EFFECTS OF PROPERTY PORTFOLIO CHARACTERISTICS ON M-REIT RISKS

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ABSTRACT

This study examines the effects of property portfolio characteristics on risks of Malaysian REITs. Risk is represented by three different proxies i.e. log of standard deviation, beta and Sharpe's ratio. The analysis is based on the March 2007 to December 2008 period. Three separate regressions are carried out and a total of ten independent property variables are used in this study. These independent variables are property type, diversification, management type, insider ownership, age, debt/equity ratio to represent leverage, price/FFO, variable to fixed debt ratio, total market capitalisation and book to market value. The cross-sectional regression technique is used to examine each variable's effect on risk and whether the risk factor is statistically significant. This study found diversification as a factor which consistently affects property portfolio risks, while other characteristics such as insider ownership, age, leverage, debt ratio and size are also found to have high significance in explaining the risk of a REIT property portfolio. The findings of this study suggest that REIT managers should pay attention to diversification, as it affects a REIT's property portfolio risk in a consistent manner.

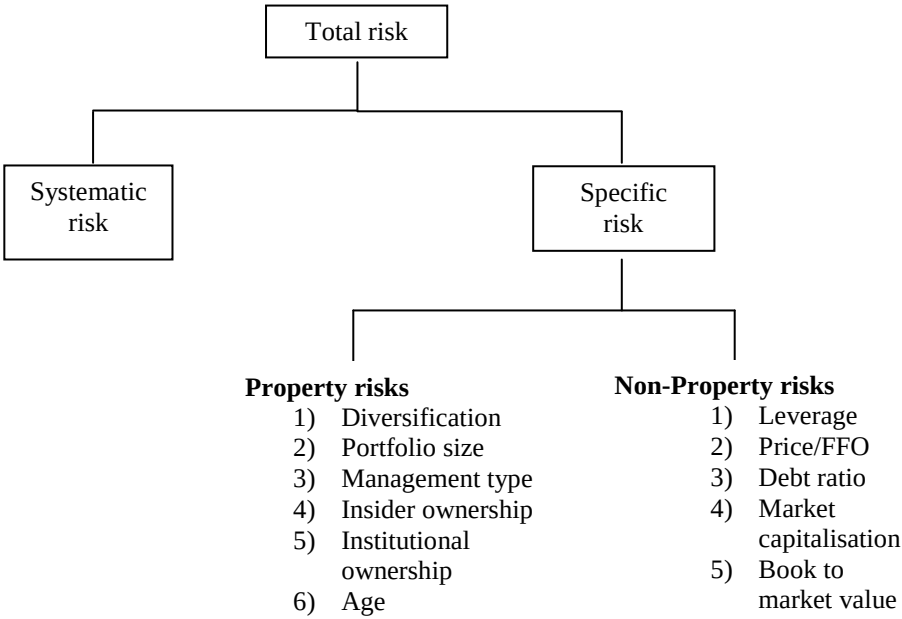
Keywords: REIT, risk, property portfolio, property characteristics

INTRODUCTION

Past research on Malaysian Real Estate Investment Trusts (M-REITs) has focused on performance and is mainly limited to the examination of M-REIT performance benchmarked against the Kuala Lumpur Composite Index (KLCI) or Kuala Lumpur Property Index (KLPI) (e.g. Newell, Ting and Acheampong, 2002; Rozali and Hamzah, 2006). Factors affecting the risks of REIT portfolios are not well examined.

Modern Portfolio Theory suggests that a portfolio's risk comprises systematic risk and specific risk. Systematic risk refers to market risk which cannot be diversified away, while specific risk refers to the risk associated with the individual assets which can be reduced through diversification. In the context of REITs, systematic risk is associated to the general market condition which is affected by macroeconomic factors and this type of risk is shared among all investments and cannot be diversified away (refer Figure 1). Specific risk on the other hand refers to the risk associated with the underlying properties and usually is diversified through property type or geographical diversification.

Figure 1: Risk characteristics of a REIT portfolio



The link between REIT's risk and property characteristics are well documented and the relationship between REITs and its underlying real estate has received considerable attention. Capozza and Lee (1995), Ziering, Winograd and McIntosh (1997), Clayton and MacKinnon (2003), Lee, Lee and Chiang (2008) and Hartzell, Kallberg and Liu (2005) are among the research that have explored this relationship.

This research aims to examine the effects of property portfolio characteristics on M-REIT risks and how property portfolio risk is priced in the public capital market.

The objectives of this research are:

1. To examine the relationship between risk and REIT's property portfolio
2. To examine the effect of property characteristics on portfolio risk
3. To explore the significance of property specific and non-property specific risk factors on REIT's property portfolio risk.

Only a handful of research has been done examining the relationship between risk and portfolio characteristics; i.e. Anderson and Springer (2005), and Springer and Cheng (2006) which focused on US REITs. In the course of searching for past research done on the relationship between risk and portfolio characteristics in the context of REITs in developing countries e.g. Malaysia, there are none to be found. This research serves to fill this research gap on M-REITs and for emerging markets in Asia.

The rest of this paper is organised as follows: Secton 2 will present and discuss related literature that provide some insights in identifying the property characteristics affecting REIT portfolio risk. Section 3 will provide the data and methodology used in this dissertation, while Section 4 present the findings and Section 5 provides the conclusion and recommendations.

LITERATURE REVIEW

Significance of property risks

The performance and the risk associated with a REIT are related to its underlying properties (Ziering *et al*,.1997; Clayton and MacKinnon, 2003; Lee, Lee and Chiang, 2005; and Lee *et al.*, 2008). Lee *et al.* (2008) examined the linkage between equity REIT returns and private real estate, and concluded that the risk exposure of REITs varies over time and that REIT returns reflect the performance of its underlying real estate.

Another issue related to property portfolios is diversification. Diversification of REIT portfolios are achieved through diversification by property type and geographical location. In terms of property type diversification, retail properties have been found to enhance REIT's value. Gyourko and Neiling (1996) found that systematic risk varies across firms depending on the types of properties they own; with REITs owning only retail properties having a beta almost 50% larger than that of a REIT specializing in industrial properties. Their research concluded that although retail REITs are able to provide better returns, they also have a higher beta value because retail tenants' income rely heavily on the catchment market that determines the disposal income of the public.

The effect of type of management on REITs has been documented in Bers and Springer (1998), Allen *et al.* (2000) and Hartzell *et al.* (2005). The type of

management of a particular REIT, whether it is self-managed or managed by a third party may affect the performance of a REIT. Bers and Springer (1998) concluded that internally managed REITs are more efficient, while other research stated only the type of management that could significantly affect the performance of a REIT.

Ownership pattern refers to insider ownership and institutional ownership. It is noted that all thirteen M-REITs included in this study have a high level of institutional ownership, whereby they are among the 30 largest unitholders, while ten out of thirteen M-REITs have a high level of insider ownership i.e. the management has a high level of share ownership of the particular REIT. The degree of insider and institutional ownership indicates the level of risk of the REITs concerned. Past research such as Below *et al.* (2000), Ciochetti *et al.* (2002), Hess and Liang (2003) and Casey *et al.* (2006) conclude that institutional investors prefer a larger and less risky REIT. Although Below *et al.* (2000) and Ciochetti *et al.* (2002) both concluded that institutional investors' preference shifts over time, institutional investors' preference in less risky REITs can be attributed to their need to maintain a more prudent investment strategy.

Significance of non-property risks

Apart from being related to its property risk, REITs are also affected by its non-property risk such as its debt structure, portfolio size and book-to-market value. This perspective has been investigated by a number of researchers which includes Allen, Madura and Springer (2000), Lewis, Springer and Anderson (2003), Ooi and Liow (2004), Hartzell *et al.* (2005) and Lee *et al.* (2005).

The leverage ratio seems to capture the negative effect of debt that is not included in the market beta. Therefore, leverage is another risk factor that is priced by the market in demanding a higher return (Schulte, 2009). Bhandari (1988) found that debt ratio (debt to equity) is positively related to expected stock return. Allen *et al.* (2000) concluded that REITs can reduce the sensitivity of their returns to stock market changes by minimizing financial leverage. Lewis *et al.* (2003) researched on the cost efficiency of REITs in relation to its leverage type, along with management type and diversification, and found that REITs with lower debt are able to perform better.

The finance literature generally classifies common stocks with high book-to-market value as value stocks and common stocks with low book-to-market value as growth stocks. Ooi and Liow (2004) commented that from an asset pricing perspective, the premium attached to value stocks indicates that investors require higher returns from stocks with high book-to-market value. Chui, Titman and Wei (2003) analysed the impact of the book-to-market value ratio on the cross-section of REIT returns and found that value stocks performed better than growth stocks in the pre-1990 period on

both a risk-unadjusted and risk-adjusted basis. However, this relationship diminishes in the post-1990 period.

Colwell and Park (1990) found size to be significant in REIT pricing. McIntosh, Liang and Tompkins (1991) found that smaller REITs are able to earn higher average rates of return and their model is robust when controlled for risk, since small REITs are at worst no more risky than their counterparts and experience lower levels of systematic risk. In a more specific model, McIntosh *et al.* (1991) showed that smaller REITs are in fact significantly less risky than their counterparts. Chen, Hsieh, Vines and Chiou (1998) found evidence that size is significant in explaining cross-sectional REIT returns. Furthermore, size was the only variable significant in any pricing model with a negative coefficient, suggesting that a risk premium is applied to smaller REITs, which are causing higher stock market returns and the small-size effect.

Ambrose, Highfield and Linneman (2005) and Bryne and Lee (2000a) found that large REITs perform better. Ambrose *et al.* (2005) concluded that large REITs tend to operate at lower cost and have a lower beta, while Byrne and Lee (2000a) put forward a theory that large property portfolios provide better diversification compared to smaller property portfolios. Byrne and Lee (2000a) observed that while large portfolios have high systematic risk, they also carry lower specific risk, creating a counterbalancing effect for itself. Apart from this, Byrne and Lee (2000a) also concluded that larger REITs are able to use a greater amount of debt compared to smaller REITs and so have greater leverage and hence a higher systematic risk.

DATA AND METHODOLOGY

Data

Monthly closing values of the Kuala Lumpur Composite Index (KLCI) are used to proxy the performance of the Bursa Malaysia, representing the Malaysian equity investment return. The monthly closing values of Malaysian Government Securities (MGS) Index are used to proxy the risk-free return. The thirteen REIT's monthly closing values and income distributions are used to calculate total returns and risks for each REIT. These datasets are obtained from Bloomberg.

The study period is from March 2007 to December 2008. With thirteen REITs, the cross-sectional data covers a total of 559 data points. Other information pertaining to individual REITs was extracted from their respective annual reports.

Methodology

The Herfindahl Index is used to measure diversification. The Herfindahl Index for diversification across property type is calculated as:

$$\text{Property Type Herfindahl Index} = \sum P_i^{\,2}$$

where P_i is the proportion of the property portfolio invested in property sub-type i.

The geographical diversification factor has been dropped in this research because the properties held by M-REITs are located in prime areas of Kuala Lumpur and concentrated in the Klang Valley; therefore geographical diversification is not incorporated in the analysis of M-REITs in this study.

Another important measurement is the measurement of obsolescence. This research has grouped the age of properties in the portfolios into two age groups; less than 15 years and more than 15 years. The age of a property is determined based on the date of completion. For completed buildings which have undergone refurbishment, the estimated effective age is the number of years since the property was renovated. The properties held by M-REITs are relatively new, with only 28% of them aged 15 years and above.

Property and non-property factors which might influence the risk of M-REIT's property portfolios are adapted from Springer and Cheng (2006). The property factors include type of management, type of lease and ownership pattern. The non-property factors included in this study are debt structure, price to Funds From Operation (FFO) ratio, total market capitalization and book to market value ratio.

Using the above property and non-property factors as independent variables, this research employs the cross-sectional ordinary least square (OLS) regression technique to test the specifications of the following two general models:

$Risk_i = f$ *(risk factors, portfolio characteristics)*

Sharpe ratio = f (risk factors, portfolio characteristics).

$Risk_i$ is proxied by standard deviation of monthly returns to represent volatility. REIT's beta is used to represent systematic risk. The use of R^2 (the coefficient of determination) as a measurement of systematic risk is not being adopted because it only measures the ratio of systematic risk to total risk and it can easily be manipulated by adding more variables. Beta values on the other hand describe how expected return is correlated to the market.

The Sharpe ratio (SI) is calculated as follows:

$$SI = \frac{R_i - r}{\sigma_i}$$

where R_i is the average historical rate of return on a portfolio, r is the risk-free rate

and σ_i is the standard deviation of returns of the portfolio. By estimating the model using standard regression techniques and controlling for various diagnostic problems, estimates of each variable's effect on risk and whether the risk factor is significant is derived. Table 1 provides a list of variables used and their definitions.

Table 1: List of variables and its measures/proxies

A. Dependent variables	**Measures/Proxies**
Standard deviation	the square root of the variance of the monthly REIT return over the selected study period
Beta	a measure of REIT's systematic risk with the general stock market using the CAPM
Sharpe ratio	the ratio of REIT's risk premium (expected return minus risk free rate) to its risk (standard deviation)
B. Independent variables	**Measures/Proxies**
Property type herfindahl index (type)	the portfolio's Herfindahl index based on property types
Relative portfolio size (size)	the size of the portfolio divided by the average portfolio size
Self-managed properties (manage)	a binary variable with 1 indicating a self-managed REIT, and 0 otherwise
Insider ownership (insider)	a binary variable with 1 indicating insider ownership, and 0 otherwise
Institutional ownership (ins. own.)	a binary variable with 1 indicating institutional ownership, and 0 otherwise
Effective age less than 15 years (age < 15)	the number of properties in the REIT's portfolio with an effective age of less than 15 years. Effective age is the lesser of the reported age or the years since renovation.
Effective age more than 15 years (age > 15)	the number of properties in the REIT's portfolio with an effective age of more than 15 years
Debt/Equity ratio (D/E)	the ratio of the REIT's total debt to its equity
Price/FFO (P/FFO)	the current common stock price divided by the Funds From Operations (FFO) per share from the annual report ending 2008
Variable-to-fixed rate debt (debt ratio)	the ratio of the REIT's variable rate debt to its fixed rate debt
Total market capitalisation (mkt. cap. rm million)	the total market capitalisation of the REIT as of year end 2008
Book value/market value (book ratio)	the ratio of the book value of the REIT's assets to its market value

ANALYSIS AND FINDINGS

Risk is represented by different proxies in three separate regression models:

(a) standard deviation of monthly returns (Model 1),
(b) risk-adjusted return represented by Sharpe ratio (Model 2) and
(c) systematic risk represented by beta (Model 3).

The regression results in this research are obtained by using the following general models:

Risk = a + b1 (Type) + b2 (Size) + b3 (Manage) + b4 (Insider) + b5 (Ins. Own.) + b6 (Age < 15) + b7 (Age > 15) + b8 (D/E) + b9 (P/FFO) + b10 (Debt ratio) + b11 (Mkt. Cap.) + b12 (Book ratio)

Return = a + b1 (Type) + b2 (Size) + b3 (Manage) + b4 (Insider) + b5 (Ins. Own.) + b6 (Age < 15) + b7 (Age > 15) + b8 (D/E) + b9 (P/FFO) + b10 (Debt ratio) + b11 (Mkt. Cap.) + b12 (Book ratio)

Table 2 shows the descriptive statistics. It shows that institutional ownership is a constant and therefore is removed from the regression models. The Sharpe ratios show that the period under this analysis reflects that of a downturn market. The negative return is because M-REIT monthly closing prices have dropped by 10% - 20% caused by the global financial crisis.

Table 2: Summary of descriptive statistics

Independent variables	Descriptive Statistics			
	Mean	Std dev	Min	Max
Type	1.273	0.976	0.344	4.318
Size	1.000	0.753	0.176	3.044
Manage	0.769	0.439	0.000	1.000
Insider	0.769	0.439	0.000	1.000
Ins. Own.	1.000	0.000	1.000	1.000
Age < 15	6.077	3.818	0.000	12.000
Age > 15	2.462	2.332	0.000	7.000
D/E	0.467	0.304	0.016	0.981
P/FFO	6.733	4.261	0.103	13.961
Debt ratio	4.849	4.295	0.000	12.206
Mkt. cap. (RM million)	329.192	248.012	57.790	1002.056
Book ratio	2.118	0.472	1.379	2.996
Dependent variables				
Log of standard deviation of returns	-1.233	0.158	-1.454	-0.992
Sharpe ratio	-0.112	0.132	-0.335	0.061
Beta	0.430	0.189	0.224	0.877

Table 3 shows that portfolio size and market capitalisation has high correlation (1.000), therefore it would be meaningless to add this variable into the models. This is probably because the M-REIT industry is still in its infancy stage and has not evolved much. Moreover, the closing prices for each respective REIT have not deviated too much from its Initial Public Offering (IPO) price. Hence the relative portfolio size variable has been excluded from the regression models.

Table 4 shows the the regression results which include ten variables in the equation with a coefficient of determination (R^2) of 0.975, 0.923 and 0.990 for the log of standard deviation model, risk-adjusted return model and beta model respectively. The regression model explains 84.8%, 53.9% and 93.7% of the variation in the dependent variable i.e. the risk which are proxied by standard deviation, Sharpe ratio and beta respectively in the three regression models. The regression output also reports the adjusted R square of 0.848, 0.539 and 0.937 for the standard deviation model, Sharpe ratio model and beta model respectively. From Table 4, the F-ratio of 18.978 in the beta model is statistically significant at the 0.05 level, indicating that the model is a good fit to the data. The F-values are not statistically significant for the other two models.

Table 3: Correlation matrix

	Type	Size	Manage	Ins. Own.	Age < 15	Age > 15	D/E	P/FFO	Debt ratio	Mkt. Cap.	Debt ratio	Log of standard deviation of returns	Sharpe ratio	Beta
Type	1.000	-0.366	0.054	0.114	0.161	0.260	-0.552	0.021	-0.256	-0.366	-0.112	0.034	0.277	-0.199
Size		1.000	0.182	0.291	0.082	-0.187	0.022	0.078	-0.097	1.000	-0.519	-0.414	-0.456	-0.243
Manage			1.000	0.567	0.211	0.276	0.050	0.537	-0.432	0.182	-0.037	-0.038	-0.033	-0.354
Insider				1.000	0.061	-0.132	0.009	0.340	-0.015	0.291	-0.413	-0.370	0.274	-0.661
Age < 15					1.000	0.389	0.297	-0.452	-0.290	0.082	0.042	0.000	-0.266	-0.420
Age > 15						1.000	-0.326	0.025	-0.528	-0.187	-0.099	-0.287	0.152	-0.237
D/E							1.000	-0.267	0.489	0.022	0.625	0.289	-0.165	0.168
P/FFO								1.000	-0.042	0.078	-0.281	-0.292	0.091	-0.246
Debt ratio									1.000	-0.097	0.259	-0.203	-0.045	0.031
Mkt. Cap.										1.000	-0.519	-0.414	-0.456	-0.243
Book ratio											1.000	0.667	-0.054	0.588
Log of standard deviation of returns												1.000	0.122	0.723
Sharpe ratio													1.000	0.091
Beta														1.000

Table 4: Regression results

	Log of standard deviation	Sharpe ratio	Beta
Constant	-0.750	0.787	1.269
	(-2.285) **	(1.650) *	(5.032) ***
Property Type (herfindahl index)	0.541	1.175	0.795
	(1.851) *	(2.306) **	(4.232) ***
Self Managed	0.298	-0.192	0.318
	(0.824)	(-0.305)	(1.368)
Insider ownership	-0.561	0.087	-0.936
	(-1.916) *	(0.171)	(-4.976) ***
Effective Age less than 15 years	-0.608	-1.823	-1.504
	(-1.744) *	(-2.998) ***	(-6.714) ***
Effective Age greater than 15 years	-0.581	0.704	0.038
	(-3.242) ***	(2.252) **	(0.327)
Debt/Equity ratio	1.153	2.650	1.668
	(2.100) **	(2.765) ***	(4.724) ***
Price/FFO	-0.316	-0.441	-0.560
	(-1.175)	(-0.938)	(-3.236) ***
Variable/fixed debt ratio	-0.966	-0.936	-0.730
	(-4.133) ***	(-2.295) **	(-4.856) ***
Total market capitalization ('Mil)	-0.415	-0.703	-0.003
	(-2.164) **	(-2.102) **	(-0.025)
Book/market ratio	-0.301	-1.649	-0.644
	(-0.653)	(-2.054) **	(-2.177) **
R square	0.975	0.923	0.990
Adjusted R square	0.848	0.539	0.937
F value	7.720	2.402	18.978 *

Note: Number in each bracket is t-value.
Significant at 0.05 (*), 0.01 (**) and 0.001 (***) levels

The following discusses as each of the ten independent variables used in the three models.

Diversification

The regression result in Table 4 shows that the diversification factor is significant at the 0.01 and 0.001 level for the Sharpe ratio model and beta model respectively. Thus, diversification is a significant factor affecting the risk of the property portfolios of M-REITs. The result is consistent with Bers and Springer (1998), Gyourko and Neiling (1996) and Ooi and Liow (2004), where diversification plays an important role in explaining REIT risk and return.

Management type

The management type factor proxied by self-management has positive coefficient values for standard deviation model and beta model, but a negative coefficient value for the Sharpe ratio model. However, none have t-values which is statistically different from zero. The results are contrary to the findings of Bers and Springer (1998) and Allen *et al.* (2000) who found that internally or self-managed REITs perform better; the three models have failed to prove this relationship.

Insider ownership

The insider ownership factor is a significant factor in the standard deviation model. Most investors are more comfortable investing in an investment when they know that the management has substantial holdings in the company. This explains the negative relationship between insider ownership and risk.

Age

New properties are found to be significant and inversely related to all three risk dependent variables, suggesting that when more new properties are added to the portfolio, standard deviation and beta decreases. This may be due to new properties being able to attract tenants more easily compared to older properties. Also, new properties will require a lower maintenance cost.

As for the inverse relationship between new properties and the Sharpe ratio, acquisition cost may be the answer. New properties normally come with a higher price tag, thus reducing yield; however, most investors are willing to settle for a lower yield in view of capital appreciation possibility. This will eventually lead to a lower return in the short run, thus creating a negative relationship between new properties and the Sharpe ratio.

Another reason for the inverse relationship between new properties and the Sharpe ratio may be institutional ownership. According to Hess and Liang (2003), institutional investors prefer new properties over older ones; therefore, it would be

safe to assume the presence of institutional investors in these REITs. Institutional investors generally require a lower return than other risk-taking investors, thus creating an inverse relationship between new properties and the Sharpe ratio.

As for old properties (age more than 15 years), it is found that old properties have an inverse relationship with standard deviation, while having a linear relationship with the Sharpe ratio. Though not as strongly related to risk/return measurements as new properties, the relationship with standard deviation and Sharpe ratio is statistically different from zero at the 0.001 and 0.05 level respectively.

The inverse relationship between old properties and standard deviation suggest that as more older properties are added to the portfolio, standard deviation decreases. As total risk also encompasses specific risk, the shift of significance from new properties to older ones may be due to significance of specific risk. In short, it suggests that while systematic risk is more sensitive to new properties, specific risk is more sensitive to older ones.

Leverage

The leverage factor is statistically significant in all the three models. The high positive relationship between leverage and risk is expected because Allen *et al.* (2000) pointed out, as a REIT becomes more highly leveraged, its sensitivity towards the stock market also increases, therefore increasing its standard deviation and beta. This relationship is further strengthened by the higher coefficient between leverage and beta compared to standard deviation. This implies that beta of a property portfolio is more sensitive towards its leverage, because as the portfolio becomes highly leveraged, the more sensitive it is towards the market risk. Similar to Schulte (2009), leverage is found to be positively related to REIT risk-adjusted returns. This is because leverage is a risk factor that is priced by the market in demanding a higher return from companies with a higher leverage ratio (Schulte, 2009).

Price to FFO ratio

The price to FFO ratio is only significant in the beta model. Price to FFO ratio is commonly used as a measure of a REIT's ability to pay a dividend and is similar to how price/earnings ratios are used in the equity market. Table 4 above indicates that price to FFO ratio is significant in explaining the beta model and is negatively related to it. This indicates that a REIT will be able to reduce its beta by increasing its payout from its FFO. This is consistent with Ting and Yunus (2007) who found that FFO is affected by the economic condition because the FFO is dependent on the well being of the economy, therefore making it a significant variable in explaining the beta model.

Debt ratio

Debt ratio is a significant factor in all the three models. Contrary to Springer and Cheng (2006) who only found significance between debt ratio and standard deviation,

there appears to be significance for all three dependent variables in this study. It is found that debt ratio is most significant in explaining beta, followed by standard deviation and lastly the Sharpe ratio. The negative relationship suggests that investors prefer variable rate debt over fixed rate when it comes to risk reduction. This is probably caused by the gloomy economic outlook at the end of 2007, which brings in the expectation that the base lending rate will be revised lower, thus resulting in lower cost of capital.

Market capitalisation

The market capitalisation factor is a significant factor in the standard deviation and Sharpe ratio models. Consistent with Springer and Cheng (2006) and Schulte (2009), market capitalisation is found to be negatively related to risk-adjusted return. This implies that as the REIT's size gets bigger, standard deviation decreases and so does its risk-adjusted return. The negative relationship between size and standard deviation is expected because as REIT size increases, more properties will be added into the portfolio and it is able to diversify across a broader region and property type, thus increasing its systematic risk but lowering its specific risk (Byrne and Lee, 2000a).

Book to market value

The book to market value factor is a significant factor in the Sharpe ratio and beta models. Contrary to Schulte (2009), the regression results for the Sharpe ratio and beta model shows that book to market value ratio is negatively related to the two models. The negative relationship could be caused by the low risk premium priced on REITs with high book to market value. REITs with high book to market value are seen as value stocks and investors are willing to accept a lower return for stocks of this nature. This explains the inverse relationship between book to market value and the Sharpe ratio in the model above. The same reason applies for the explanation of the inverse relationship between book to market value and beta; because of the high book to market value of these REITs, they are priced with a lower risk premium, hence resulting in an inverse relationship with beta.

SUMMARY AND CONCLUSION

The purpose of this research was to examine the effects of property portfolio characteristics on the risks of Malaysian REIT property portfolios. Property characteristics are segregated into property risks which include diversification, type of management, presence of insider ownership, age and non-property risks which include leverage, price/FFO ratio, debt ratio, book to market value and size. Risk is proxied using log of standard deviation of monthly returns, risk-adjusted return represented by the Sharpe ratio and systematic risk represented by beta.

The regression results show that the beta model is the best model among the three models. Among the ten independent variables in the models, diversification exhibits high significance in explaining the beta model with a positive relationship. This implies that diversification across property type is able to reduce the beta of a REIT's property portfolio. Apart from that, a counter balancing effect between specific risk and systematic risk is observed.

Insider ownership is found to be significant in explaining the beta model. This brings a conclusion that there exists an investor sentiment effect in that investors feel safer investing in a REIT with insider ownership. The relationships between age and the three separate risk measurements are mostly a negative relationship, save for a positive relationship between old properties and the Sharpe ratio. This situation is attributed to acquisition cost and institutional ownership. The regression results also appear to suggest that beta is more sensitive towards new properties, while standard deviation is more sensitive towards older properties.

The relationship between leverage and the three risk measurements are very strong, showing a positive relationship with all three risk proxies. The property characteristic which remains inconclusive is the effect of market capitalisation. This may be caused by the small numbers of properties held in M-REIT property portfolios. Byrne and Lee (2000b) suggested that portfolios with relatively few properties can have a very high or very low risk and the only way to study this relationship in the context of M-REITs is to examine the relationship between the size of individual REITs and its systematic risk. When more new REITs are listed on Bursa Malaysia, this relationship could be examined in the future.

Further research may examine the relationship between portfolio risk and focused or diversified REITs. Bers and Springer (1998) and Schulte (2009) have shown that focused and diversified REITs behave differently and its property characteristics have different effects on them.

The findings of this research are useful to investors when making investment decisions, as they will be able to understand the attributes of property portfolio risk better and which factors that are significant in affecting their portfolio. REIT managers will also benefit from the findings because they can have a more accurate assessment on how an individual property in their portfolio affects their asset holding.

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