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A TEST FOR SMALL FIRM EFFECTS ON STOCK RETURNS ON THE KLSE SECOND BOARD

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ZRAL

ABSTRACT

This study examines the association between stock returns and market returns as proxy whether the randomly selected companies experience excess return on the KLSE Second Board. Several researchers postulated a relationship between returns and size of the firms, specifically believed that the rates of return of small capitalisation firms relatively out performed the larger capitalisation firms even after adjusting returns for estimated CAPM betas. This anomaly is defined as the "firm size effect" This paper is to investigate the presence of such excess returns associated with firms size based on the weekly returns data over a period of five years between 4 January 1993 to 13 October 1997. We have used natural logarithm of quoted closing Friday prices in computing returns of these randomly 10 selected firms to impart an upwards bias trend. We also examined the role that measurement error potentially has in simple regression test of excess returns using market returns as proxy. The results indicate that there is no excess returns experienced by these companies due to their betas being less than one and very unstable. We also found that the portfolio returns varied positively with betas in roughly a straight line manner but to be much flatter than those implied by the theory. Even though the results shows weak relationship due to lower beta values for these companies they may have experienced high returns in some of the months, particularly in the month of December, February, April, May and October. These excess returns could have been contributed by the end of the year effect, fiscal year effect, budget announcement effect and festive season effect including end of the week effect instead of size.

CHAPTER 1

INTRODUCTION

The anomaly in stock market has been the focus of many research studies because of its importance to researchers to test the efficient market hypothesis. The theory says if market immediately response to new information, it generally supports market efficiency. But there are exceptions, sometimes anomaly relates to event, for example a study conducted on local stock market by Ahamed and Obiyathulla (1997), their findings suggested that there is abnormal price behaviour around announcement date of bonus stock issuance.[1] On the other hand, with today's automated trading systems has added greater efficiency to the market. However, under the situation that cannot be explained it has become increasing critical for individual investors, institutions and brokers to know how they can managed risk, both systematic (undiversifiable) and unsystematic (diversifiable). Knowing the fact that stock prices behave randomly, investors continuously search for new information and ways to increase their returns and hope to minimise risk through diversification of their portfolio, by balancing their investment holding on large and small capitalisation firms. As a result, investors rely on Capital Assets Pricing Model (CAPM) to determine their stock riskiness which is optimal and how this stock portfolio can be combined with lending at a risk-free rate or borrowing in order to achieve a balance risk-return trade off.

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[1]   Meera, Ahamed Kameel and Bacha, Obiyathulla Ismath, Who Gets the Bonus in Bonus Stock Issuance, International Islamic University Malaysia, 1997, p (i).

The CAPM helps to address analysis of security pricing, development of an ideal investment strategy and evaluation of stock's performance. Many investors are content with stock market being efficient and suggest that the best estimate of value of stock is its current price which would enhance their returns. This is not good enough but not until the late 1970s that it was discovered that common stock of small firm having low price-earnings (P/E) ratio out perform the larger ones with high P/Es, given the same level of risk. However, these have lead to many other rigorous studies being conducted related to excess returns, particularly on small firm.

There is much to be said about excess returns, the issue is very complex where much of these empirical studies hinges on using proxy for the market's assessment to measure excess returns which resulted in many inferences. We have been motivated on this subject because of the application of CAPM. The objective of this study is to examine the association between excess stock returns using CAPM and the significance of this measurement on the KLSE Second Board. The excess return depends on two factors. Firstly, the difference between expected return and return on market index and secondly, the firm's systematic risk is measured by beta. The findings shows no excess returns due to the beta of the respectives firms were below 1.0. Further to this, many of the anomalies are closely related, this study also conducted exploratory analysis using average weekly returns of the month (we computed the monthly excess returns by taking the relative weekly expected return less relative weekly return of market index and add them up for the month, then divide by four weeks for the month that gives the excess return that month) to test for seasonal and calendar effects. The test from this

exploratory investigation shows there are excess returns in the month of December, February, April, May and October that contributed due to seasonal and calendar effects.

The remainder of this study contains five chapters. Chapter 2 provides the empirical evidence on the size effect, that is small firms have provided much higher returns than larger firms. This section also discusses other main anomalies which includes P/E retio effect and January effect. Chapter 3 describes the underlying hypothesis and discusses the purpose of this study to determine whether there is evidence of excess returns on the KLSE Second Board using CAPM. Thus, we have a measure of expected returns, then excess return is the difference between expected return and return on market index. Chapter 4 deals with data and methodology of the study incorporates the steps suggested by Reinganum, thus minimises the biases in measuring the excess returns. Chapter 5 focuses on the results of exploratory analysis and regression analysis as well as discussion on the limitation of CAPM. Chapter 6 contains the study conclusions and suggestions.

CHAPTER 2

EMPIRICAL EVIDENCE ON THE "SIZE EFFECT"

Currently, more investors are investing in small firm, partly attributed to Banz's (1981) findings. The objective of Banz's (1981) study was to measure the relationship between return and market value of common stocks by constructing five common stock portfolios containing stocks based equity capitalisation. He documented the phenomenon by calculating the returns of listed stocks on New York Stock Exchange over the period from 1926 to 1981, ranked by market capitalisation and included the small size firms in his sample. From his studies, he observed that the smaller capitalisation firms have provided a high returns than that of the larger firms. He calculated that the average excess returns from holding very small firms for long and very large firms short over the period 1936 to 1975 was 19.8 percent on the market. However, he offered no conclusions as to why small firms should have given much larger returns than large firms, but suggested that his results might be due to a mis-specification of the CAPM rather than to market inefficiency. Subsequently, Ibbotson Associate updated the performance of the smallest capitalisation dociles for 1982 to 1993. The evidence data is shown in Table I.

Based on the Table I, the small capitalisation firms out performed the larger firms significantly in the first, third and fifth sub-period; but under performed substantially in the second and fourth sub-period. However, there is no explanation as to the occurrence of such behaviour.

Table I : Large & Small Capitalisation Stock Performance (1963-1993)

Sub-period	Small-Capitalisation Returns	Large-Capitalisation Returns
1) 1963-1968	30.90 %	12.20 %
2) 1969-1974	-13.60 %	-3.40 %
3) 1975-1983	35.30 %	15.70 %
4) 1984-1990	2.60 %	14.60 %
5) 1991-1993	29.20 %	15.60 %

Source : Adapted from Portfolio Management by James L. Farrell, Jr.
Second Edition, McGraw-Hill (1997), p 308.

The fact that supports these sub-periods means that the small capitalisation firms on the average recorded high returns relative to the overall stock market index. As such, according to the CAPM this could be due to the higher risk attached to these small capitalisation firms which should be reflected in their higher beta values. Reinganum (1981, 1982) however observed that the higher returns continue to prevail even after adjustment for risk for small capitalisation firms and found that these stock do not lie on the security market line (SML).[2]

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[2]   Cuthbertson, Keith, Quantitative Financial Economics : Stocks, Bonds and Foreign Exchange, Wiley, 1996, p. 170.

Even though Banz (1981) documented equally strong evidence that small capitalisation firms have higher beta, but he also discovered that these phenomenon do not fully explained the high returns. To reiterate Reinganum (1981,1982), in his study on anomalies suggests that either the single period Capital Asset Pricing Model (CAPM) is mis-specified or the capital market is inefficient.

His observations, particularly on the portfolios based on firm size or earning/price (E/P) ratios indicates that these companies experience average returns systematically different from those predicted by single period CAPM. He further highlighted that these "anomalies" persist for the last two years in his study. Such trend however, reduces the likelihood that these anomalies are being generated by market inefficiency, but rather the evidence seems to indicate that the single period CAPM is mis-specificed. In other words, the evidence suggests that single period CAPM may not adequately describe the behaviour of stock prices. This is because his data also reveals that an E/P effect does not emerge after returns are controlled based on firm size, but highlighted that the firm size effect largely subsumes the E/P effect. When each variable is considered separately, these anomalies seems to exist. Hence, this could be related to the missing factors, and these factors appears to be more closely associated with firm size rather than E/P ratios.[3] To sum up his findings, he observed that the portfolio containing small capitalisation firms achieved average rates of return more of than 20 percent per year; higher than those of the portfolio containing the large capitalisation firms.[4]

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[3] Reinganum, Marc, Mis-specification of Capital Asset Pricing, Journal of Financial Economics 9, 1981, P 19.

[4] Reinganum, Marc, Abnormal Returns in Small Firm Portfolios, Financial Analysts Journal, March - April 1981, p 52 53.

Reinganum (1981,1982) derived at his conclusion by ranking about 700 common stocks in the mid-1960s to about 1200 in the mid-1970s listed on the New York Stock Exchange (NYSE) and American Stock Exchange (AMEX) according to size during each year from 1963 to 1997. He defined firm's size based on Banz's (1981) criteria, that is by the market value of the firm's common stock.

This is done by multiplying the outstanding shares for each of the listed firm on the Exchange by its share price at the beginning of the year. Further, he constructed ten common stock portfolio containing stocks ranked according to equity capitalisation size. The firms in the top ten percent of this ranking comprise of the large firm portfolio (*MV 10*). Firms in the bottom ten percent form the small firm portfolio (*MV 1*) and the remaining firms are placed in eight intermediate positions, *MV 9* through *MV 2*. Then, he computes these portfolio betas and all turned out to have betas closed to one.[5] Note that there are various methods currently available for this type of empirical research and it become considerably confusing about their relative merit and sometimes more than one technique is used in such studies which lead to contradiction or inconsistent in their findings. As an example, for Reniganum (1981,1982) to make a meaningful comparison of the investment returns, by adjusting the portfolio returns upward or downward for the effect of investment risk using daily data. While, Banz (1981) used monthly data which implies that small capitalisation firms premium after risk adjustment should be smaller than Reinganum's (1983) findings.[6]

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[5] Reinganum, Marc, The Anomalous Stock Market Behaviour of Small Firms in January, Journal of Financial Economics 12, 1983, p. 91.

[6] Banz, Rolf, The Relationship Between Return and Market Value of Common Stocks, Journal of Financial Economic 9, 1981, p 16.

To avoid further confusion, Goodman (1986) adapted and test Banz and Reniganum's (1981,1982) model to examine the effect of P/E ratio and firm size on common stock returns.[7] The results reveal that portfolios comprising low P/E securities earned high risk-adjusted returns over the 1970-1980, whereas high P/E portfolios produced low rates of returns. This is shown in Table 2.

Table 2 : Mean Quarterly Excess Returns of P/E Portfolios

P/E Quintile	P/E Mean	Beta	Mean Excess Risk-Adjusted Returns (t-values)*
PE1 Lowest	7.1	0.92	2.80% (4.52)
PE2	9.5	0.95	1.51% (2.44)
PE3	11.4	0.98	-0.47% (-0.76)
PE4	14.3	1.02	-1.42% (-2.29)
PE5 Highest	25	1.16	-2.42% (-3.90)

* F-statistic = 12.98 (significance = 0.01)

While the portfolio containing small capitalisation firms consistently proved positive excess returns over the identical time horizon, the stocks of larger firms tended to under perform compared to the average-size and small-size firms.

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[7] Goodman, David A, The Interaction of Firm Size and Price-Earnings Ratio on Portfolio Performance, Financial Analysts Journal, January - February 1986, p 101 - 11.

Table 3, shows the risk-adjusted mean excess returns and beta from the smallest to largest.

Table 3 : Mean Quarterly Excess Returns of Firm Size Portfolio

FS Quintile	Mean (Million $)	Beta	Mean Excess Risk-Adjusted Returns (t-values)*
FS1 Smallest	25.1	1.14	1.30 (2.10)
FS2	85.3	1.04	1.04 (1.68)
FS3	225.8	0.98	0.12 (0.19)
FS4	562.5	0.99	-0.86 (-1.39)
FS5	968.4	0.91	-1.61 (-2.6)

* F-statistic = 12.98 (significance = 0.01)

Roll's (1981) argument on the excess returns was attributed to small capitalisation or firm size are statistical artifacts of improper estimates of beta. He says that beta estimates of small capitalisation firms obtained from the market model may be downward biased because of infrequent trading. Hence, beta for these firms may be difficult to obtain. Nevertheless, he recognised the possibility even the highest point estimate for the beta of the small firm portfolio which does not seem to account for the firm's superior performance. Therefore, he concluded that excess returns related to size can be explained by the mis-assessment of risk.[8]

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[8] Roll, Rechard, A Possible Explanation of the Small Firm Effect, The Journal of Finance, Vol. XXXVI, No : 4, September 1981, p 88.

However, this runs contrary to Reinganum's (1982) findings, which indicates that the ordinary least squares (OLS) estimator in his study shows the magnitude of biases appears to be too small and he is confident that the small capitalisation firms effect is still significant as empirical anomaly.[9]

Further, Reinganum asserts that in equilibrium, CAPM provides the expected returns on any assets equal to the risk-free rate plus risk premium proportional to the asset's beta. Therefore, it is a measure of the asset's covariance with the market as a whole, even with any two assets with the same beta will have the same expected returns. In particular, the model implies that the small capitalisation firms will command higher risk premiums only if they have high betas. The evidence presented by Reinganum suggests that the superior returns of American Stock Exchange (AMEX) and over-the-counter stocks may not be an anomalous event. In fact, these index contains many small capitalisation firms, they could be expected to experience higher average returns, advance than the Dow Jones average, which contains only very large capitalisation firms.

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[9]   Reinganum, Marc, The Direct Test of Roll's Conjecture on the Firm Size Effect, The Journal of Finance, Vol 12 No : 1, March 1982, p. 35.

With these observations on relationship between firm size and securities returns as discussed above has led to re-evaluation of other findings. Brown, Kleidon and Marsh (1983) discerned that the average risk-adjusted returns were linearly related to the logarithm of firm size. Blume and Stambaugh (1983) found that the studies using daily returns tend to overstate the small firm effect because of the "bid-ask" effect. Stoll and Whaley (1983) assessed the impact of transaction costs on Banz (1981) and Reinganum (1981,1982) results which were based on gross returns. Shultz (1983) extended the analysis to AMEX stocks and found that the transaction costs cannot explain the periodic sign reversal observed by Brown, Kleidon and Marsh (1983), or the excess January returns behaviour of small firms. Amihud and Mendelson (1986) hypothesised that investors demand compensation for illiquidity and that the size effect is proxy for liquidity. They employed the bid-ask spread as a measure of market thinness. Chiang and Venkatesh (1988) maintained that higher spread for small firms is not due to illiquidity, but due to insider trading. Hunda, Kithari and Wasley (1987) showed that even the betas of small firm portfolio estimated from monthly returns will have downward biased. Shefin and Statman (1987) have conjectured that size anomaly proxies for a "responsibility" effect. Lehmann and Modest (1987) also found that APT is incapable of explaining the small firm effect. Arbel, Carvell and Strebel's (1983) look at small firms as neglected effect.[10]

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[10]   Jacobs, Bruce I, and Levy, Kenneth N, Forecasting the Size Effect, Financial Analysts Journal, May - June 1989, p 38 - 54.

Keim (1986) has also documented a stronger size effect on Friday which he found that 63 percent of the size effect occur on that day. He also found that the non-linear relationship stems largely from the exaggerated occurrence of the effect in January.[11] Other prominent researchers also looked at international data to see whether the size effect exist in these countries.[12] For example, Brown, Keim, Kleidon and Marsh (1983) studied the stock return seasonalities and the tax loss selling hypothesis in Australia. Berges, McConnell and Schlarbaum (1984) reviewed securities at the turn-of-the-year in Canada, Nakamura and Terada (1984) studied the size effect and seasonality in Japan stock returns and Reinganum and Shapiro (1984) investigated the taxes and stock returns seasonality on London Stock Exchange. Their findings however exhibits an inverse relationship between securities returns and market capitalisation. Their respective results of the analysis is shown in Table 4.

[11] Keim, Donald B, Dividend Yields and Stock Returns : Implications of Abnormal January Returns, Journal of Financial Economics, 1985, p 473 - 489.
[12] Keim, Donald B, The CAPM and Equity Return Regularities, Financial Analyst Journal, May - June 1986, p 24 - 25.

TABLE 4 THE FIRM SIZE EFFECT : INTERNATIONAL EVIDENCE

Australia (1958- [a]		Canada (1951-1980) [b]			Japan (1966-1983) [c]		United Kingdom (1956-1980) [d]		
Size Portfolio	% Return (std error)	Size Portfolio	% Return (std. error) 1951-1972	1973-1980	Size Portfolio	% Return (std. error)	Size Portfolio	% Return (std. error) 1956-1965	1966-1980
Smallest	6.75 (0.64)	Smallest	2.02 (0.27)	1.67 (0.58)	Smallest	2.03 (0.35)	Smallest	1.27	1.00
2	2.23 (0.39)	2	1.48 (0.22)	1.66 (0.56)	2	1.50 (0.32)	2	1.18	0.89
3	1.74 (0.31)	3	1.14 (0.22)	1.41 (0.59)	3	1.38 (0.29)	Largest	0.98	0.84
4	1.32 (0.27)	4	0.99 (0.23)	1.39 (0.56)	4	1.17 (0.27)			
5	1.48 (0.24)	Largest	0.90 (0.23)	1.23 (0.58)	Largest	1.14 (0.27)			
6	1.27 (0.24)								
7	1.15 (0.24)								
8	1.22 (0.24)								
9	1.18 (0.25)								
Largest	1.02 (0.29)								

Notes :

a. P. Brown, D.B. Keim, A.W. Kleidon and T.A. Marsh, "Stock Return Seasonalities and the Tax Loss Selling Hypothesis : Analysis of the Arguments and Australia Evidence. "Journal of Financial Economics, 1983, pp. 105-127.

b. A. Berges, J.J. McConnell and G.G. Schlarbaum, "The Turn-of-the Year in Canada, "Journal of Finance, 1984, pp. 185-192.

c. T. Nakamura and N. Terada., "The Size Effect and Seasonality In Japan Stock Returns" (Nomura Research Institute, 1984).

d. M.R. Reinganum and A. Shapiro, "Taxes and Stock Return Seasonality : Evidence from the London Stock Exchange" (University of Southern California, 1983).

Source : Adopted from Keim, Donald B, Financial Analysts Journal, May - June 1986, p. 26.

In view of the above, it appeals to us that each study ease the interpretation of small firm effect, both qualitative as well as quantitative. However, these studies suggested four explanations for the size effect :

1) Market liquidity means that the large gains for the size effect only seems to apply to the shares of the smallest companies. But, it would be difficult for medium and large institutions to buy and sell companies' on a worthwhile scale without shifting the market price adversely.

2) With regards to information, small firms may not present information as frequently compared to larger firms. Therefore, their stock may be more risky than those of large firms. As a result, the cost of monitoring their performance of a large portfolio of small firms would be much more relative to a smaller portfolio of a large firms.

3) The transaction costs of buying and selling small firm stocks are higher than those of buying and selling the stock of large firms. As such, this will apparently reduce excess returns of small firms.

4) Incorrect estimation of beta of small firms due to disproportion include large number of firms which are non performing. These firms may have risen as a result of their difficulties, and estimates of their betas, which are usually measured over a period of five-year could be underestimated. In addition, closing prices of these stocks may not reflect the price which is actually traded. This will result in their stock prices movements being less sensitive to market movements and again bringing to unrealistic low estimates of their betas. In the event that the actual betas are higher than estimated betas, excess returns will have been overstated by the CAPM.

But, these approaches rely on CAPM to deal with variations of risks. To sum up, however the CAPM assumes that investors are risk-averse and have chosen "efficient" portfolios by maximising expected return for a given level of risk, there is no taxes or transaction costs, there are identical borrowing and lending rates, investors are in complete agreement with regard to expectations about individual securities, and lastly the securities returns have normal distribution.

CHAPTER 3

HYPOTHESIS AND PURPOSE OF THIS STUDY

The efficient market hypothesis contributed by Fama (1965), says that stock price changes are unpredictable and it follows a "random walk".[13] The two key ideas in Fama's thesis are that, the first being investors are rational, and the second, rational investors trade only on new information, and not on intuition. Under this scenario, this has brought us to make reference to Capital Assets Pricing Model, most popularly known as CAPM. This model assumes that rational investors will seek optimum or premium return from risky investments, which means that the risk premium of a share in relation to the market. The model simply suggests that, an investor who diversifies will do better than the one who does not. As a result of this observation, it has helped numerous researchers to further test this model.

While, Fama and French (1992) used the last 50 years to study the cross-section of expected stock returns. They group these companies on the basis of size (market capitalisation) and market to book ratios. These data were simulated using CAPM which provided an explanation of differences in return, but each portfolio contained a wide range of betas.[14] This means that the returns of small firm differs from those of

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[13] Fama, E.F., The Behaviour of Stock Market Price, Journal of Business, January 1965, p 34 - 105.
[14] Fama, E.F. and French K.R., The Cross-section of Expected Stock Returns, Journal of Finance, June 1992, p 427 - 465.

large firm. They concluded that the different returns was attributed to size which is consistent with Gordon (1962) findings, where he observed that common stock returns are inversely related to a firm's size.[15]

Further to these studies, Banz (1981) uses a methodology similar to Fama and MacBeth (1973) and their findings shows a negative relationship between average returns to stock and market value of the stock after controlling for risk. He found that the "size effect" is not linear in the market proportion, but this occurs most to the smallest firms in the sample. On the other hand, Reinganum (1981) also found that small firms on the New York Stock Exchange (NYSE) had higher average returns from the large firms, when returns were adjusted for risk using the CAPM. This discovery seems to coincide with excess returns i.e. returns that are more than compensate for a stock's systematic risk.

The presence of excess returns associated with such factors were referred to as anomalies which can also be seen on the KLSE Second Board, where we observed prices of some of these companies on the Board were extremely high which can be interpreted due to small firm size effect! This bring about to the purpose of this study whether excess return prevails on the KLSE Second Board due to firm size (market capitalisation). In order to determine excess returns, it is necessary to have a measure of what is the expected returns. The used of market model provides the expected return through regression analysis between the return on a firm's security and return on

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[15]   Jacobs, Bruce I, and Levy, Kenneth, Forecasting the Size Effect, Financial Analysts Journal, May June 1989, p 38.