

Size Effect on the Performance of Listed Real Estate Companies

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**INTERNATIONAL REAL ESTATE RESEARCH SYMPOSIUM
(IRERS) 2006
11 – 13TH APRIL 2006
PWTC KUALA LUMPUR, MALAYSIA**

Abstract

The paper presents the examination of company size effect to the risk and return. Many previous studies explore the effects of size to the securitised real estate such as real estate share and real estate trust from the perspective of returns, risk and asset allocation. The study aims to explore the effects of size to the performance of listed real estate share by looking on the implications of real estate company size to the mixed assets portfolio and identifying the relationship between firm size and unsystematic risk of real estate share. The total of 30 real estate shares were randomly selected from Bursa Malaysia and divided into three groups based on size viz: big, medium, small capitalisation group. The result shows that big capitalisation real estate shares have better performance than other real estate share with higher return and lower risk in the allocation with mixed assets. The study also found there is a negative relationship between size and unsystematic risk in which the larger the firm size, the unsystematic risk is lower.

Keywords: Market Capitalisation, Firm Size, Risk, Return, Performance.

1.0 Introduction

The effect of size (market capitalisation) on spreads and returns for stocks have received much attention in the finance literature (Nelling *et al.*, 1995). According to Banz (1981), several study in early eighties have indicated that investment in common stocks in small-sized firms earned significantly higher rate of returns than similar investment in medium or large-sized corporations.

However, there are little studies to date that explore the effects of size to the securitised real estate such as real estate share and property trust (Real Estate Investment Trusts - REITs) from the prospective of returns, risk, performance, diversification and allocation. A study by McIntosh, Liang and Tompkins (1991) showed evidence of a size effect in REITs, demonstrating that small firms perform better than large firms. They found that smaller REITs provided greater return without greater risk and there is a negative relationship between size and return. Thus, there are debates on does the size affect the performance of securitised real estate. This is the first area of this study.

The asset allocation decision determines to a great extent both the returns and the volatility of the portfolio which explain the power of diversification. Bomfim (2003) has studied the assets allocation with the large and small capitalisation stocks, corporate bonds, government bonds and money market instrument to construct efficient frontier. Therefore, does the size of securitised real estate in a portfolio affect the return and risk? This is the second area of this study.

However, risk can be defined as the possibility on loss/damage due to unexpected circumstances such as economic downturn (Sharpe, 1999). The total risk associated with investments is usually classified under the headings of systematic and unsystematic risk (Mayo, 2003). The study of Byrne and Lee (2003) probably is the first study to test empirically relationship between real estate portfolio size diversification and risk in UK real estate portfolio. According to their study, by increasing the portfolio size might lead to a larger reduction in unsystematic risk. Does the real estate share in Malaysia perform the same relationship with their findings? This is another area of the study.

The main objective of this study was to investigate the effects of firm size on the performance of listed real estate companies in Malaysia. This paper examines the effects from risk return analysis of listed real estate shares with different sizes and the implications of firm size in mixed assets portfolio. The scope this study is, first, risk return analysis is merely based on the share price movement. Secondly, the study only examines the relationship between unsystematic risk and size as the systematic risk is a non-diversify risk which cannot be eliminated or reduced by diversification.

2.0 Firm Size Effect

The firm size effect was also found to be closely linked to the so-called 'neglected firm effect' caused by the lack of information and limited institutional interest. To date, the firm size effect remains an unsolved issue. Until it is resolve, firm size, or a variable highly correlated with size, may be used as a variable to determine the returns in security and real estate market.

Abbrose and Linneman (2001) found a statistically positive coefficient on firm size and a statistically negative coefficient for the quadratic size effect, indicating that firm profitability increases with firm size but at a decreasing rate. They also have undertaken sensitivity analysis (evaluating the regression equation at the data means) indicates that for

every billion dollar increase in market capitalization, REIT profit margins will increase by approximately 9%.

Fama and French (1992) using a multivariate model to tested the robustness of the size effect. They found that firm sizes have a good explanation and prediction on variations in stocks returns over the period 1963 to 1990. Furthermore, they found inverse relation between firm size and return; the smaller the firms size the larger the return.

Without the common stock, there are also many studies about the firm size effect in the real estate and REITs. Byrne and Lee (2003) used 136 UK real estate portfolio fund with 11 years from 1989 to 1999 data to determine the relationship between real estate portfolio size, diversification and risk. From their result, they found that a significantly positive correlation between size and diversification does not necessarily translate into a negative correlation between size and risk.

Conover, Friday and Howton (1998) used the monthly stock prices, dividends and split information from January 1985 to June 1996 to examine the return of real estate firm related to size. They used medians to measure return and standard deviation to measure risk. As a result, they found that in both Local Currency and U.S. Dollars, the relationship between firm size and return as well as risk is monotonic across quartile grouping. The return and risk differences between large firms and small firms is statistically significant.

In fact, the results of these researchers show that the size effect is still very much an unsolved issue. It can only be said that the single factor market model does not completely explain the behaviour of the returns and risks in the stock and real estate market. A firm size or a variance highly correlated with size is an omitted factor in the model to determine the returns and risk in the real estate securities market.

3.0 Relationship between Return, Risk and Firm Size

Investments are made to earn a return. The returns of investment are from the change of the market value either capital gain or loss and the income such as dividend. Risk is concerned with the uncertainty that the realized return will not equal the expected return.

Peterson and Hsieh (1997) investigate REIT pricing and performance with the firm size using five factors model of Fama and French (1993). They hypothesize that the factors which influence the stock returns possibly also have an effect on, to a greater or lesser extent, returns on REITs shares. Their results indicate that risk premiums on REITs are significantly related to risk premiums on a market portfolio of stocks since REITs are also traded on the stock exchanges.

Kishore (2002) examines the effects of size and value attributes on listed property trust (LPT). He found that size and value premiums are significant in both LPT and stock risk premiums. However, size premium is more profound in LPT while value premium is more dominant factor in stocks.

There are some studies on the implications of fund size to securitised real estate, such as Ziering and McIntosh (1999), they studied the relationship between real estate size and risk-return profile which is performance measurement. They found that real estate size is a powerful moderator of risk/ return across the spectrum of size and that the largest category of real estate (\$100, million and over), while providing investors with the highest average return, also exhibits greatest volatility.

4.0 Data and Analysis

There are 88 companies listed in main board and two companies listed in second board up to 31st December 2003 but only 30 listed real estate shares were randomly chosen for the study.

The required data are the closing price and market capitalisation of the 30 listed real estate share that has been chosen randomly; Kuala Lumpur Composite Index (KLCI), The Malaysian Housing Index (MHI), returns of Treasury Bills (TB) and Malaysian Government Securities (MGS). According to Glascock *et al.* (2004), close-to-close returns are of interest to long-term investors and are a common return measure used in academic studies. This study period is from year 1992 until 2003 because the data for MGS are only available from year 1992. To standardise the data, the annual data are used as MHI is only available on annually basis. The average market capitalisation of each real estate shares from 1992 to 2003 are used to dividing the real estate shares into three groups which is big, medium and small capitalisation group.

According to Mason, Lind and Marchal (1998), Cumulative Frequency Distribution gives the answer of the percentage of observations that are less than a particular value. There are several essential steps to group the real estate shares. First, the thirty real estate shares' average market capitalisation is arrange from small to large in order and grouped frequency distribution. Then, an Ogive is drawn by using the cumulative frequency and prices. Finally used the formula to calculate the big, medium and small capitalisation and then divided the real estate shares into three groups in which comprise ten listed real estate shares in each group. The formula is as below:-

$$Size = L + \left[\frac{\frac{N}{3} - cum f}{f} \right] (C) \quad (1)$$

Where L is Lower Limit of the class, N is Total Frequency, $cum f$ is Cumulative Frequency before the class, f is Frequency of class and C is size of class.

The 30 real estate share divided into 3 capitalisation group based on the range of average market capitalisation. Table 1 show the range of market capitalisation for each real estate group.

Table 1: Real Estate Share Group

Real Estate Group	Average Market Capitalisation
Big Capitalisation Group	RM550,000,002 until RM1,800,000,001
Medium Capitalisation Group	RM 300,000,002 until RM 550,000,001
Small Capitalisation Group	RM 0 until RM 300,000,001

The mean-variance analysis, Sharpe ratio and coefficient of variation are used in order to analyse the performance of these real estate groups. Sharpe ratio is estimated by calculating the ratio of the average risk premium for a portfolio and divided by its total risk (Brown & Matysiak, 2000) which can be represented as follows:

$$\text{Sharpe ratio} = \left(\frac{r_p - r_f}{\sigma_p} \right) \quad (2)$$

Where, r_p is portfolio's return, r_f is risk free return and σ_p is portfolio risk.

The coefficient of variation (CV) is calculated to rank those groups from the following (Hishamuddin *et al.*, 2003):-

$$CV = \frac{\text{Risk}}{\text{Rate of Return}} \quad (3)$$

Next, the mean-variance analysis is used to examine the allocation of portfolio, which comprises the firm size. The correlation and covariance is used to examine the diversification potential of the assets. However, the efficient frontier is used to determine the impact of portfolio allocation either shift upward for positive impact or shift downward for negative impact. The construction of efficient frontier can be done using SOLVER of Microsoft Excel for windows spreadsheet. SOLVER is capable to determine the maximum or minimum value of one cell by changing other cells (Hishamuddin & Ruddock, 2000).

Capital Asset Pricing Model (CAPM) is used to analyses the relationship of systematic risk and unsystematic risk against firm size by using average market capitalisation of all real estate share. Systematic risk is the market risk that can not be eliminated by diversification. By using CAPM, the systematic risk can be determined by using beta. Formula to determine beta (systematic index) is:-

$$R_i = \alpha_i + \beta_i R_m + \varepsilon_i \quad (4)$$

Where, R_i is the return of the asset i , R_m is the return on the market portfolio, β_i is the index of systematic risk of asset i , α_i is the intercept coefficient and ε_i is a random error term, which has an expected value of zero.

The systematic index in Equation (4) serves as a proxy for systematic factors affecting the return on all assets. Since the residual vector (ε_i) is by construction uncorrelated with the returns on the market (m), the following variance decomposition holds (Byrne and Lee, 2003):-

$$Var(R_i) = \beta_i^2 Var(R_m) + Var(e_i) \quad (5)$$

where $Var(R_i)$ is total risk which associated with asset's returns, $\beta_i^2 Var(R_m)$ represents the variability of asset (i) return that stems from systematic factors and $Var(e_i)$ represent the return variability specific to the asset

The empirical relationship between size and unsystematic can be estimated by the following regression:

$$\text{Log (Unsystematic Risk}_i) = \alpha_i + \beta_i \log(\text{Size}_i) \quad (6)$$

Where Size is the market capitalisation of i real estate share; α_i and β_i are the regression coefficients to be estimated.

The purpose of this regression is merely to determine how firm size is related to the unsystematic risk. The portfolio theory predicts a significance and negative relationship between size and unsystematic risk, while increase in size has no effect on the systematic risk.

5.0 The Results

Table 2 shows that big capitalisation group perform better than others. From the Sharpe ratio, the highest performance is big capitalisation group (0.1994) followed by small capitalisation group (0.1870) and medium capitalisation group (0.1818). The overall real estate shares group indicates 0.1887 of Sharpe ratio.

Table 2: The Returns, Risk and Performance of Overall Real Estate Shares, Big, Medium and Small Capitalisation Group

Investment Options	Return	Risk	Sharpe ratio	Risk Adjusted Ranking	CV
Big Capitalisation	20.96%	80.42%	0.1994	1	3.8370
Medium Capitalisation	22.61%	97.30%	0.1818	3	4.3033
Small Capitalisation	24.23%	103.25%	0.1870	2	4.2600
Overall Property Shares	22.60%	93.65%	0.1887	-	4.1437

The return and risk for big capitalisation group are 20.96% and 80.42% respectively which are the lowest risk and return among the groups. Although, the return and risk of small capitalisation group is the highest, big capitalisations group have performed better than small capitalisation group. The coefficient of variation of big and small capitalisation group is 3.837 and 4.26 respectively.

Figure 1 shows the risk and return space for those groups.

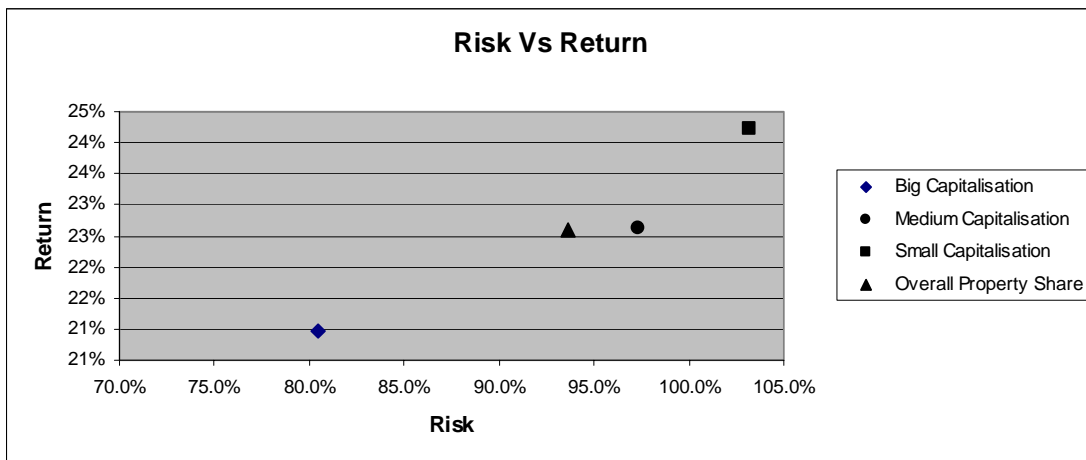


Figure 1: Risk and Return of Real Estate Share Group

Figure 1 shows that big capitalisation group have the most conservative point in risk return space. Although the position of overall real estate share is close to medium capitalisation group in risk return space graph but the overall real estate shares have better performance than medium capitalisation. Therefore investing in overall real estate share is better than medium capitalisation group. For aggressive investors, they should consider investing in small capitalisation group.

5.1 Risk and Returns of Various Assets

The averages of annual returns and risk of various assets are shown in Table 3.

Table 3: Average Returns of Various Assets

Assets	Average Returns	Risk
KLCI	8.66%	35.62%
MHI	0.53%	16.20%
TB	4.93%	1.75%
MGS	5.05%	1.72%
Big Capitalisation Group	20.96%	80.42%
Medium Capitalisation Group	22.61%	97.30%
Small Capitalisation Group	24.23%	103.24%
Overall real estate shares	22.60%	93.65%

The small capitalisation has the highest average return and risk which are 24.23% and 103.24% respectively. The average return of MHI is only 0.53 and the lowest among other assets. Overall, the returns for KLCI and MHI are mainly affected by the economic turmoil in 1997 which experience the drop of nearly 52% and 48% respectively. Nevertheless, real estate shares have outperformed in Bursa Malaysia compared to other sectors. Coincidentally, during the period of study, Bursa Malaysia experienced the highest KLCI points in 1994 and the lowest points in 1998 which contributing for higher risks.

5.2 Comparison Between The Efficient Frontier Among the Capitalisation Group

Figure 2 compares four efficient frontiers, which are the asset mix of KLCI, MHI, TB and MGS with four different groups of real estate shares.

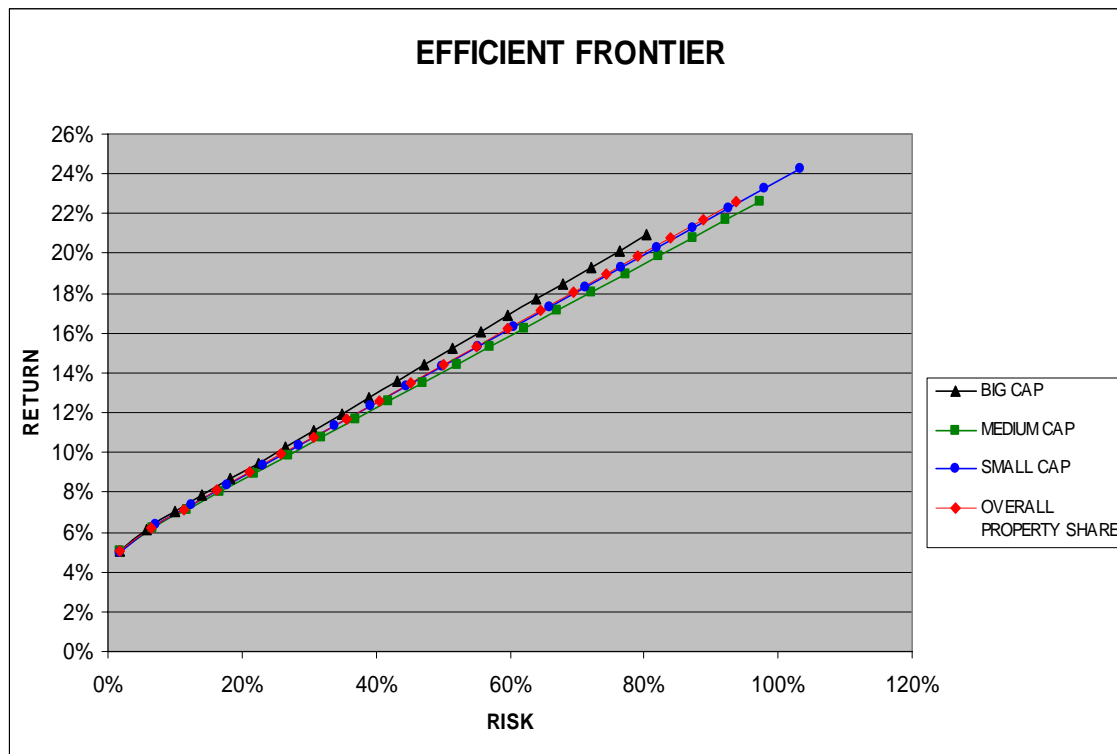


Figure 2: Comparison between the Efficient Frontier of Mixed Assets with Big, Medium, Small Capitalisation and Overall Real Estate Shares

Figure 2 shows slightly differences of four efficient frontiers whereby efficient frontier with asset mix and big capitalisation group lies above others frontiers. Hence, the frontier incorporates big capitalisation group are able to provide higher return at the same level of risk with others. In other words, by including big capitalisation group in the

investment portfolio would offer better performance. The investment portfolio of asset mix and medium capitalisation group lies below all other combinations which show the unfavourable of asset mix.

5.3 *Measuring Systematic and Unsystematic Risk*

There are two components of total risk, which are systematic and unsystematic risk. Table 4 is display the systematic risk, unsystematic risk and total risk of each real estate group.

Table 4: Systematic, Unsystematic and Total Risk of each Group

	Total Risk	Systematic Risk	Unsystematic Risk
Big Capitalisation	76.64%	65.48%	11.16%
Medium Capitalisation	111.74%	92.45%	19.28%
Small Capitalisation	124.24%	84.74%	39.50%
Overall Real Estate Share	104.21%	80.89%	23.31%

Table 4 shows the empirical relationship between size and the various measures of risk. One immediate observation is that as size increase, total return variability does not, similar to the expectations of portfolio theory (MPT). The small capitalisation group has the highest total risk that is 124.24%, followed by medium capitalisation group (111.74%), and big capitalisation group which is the lowest or 76.64%. Generally, there is a negative relationship between total risk and firm size, which is when the firm size is increase, the total risk will drop.

In addition, Table 4 also shows the relationship between size and the two components of total risk, which is systematic risk and unsystematic risk. The systematic risk rises from big capitalisation group (65.48%) to medium capitalisation group (92.45%) and falls from medium capitalisation group to small capitalisation group (84.74%). The overall real estate shares group has 80.89% of systematic risk, which is lower than medium and small capitalisation groups. Therefore, the relationship between size and systematic risk is quite difficult to explain and unpredictable.

The patterns illustrated in Table 4 provide empirical support for the classic view that size improves diversification. Since unsystematic risk declines with increased size, this implies that the size of real estate shares enhance diversification. However, the size of real estate share is negatively related to increased systematic risk, suggesting that small capitalisation group have an increasing tendency to invest in certain risky assets or follow riskier investment strategies.

There is also a negative relationship between unsystematic risk and size. It means when the size increases, the unsystematic risk will decrease which follows MPT. For small capitalisation group, the unsystematic risk is the highest which is 39.50%. While the unsystematic risk of big capitalisation group, is the lowest (11.16%). The medium capitalisation group and overall real estate shares group have 19.28% and 23.31% of unsystematic risk respectively. The results show that as expected, the unsystematic risk can be reduced by diversification.

5.4 *The Empirical Relationship between Size and Unsystematic Risk*

Table 5 shows the regression that interprets the relationship between size and unsystematic risk.

Table 5: Regression on Systematic Risk and Size

	Log (Unsystematic Risk)
Constant	1.642506658
Log (Size)	-0.302765139

From the Table 5, the relationship between unsystematic risk and size is as: -

$$\text{Log}(\text{Unsystematic Risk}) = 1.6425 - 0.3028 \text{Log}(\text{Size}) \quad (7)$$

From Equation 7, there is a negative relationship between firm size and unsystematic risk as observed by Byrne and Lee (2003). It means that when the size is increase the unsystematic risk will decrease as explained in previous section. The investor can reduce the risk by investing on big capitalisation group.

6.0 Conclusion

This paper has examined the size effect to the performance of real estate shares. From Sharpe ratio and CV, big capitalisation group has better performance and lower risk than small group. This result is same as the findings of Conover, Friday and Howton (1998) in which larger firms have higher return and lower risk than small firms.

The efficient frontier of mixed assets with big capitalisation group is also better than others in which can provide an ideal and best possible of investment portfolio. The study also found the negative relationship between unsystematic risk and size which means when the size increase, the unsystematic risk will decrease as it is a diversifiable risk. Therefore the unsystematic risk of big capitalisation real estate companies is lesser than other real estate share groups as the big capitalisation companies have the ability to reduce the risk by diversifying the real estate business. The activities of big capitalisation group are mostly involved in property development and investment in various scales. A study by Hishamuddin and Ruddock (2000) also observed that real estate companies with high market capitalisation employ growth strategy which undertakes an active portfolio policy.

The empirical research on real estate investment analysis using a capital market approach is still young in Malaysia as the perception of indirect real estate investment are still ambiguous. No doubt the selected real estate shares are very much influenced by the overall performance of shares in Bursa Malaysia. Nevertheless, there is some explainable behaviour that can be explored in relation to real estate investment.

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