise, that is, the level of significance, p is lesser than 0.05, the null hypothesis, H_0 will be rejected. Thus, the alternative hypothesis, H_1 will be accepted, which implies that the mean annual investment return of the P/BV or P/E portfolios as compared to the mean annual return of the KLCI is significantly different.

Research Results

From the stock selection criteria, 240 counters were chosen for this study. The details of the counters, their P/BV ratio, P/E ratio and their market values at the end of each of the 5 post-formation years are tabulated and included in Appendix 3. The aggregate market values, gross and average returns of the portfolios for each formation year are also included therein.

Performance review of the P/BV portfolios

We examined the post-formation performance of the P/BV portfolio that was formed on 31st March 1986 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that, with the exception for the performance of the said P/BV portfolio in the first post-formation year ending 31st March 1987, the P/BV portfolio had outperformed the KLCI for all the other relevant post-formation years. The P/BV portfolio that was formed on 31st March 1986 had an investment base value of RM11.74. The initial base investment value of the P/BV portfolio soon grew to RM18.33 for first post-formation year ending 31st March 1987, thus earning a gross investment return of 56.1 percent for the said investment period. As such, the P/BV portfolio that was formed on 31st March 1986 and held for a one-year investment period earned an average annual investment return of 56.1 percent per annum. The performance of the P/BV portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1987, the KLCI managed to earn a commendable average annual investment return of 66.0 percent per annum as compared to the performance of the P/BV portfolio. Thus, the P/BV portfolio under-performed the KLCI by 9.9 percent for the said investment period. In the second post-formation year ending 31st March 1988, the investment value of the P/BV portfolio dropped to RM17.99, but still managed to earn a gross investment return of 53.2 percent in comparison to the initial base investment value of RM11.74. Thus, the P/BV portfolio that was formed on 31st March 1986 and held for a two-year investment period earned an average annual investment return of 26.6 percent per annum. The performance of the P/BV portfolio during the said investment period compares favorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1988, the KLCI only managed to earn an average annual investment return of 24.9 percent per annum as compared to the performance of the P/BV portfolio. Thus, the P/BV portfolio out-performed the KLCI by 1.7 percent for the said investment period. In

the third post-formation year ending 31st March 1989, the investment value of the P/BV portfolio increased to RM30.09, thus earning a gross investment return of 156.3 percent for the said investment period. As such, the P/BV portfolio that was formed on 31st March 1986 and held for a three-year investment period earned an average investment return of 52.1 percent per annum. The performance of the P/BV portfolio during the said investment period compares favorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1989, the KLCI only managed to earn an average annual investment return of 38.2 percent per annum as compared to the performance of performance of the P/BV portfolio. Thus, the P/BV portfolio out-performed the KLCI by a commendable 13.9 percent for the said investment period. In the fourth post-formation year ending 31st March 1990, the investment value of the P/BV portfolio further increased to RM56.56, thus earning a gross investment return of 381.7 percent for the said investment period. As such, the P/BV portfolio that was formed on 31st March 1986 and held for a four-year investment period earned an average investment return of 95.4 percent per annum. The P/BV portfolio during the said investment period compares very favorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1990, the KLCI managed to earn a commendable average annual investment return of 51.4 percent per annum as compared to the performance of the P/BV portfolio. Thus, the P/BV portfolio out-performed the KLCI by a whopping 44.0 percent for the said investment period. In the fifth post-formation year ending 31st March 1991, the investment value of the P/BV portfolio further dropped slightly to RM55.31, thus earning a gross investment return of 371.1 percent for the said investment period in comparison to the base investment value of RM11.74. As such, the P/BV portfolio that was formed on 31st March 1986 and held for a five-year investment period earned an average investment return of 74.2 percent per annum. The performance of the P/BV portfolio during the said investment period compares favorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1991, the KLCI managed to earn a commendable average

annual investment return of 41.5 percent per annum as compared to the performance of performance of the P/BV portfolio. Thus, the P/BV portfolio out-performed the KLCI by a whopping 32.7 percent for the said investment period.

We further examined the post-formation performance of the P/BV portfolio that was formed on 31st March 1987 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that, with the exception for the performance of the said P/BV portfolio in the first post-formation year ending 31st March 1988, the P/BV portfolio had outperformed the KLCI for all the other relevant post-formation years. The P/BV portfolio that was formed on 31st March 1987 had an investment base value of RM13.03. The initial base investment value of the P/BV portfolio dropped to RM11.50 for first post-formation year ending 31st March 1988, thus earning a gross investment return of negative 11.7 percent for the said investment period. As such, the P/BV portfolio that was formed on 31st March 1987 and held for a one-year investment period earned an average annual investment return of negative 11.7 percent per annum. The performance of the P/BV portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1988, the KLCI managed to earn a commendable average annual investment return of negative 9.8 percent per annum as compared to the performance of the P/BV portfolio. Thus, the P/BV portfolio under-performed the KLCI by 1.9 percent for the said investment period.

Further, we examined the post-formation performance of the P/BV portfolio that was formed on 31st March 1988 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/BV portfolio had outperformed the KLCI for all the post-formation years.

Next, we examined the post-formation performance of the P/BV portfolio that was formed on 31st March 1989 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that, with the exception of the performance of the P/BV portfolio for the third post-formation year ending 31st March 1992, the P/BV portfolio had outperformed the KLCI for all the other relevant post-formation years. In the third post-formation year ending 31st March 1992, the investment value of the P/BV portfolio dropped to RM18.34, thus earning a gross investment return of 43.4 percent for the said investment period. As such, the P/BV portfolio that was formed on 31st March 1989 and held for a three-year investment period earned an average investment return of 14.5 percent per annum. The performance of the P/BV portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1991, the KLCI managed to earn an average annual investment return of 14.9 percent per annum as compared to the performance of performance of the P/BV portfolio. Thus, the P/BV portfolio under-performed the KLCI by 0.4 percent for the said investment period.

We examined the post-formation performance of the P/BV portfolio that was formed on 31st March 1990 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/BV portfolio had outperformed the KLCI for all the relevant post-formation years.

We further examined the post-formation performance of the P/BV portfolio that was formed on 31st March 1991 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/BV portfolio had outperformed the KLCI for all the relevant post-formation years.

Further, we examined the post-formation performance of the P/BV portfolio that was formed on 31st March 1992 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/BV portfolio had outperformed the KLCI for all the relevant post-formation years.

Next, we examined the post-formation performance of the P/BV portfolio that was formed on 31st March 1993 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/BV portfolio had outperformed the KLCI for all the relevant post-formation years.

We examined the post-formation performance of the P/BV portfolio that was formed on 31st March 1994 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/BV portfolio had outperformed the KLCI for all the relevant post-formation years.

We further examined the post-formation performance of the P/BV portfolio that was formed on 31st March 1995 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/BV portfolio had outperformed the KLCI for all the relevant post-formation years.

Performance review of the P/E portfolios

We examined the post-formation performance of the P/E portfolio that was formed on 31st March 1986 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that, with the exception of performance of the P/E portfolio for the post-formation years ending 31st March 1987 and 31st March 1988, the P/E portfolio had outperformed the KLCI for all the other relevant post-formation years. The P/E

portfolio that was formed on 31st March 1986 had an investment base value of RM23.31. The initial base investment value of the P/E portfolio soon grew to RM33.98 for first post-formation year ending 31st March 1987, thus earning a gross investment return of 45.8 percent for the said investment period. As such, the P/E portfolio that was formed on 31st March 1986 and held for a one-year investment period earned an average annual investment return of 45.8 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1987, the KLCI managed to earn a commendable average annual investment return of 66.0 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 20.2 percent for the said investment period. In the second post-formation year ending 31st March 1988, the investment value of the P/E portfolio grew to RM34.36 and managed to earn a gross investment return of 47.4 percent in comparison to the initial base investment value of RM23.31. Thus, the P/E portfolio that was formed on 31st March 1986 and held for a two-year investment period earned an average annual investment return of 23.7 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1988, the KLCI managed to earn an average annual investment return of 24.9 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 1.2 percent for the said investment period. In the third post-formation year ending 31st March 1989, the investment value of the P/E portfolio increased to RM53.18, thus earning a gross investment return of 128.1 percent for the said investment period. As such, the P/E portfolio that was formed on 31st March 1986 and held for a three-year investment period earned an average investment return of 42.7 percent per annum. The performance of the P/E portfolio during the said investment period compares favorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1989, the KLCI only

managed to earn an average annual investment return of 38.2 percent per annum as compared to the performance of performance of the P/E portfolio. Thus, the P/E portfolio out-performed the KLCI by 4.5 percent for the said investment period. In the fourth post-formation year ending 31st March 1990, the investment value of the P/E portfolio further increased to RM78.37, thus earning a gross investment return of 236.2 percent for the said investment period. As such, the P/E portfolio that was formed on 31st March 1986 and held for a four-year investment period earned an average investment return of 59.1 percent per annum. The P/E portfolio during the said investment period compares favorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1990, the KLCI managed to earn a commendable average annual investment return of 51.4 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio out-performed the KLCI by 7.7 percent for the said investment period. In the fifth post-formation year ending 31st March 1991, the investment value of the P/E portfolio further grew to RM88.65, thus earning a gross investment return of 280.3 percent for the said investment period in comparison to the base investment value of RM23.31. As such, the P/E portfolio that was formed on 31st March 1986 and held for a five-year investment period earned an average investment return of 56.1 percent per annum. The performance of the P/E portfolio during the said investment period compares favorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1991, the KLCI managed to earn a commendable average annual investment return of 41.5 percent per annum as compared to the performance of performance of the P/E portfolio. Thus, the P/E portfolio out-performed the KLCI by 14.6 percent for the said investment period.

We further examined the post-formation performance of the P/E portfolio that was formed on 31st March 1987 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that, with the exception for the performance of the said P/E portfolio in the second and third post-formation years ending 31st March 1989 and 31st March

1990, the P/E portfolio had outperformed the KLCI for all the other relevant post-formation years. The P/E portfolio that was formed on 31st March 1987 had an investment base value of RM49.33. In the second post-formation year ending 31st March 1989, the investment value of the P/E portfolio grew to RM59.64 and managed to earn a gross investment return of 20.9 percent in comparison to the initial base investment value of RM49.33. Thus, the P/E portfolio that was formed on 31st March 1987 and held for a two-year investment period earned an average annual investment return of 10.5 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1989, the KLCI managed to earn an average annual investment return of 14.7 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 4.2 percent for the said investment period. In the third post-formation year ending 31st March 1990, the investment value of the P/E portfolio increased to RM82.19, thus earning a gross investment return of 66.6 percent for the said investment period. As such, the P/E portfolio that was formed on 31st March 1987 and held for a three-year investment period earned an average investment return of 22.2 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1990, the KLCI managed to earn an average annual investment return of 28.1 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 5.9 percent for the said investment period.

Further, we examined the post-formation performance of the P/E portfolio that was formed on 31st March 1988 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/E portfolio had under-performed the KLCI for all the post-formation years. The P/E portfolio that was formed on 31st March 1988 had an investment base value of RM37.85. The initial base investment value of the P/E

portfolio grew to RM46.49 for first post-formation year ending 31st March 1989, thus earning a gross investment return of 22.8 percent for the said investment period. As such, the P/E portfolio that was formed on 31st March 1988 and held for a one-year investment period earned an average annual investment return of 22.8 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1989, the KLCI managed to earn a commendable average annual investment return of 43.4 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 20.6 percent for the said investment period. In the second post-formation year ending 31st March 1990, the investment value of the P/E portfolio grew to RM56.51 and managed to earn a gross investment return of 49.3 percent in comparison to the initial base investment value of RM37.85. Thus, the P/E portfolio that was formed on 31st March 1988 and held for a two-year investment period earned an average annual investment return of 24.7 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1990, the KLCI managed to earn an average annual investment return of 52.1 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 27.4 percent for the said investment period. In the third post-formation year ending 31st March 1991, the investment value of the P/E portfolio dropped to RM52.76, thus earning a gross investment return of 39.4 percent for the said investment period. As such, the P/E portfolio that was formed on 31st March 1988 and held for a three-year investment period earned an average investment return of 13.1 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1991, the KLCI only managed to earn an average annual investment return of 35.1 percent per annum as compared to the performance of performance of the P/E portfolio.

Thus, the P/E portfolio under-performed the KLCI by 22.0 percent for the said investment period. In the fourth post-formation year ending 31st March 1992, the investment value of the P/E portfolio grew to RM55.74 and managed to earn a gross investment return of 47.3 percent for the said investment period in comparison to the base investment value of RM37.85. As such, the P/E portfolio that was formed on 31st March 1988 and held for a four-year investment period earned an average investment return of 11.8 percent per annum. The P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1992, the KLCI managed to earn a commendable average annual investment return of 26.8 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 15.0 percent for the said investment period. In the fifth post-formation year ending 31st March 1993, the investment value of the P/E portfolio further increased to RM62.64, thus earning a gross investment return of 65.5 percent for the said investment period. As such, the P/E portfolio that was formed on 31st March 1988 and held for a five-year investment period earned an average investment return of 13.1 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1993, the KLCI managed to earn a commendable average annual investment return of 25.0 percent per annum as compared to the performance of performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 11.9 percent for the said investment period.

Next, we examined the post-formation performance of the P/E portfolio that was formed on 31st March 1989 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that, with the exception of the performance of the P/E portfolio for the fifth post-formation year ending 31st March 1994, the P/E portfolio had under-performed the KLCI for all the other relevant post-formation years. The P/E portfolio that

was formed on 31st March 1989 had an investment base value of RM50.02. The initial base investment value of the P/E portfolio grew to RM59.02 for first post-formation year ending 31st March 1990, thus earning a gross investment return of 18.0 percent for the said investment period. As such, the P/E portfolio that was formed on 31st March 1989 and held for a one-year investment period earned an average annual investment return of 18.0 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1990, the KLCI managed to earn a commendable average annual investment return of 42.4 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 24.4 percent for the said investment period. In the second post-formation year ending 31st March 1991, the investment value of the P/E portfolio increased to RM62.92 and managed to earn a gross investment return of 25.8 percent in comparison to the initial base investment value of RM50.02. Thus, the P/E portfolio that was formed on 31st March 1989 and held for a two-year investment period earned an average annual investment return of 12.9 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1991, the KLCI managed to earn an average annual investment return of 21.6 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 8.7 percent for the said investment period. In the third post-formation year ending 31st March 1992, the investment value of the P/E portfolio dropped to RM61.97, thus earning a gross investment return of 23.9 percent for the said investment period. As such, the P/E portfolio that was formed on 31st March 1989 and held for a three-year investment period earned an average investment return of 8.0 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1991, the KLCI managed to earn an average annual

investment return of 14.9 percent per annum as compared to the performance of performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 6.9 percent for the said investment period. In the fourth post-formation year ending 31st March 1993, the investment value of the P/E portfolio increased to RM63.48 and managed to earn a gross investment return of 26.9 percent for the said investment period in comparison to the base investment value of RM50.02. As such, the P/E portfolio that was formed on 31st March 1989 and held for a four-year investment period earned an average annual investment return of 6.7 percent per annum. The P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1993, the KLCI managed to earn a commendable average annual investment return of 14.2 percent per annum as compared to the performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 7.5 percent for the said investment period.

We examined the post-formation performance of the P/E portfolio that was formed on 31st March 1990 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that, with the exception for the performance of the P/E portfolio for the post-formation year ending 31st March 1991, the P/E portfolio had outperformed the KLCI for all the other relevant post-formation years. The P/E portfolio that was formed on 31st March 1990 had an investment base value of RM55.19. The initial base investment value of the P/E portfolio dropped to RM53.47 for first post-formation year ending 31st March 1991, thus earning a gross investment return of negative 3.1 percent for the said investment period. As such, the P/E portfolio that was formed on 31st March 1990 and held for a one-year investment period earned an average annual investment return of 3.1 percent per annum. The performance of the P/E portfolio during the said investment period compares unfavorably with the corresponding performance of the KLCI. During the same investment period ending 31st March 1991, the KLCI managed to earn an average annual investment return of 0.5 percent per annum as compared to the

performance of the P/E portfolio. Thus, the P/E portfolio under-performed the KLCI by 3.6 percent for the said investment period.

We further examined the post-formation performance of the P/E portfolio that was formed on 31st March 1991 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/E portfolio had outperformed the KLCI for all the relevant post-formation years.

Further, we examined the post-formation performance of the P/E portfolio that was formed on 31st March 1992 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/E portfolio had outperformed the KLCI for all the relevant post-formation years.

Next, we examined the post-formation performance of the P/E portfolio that was formed on 31st March 1993 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/E portfolio had outperformed the KLCI for all the relevant post-formation years.

We examined the post-formation performance of the P/E portfolio that was formed on 31st March 1994 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we found that the P/E portfolio had outperformed the KLCI for all the relevant post-formation years.

We further examined the post-formation performance of the P/E portfolio that was formed on 31st March 1995 in comparison against the performance of the KLCI for the subsequent five post-formation years. From such examination, we

found that the P/E portfolio had outperformed the KLCI for all the relevant post-formation years.

The average annual returns of each of the P/BV and P/E portfolios at the end of each formation year are extracted from the individual tables mentioned above and summarized on Table A and Table B respectively in Appendix 1. The average annual returns of the KLCI in each of the portfolios post-formation periods are summarized on Table C in Appendix 1. For the purpose of this study, AR_1, AR_2, AR_3, AR_4 and AR_5 are defined as the average annual returns of post-formation period +1, +2, +3, +4 and +5 years respectively.

From Table A, the average AR of the P/BV portfolios in each of the 10 formation years ranged from 18.1% to 151.9%, with an overall average of **65.8%** return. From Table B, the average AR of the P/E portfolios in each of the 10 formation years ranged from 13.7% to 58.2%, with an overall average of **28.3%** return. Correspondingly, from Table C, the KLCI managed to produce average AR in the 10 portfolio-formation years that ranged from 1.3% to 44.4% return, with an overall average of just **18.7%** return. Clearly, both the P/BV and P/E portfolios have outperformed the KLCI, with the P/BV portfolios outperforming the P/E portfolios over the period covered in this study.

The out-performances of the P/BV and P/E portfolios against the KLCI in each of the ten portfolio-formation years are further summarized on Table D and Table E respectively in Appendix 1. The out-performance of the P/BV portfolios against the KLCI averaged between 14.7% and 150.5%, with an overall average out-performance of **47.0%** over the period of this study. Correspondingly, the out-performance of the P/E portfolios against the KLCI averaged between -19.4% and 37.2%, with an overall out-performance of just **9.6%** over the period of this study.

The results of our tests on the average annual investment return, using the SPSS statistical software package, are tabulated in Appendix 5. We found that the P/BV portfolios have a mean annual investment return of 65.8 percent with a standard deviation of 0.73. The P/E portfolios have a mean annual investment return of 28.3 percent with a standard deviation of 0.23 and the KLCI has a mean annual return of 18.7 percent with a standard deviation of 0.17.

When we performed the paired sample t-tests, we found that the relationship between the P/BV portfolios and the KLCI are statistically significant. The level of significance, p is equal to 0.013, which is less than 0.05. We also found that the relationship between the P/E portfolios and the KLCI are statistically significant. In this case, the level of significance, p is equal to 0.000, which is also less than 0.05. Therefore, the null hypothesis, H_0 is rejected and the alternative hypothesis, H_1 accepted, which implies that the mean annual investment return between the P/BV or P/E portfolios as compared to the mean annual return of the KLCI is significantly different. As in our earlier analysis, these tests provide further evidence that a portfolio consisting of stocks with low P/BV or P/E ratio, formed on the basis of value investing strategy, outperformed the KLCI.

When we performed the regression tests, we found that the relationship between the P/BV portfolios and the KLCI are statistically significant. The level of significance, p is equal to 0.013, which is less than 0.05. The adjusted R square is equal to 0.102. This meant that the variation in the independent variable, in this case, the average annual return of the KLCI, only accounted for 10.2 percent of the variation in the dependent variable, that is, the average annual investment return of the P/BV portfolio. We also found that the relationship between the P/E portfolios and the KLCI are statistically significant. The level of significance, p is equal to 0.000, which is less than 0.05. The adjusted R square is equal to 0.273. This meant that the variation in the independent variable, in this case, the average annual return of the KLCI, only accounted for 27.3 percent of the variation in the dependent variable, that is, the average annual investment return

of the P/E portfolio. Therefore, the null hypothesis, H_0 is rejected and the alternative hypothesis, H_1 accepted, which implies that the mean annual investment return between the P/BV or P/E portfolios as compared to the mean annual return of the KLCI is significantly different. As in our earlier analysis, these regression analysis also provide further evidence that a portfolio consisting of stocks with low P/BV or P/E ratio, formed on the basis of value investing strategy, outperformed the KLCI.

The histograms, cumulative probability and scatter plots generated by the SPSS software for the P/BV portfolios and P/E portfolios indicate that the sampling distributions are not normally distributed. When we proceed to perform the non-parametric Wilcoxon tests, we found that the relationship between the P/BV portfolios and the KLCI are statistically significant. The level of significance, p is equal to 0.000, which is less than 0.05. We also found that the relationship between the P/E portfolios and the KLCI are statistically significant. In this case, the level of significance, p is equal to 0.002, which is also less than 0.05. Therefore, the null hypothesis, H_0 is rejected and the alternative hypothesis, H_1 accepted, which implies that the mean annual investment return between the P/BV or P/E portfolios as compared to the mean annual return of the KLCI is significantly different. As in our earlier analysis, these Wilcoxon tests also provide further evidence that a portfolio consisting of stocks with low P/BV or P/E ratio, formed on the basis of value investing strategy, outperformed the KLCI.

Conclusion

From the results obtained in this study, we found that both the P/BV and P/E portfolios, formed on the basis of the value investing strategy that used historical, public information as popularized by Benjamin Graham and Warren Buffett, have clearly produced abnormal returns and outperformed the KLCI. In refuting the EMH in its semi-strong form, albeit indirectly, we can safely conclude that stock prices do not adjust rapidly to the arrival of new, public information and, therefore, they do not reflect all information of the said stocks. Simply, investors