The relationship between common risk factors and UK property shares

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Summary

The performance of international property shares has been studied broadly (Eichholtz, 1996,1997,1998). Based on the global and country general stock and property share indices, previous studies indicated that the correlation between property shares and ordinary common shares is decreasing. Therefore, there is diversification potential for investing in international property shares instead of holding real property. However, it is not clear that this phenomenon is just a cyclical or a more permanent change. Therefore identifying the reason of different performance of property shares is necessary.

Previous studies indicate that REITs may possess distinct risk factors from common shares. This paper examines the relationship between return of UK Property Company and company specific variables, to see whether any of the risk factors prevailing among common equities are useful in explaining the cross-sectional return variation in UK property shares.

Modified Fama-Macbeth regression is used to test the relationship between monthly cross-section return and company beta and specific variables. The results show that Beta or size has power when used alone to explain cross sectional return variation. However, when more than one factor is included in the model, none of them has consistent relation with expected return. Also, there is no evidence of significant relationship between beta and size of UK property shares.

Key words: property shares, expected return, risk factors.

Introduction

Recent research questions the adequacy of the CAPM as a model for expected return. Specifically, many papers argue that market beta does not suffice to explain the cross-sectional return variation. Fama and French (1992) conclude that there is a reliable size effect over the 50-year period (1963-1990), but little relation between beta and average return. The relationship between firm size and average stock returns is also documented in Banz(1981). In addition, earlier research finds that debt/equity and earning /price ratios (Bhandari,1988 and Basu, 1983) also contain information about average stock returns. However, Fama and French find that when used in combination, size and BE/ME capture the apparent roles of leverage and earning/price ratios in returns. Further, Fama and French (1993) develop a three-factor model in which a stock's expected return depends on the market factor (beta), size and BE/ME. Despite the empirical evidence of Fama and French, Gleen (1995) and Dusan(1999) argue that CAPM predicts expected return instead of realised return, they find a consistent and significant relationship between beta and returns by adjusting for expectations concerning negative market excess returns.

Although Fama and French (1992, 1993) exclude REITS from their analysis, some research focuses on the common risk factors to return variation of REITS since then. Peterson and Hsieh (1997) indicate that risk premium on equity REITS are significantly related to risk premium on a market portfolio of shares as well as to size and BE/ME. Many other studies have been conducted in evaluating REIT performance (Kuhle, 1986; Liu, 1990; Grieg 1990; Chen, 1998). However, these studies investigate only US REITS. Obviously, for the purpose of investigating on the diversification benefit of investment on international property shares, it is necessary to study on relationship between common risk factors and returns of international property shares.

The performance of international property shares has been studied broadly (Eichholtz, 1996,1997,1998). Based on the global and country stock and property stock indices, previous studies indicated that property stock market has fundamentally changed since 1980's, it shows the correlation is decreasing between the property markets and common stock markets as market matures (Hartzell, 1993). This may imply a more potential for diversification on the mixed-asset level for property shares. However, it is still not clear whether risk return characteristics of property shares behave different from common shares. If the beta of property shares is not associated with the expected return, any evidence of decreasing beta is less meaningful for the purpose of diversification benefit of investing in property socks.

The objective of this study is to investigate the relationship between common risk factors and expected return of European property shares. This paper studies on the performance of UK property shares. Investigation on property shares in other major European countries will be followed.

The next section describes the data and methodology. This is followed by the presentation of empirical results. The final section contains concluding remarks.

Data and Methodology

As mentioned in last section, this study focuses on the UK property shares. Unlike empirical research on common stock market, we investigate on individual stock instead of portfolio since there are a relative small sample of property shares comparing to general shares.

We follow the criteria of identifying the property shares defined by the Global Property Research (GPR). Until the end of 1998, there are 77 property companies listed in UK stock market. For the reason of estimating the beta and testing the expected return, we select those companies listed from 1984. We use monthly return data of all property shares provided by GPR, the sample period is 1985-1998. Firm specific variables such as size, BE/ME. Earning price ratio, leverage are collected from Datastream. These variables are measured in the same way as Fama and French(1992). We use FTSE all share index as a proxy of market return and UK government bond yield as risk free return.

In general, the sample period (1984-1998) is divided into two subperiods. The first subperiod (1984-1988) is used for the beta estimation. Beta of each stock is updated through the sample period. The second subperiod (1989-1998) is for testing relationship between return and beta, size and BE/ME. During testing period of 1989-1998, there are 4320 observations of cross sectional return from 40 property shares on monthly average. We use individual stock instead of forming portfolios because of the small sample size. This is the same reason that the shares are not sorted by the beta or other firm specific variables.

Modified Fama and Macbeth(1973) regression is used to test the cross sectional return against beta and other firm specific variables. First, beta of each property stock is estimated using rolling 60 months return data starting from Jan.1985. In the second step, relationship between cross section return and beta, return and specific variables are tested from 1990 to 1998 on the monthly basis.
Beta of property shares is measured by general market model as shown below,

$$R_{it} - R_{ft} = \beta\,(R_{mt} - R_{ft}) + \varepsilon_{it} \qquad (1)$$

Where:
R_{it} : property stock's return in each study month t
R_{ft} : Risk free rate using UK government bond rate
R_{mt}: Market return using FTSE All Share index
ε_{it} : the error term

For testing relationship between beta and cross sectional return, we use two methods. One is used by Fama and French (1992,1993); the another is proposed by Pettengill (1995).
The first method is based on the Equation (2) ,

$$R_{it} = \gamma_{0t} + \gamma_{1t} * \beta_i + \varepsilon_{it} \qquad (2)$$

Equation (1) estimates the beta risk for each stock using realised return for both stock and the market, which providing a proxy for the beta in the CAPM. Under the assumption that betas in the estimation period proxy betas in the testing period, a test for a positive risk-return relationship utilise Equation (2). If the value of γ_1 is greater than zero, a positive risk-return relationship is supported. γ_1 is the average slope from the monthly regressions of individual stock returns against estimated beta. T-test is used for testing the significance of the value of average slope.

The second method is proposed by Pettengill (1995), he argues that the relationship between the return and beta is conditional on the relationship between realised market return and the risk-free return. If $R_m < R_f$, then $\beta_p*(R_{mt}-R_{ft}) < 0$. In this case, the predicted return includes negative risk premium that is proportional to beta. Therefore, Equation (3) is used for testing the relation between return and beta.

$$R_{it} = \gamma_{0t} + \gamma_{1t} * \beta_i * \delta + \gamma_{2t} * (1-\delta) * \beta_i + \varepsilon_{it}$$

Where $\delta=1$, if $(R_{mt}-R_{ft}) > 0$, and $\delta = 0$, if $(R_{mt}-R_{ft}) <0$
The above relationship is examined for each month in the test period by estimating either γ_1 or γ_2 , depending on the different market excess return.

In the same way, the Size and BE/ME of each stock are tested individually and together with beta as three-factor model (Fama and French, 1993). Since we don't sort shares by size or beta because of small sample size, it is necessary to analyse the relation between beta and firm specific variables, which can identify the true explanatory variables for return variation. For this reason, regressions are conducted between beta and firm specific variables.

Results

A. Beta vs. Returns

Panel A of Table 1 presents the estimates of average slope coefficients and t-statistics. The results of first testing method indicated that the regression coefficient associated with the market beta is not significant from zero. This is in line with the findings of Chen(1986) using ordinary common shares and Fama and French (1992) using non-financial shares. Therefore, our finding in UK property shares does not support CAPM when first testing method applied.

Panel B of Table 1 presents average of slope coefficient and t-statistics under two conditions. Hypothesis here is that positive relation between beta and realised return during periods of positive market excess return and a negative relation during periods of negative market excess return. This hypothesis is supported by the results of Panel B. Mean value of γ_1 is 0.015 which is significant different from zero. Mean value of γ_2 is –0.025 is also significant different from zero. The results show that high beta shares outperform in bull market and underperform in bear market. We support that the beta of property shares has reliable relation with expected return by this evidence.

Table 1. Average slope from monthly regression of stock returns on Beta under two methods (Beta estimation from 1985)

Panel A Estimating slope by: $R_{it} = \gamma_{0t} + \gamma_{1t} * \beta_i + \varepsilon_{it}$			
Period (1989-1998) 120 months	γ_1	T-statistics	P-value
	0.017	0.34	0.360
Panel B Estimation slope by: $R_{it} = \gamma_{0t} + \gamma_{1t} * \beta_i * \delta + \gamma_{2t} * (1-\delta) * \beta_i + \varepsilon_{it}$			
Positive market excess return 70 months	γ_1	T-statistics	P-value
	0.015	2.82	0.003
Negative market excess return 50 months	γ_2	T-statistics	P-value
	-0.025	-7.14	0.000

B. Three Factor Model

As proposed by previous research, Size, BE/ME and beta are considered as important factors in explaining return variation for common shares. Table 2 shows the results of average slopes (t-statistics) of the monthly regression of returns against beta, size and BE/ME.

Table 2. Average slope from monthly regression of shares returns on Beta, Size and BE/ME of property shares

Beta	Ln(ME)	Ln(BE/ME)	P/E
	-0.0018 (-1.78584) (0.04)		
		0.0068 (1.30) (0.10)	
			0.0002 (0.52) (0.30)
0.002 (0.78) (0.22)	-0.000048 (-0.01) (0.50)		
0.004 (0.66) (0.26)		0.0032 (0.90) (0.18)	
	-0.00065 (-0.2) (0.42)	0.0032 (1.07) (0.14)	
0.002 (0.43) 0.33)	-0.001 (-0.48) (0.32)	0.002 (0.57) (0.28)	

- Numbers in parentheses are t-statistics and p-values.

As presented in Table 2, size alone helps to explain the cross section of average stock returns, which is consistent with the evidence of previous research both on general shares and REITS. While BE/ME has no explaining power for expected return variation, this result is different from results of common shares. Similar evidence also is found by Hsieh (1998) on REITS. When more factors are introduced in the regression against expected returns, none of them shows reliable relationship with expected stock returns. All average slopes are not significant different from zero. Again, it differs the results achieved from common shares. Fama and French (1992,1993) present the consistent relationship between Size, BE/ME and expected returns under the combination with beta. However, our results are in line with the evidence from Hsieh (1998). Although Peterson's findings (1997) support the three factor model in explaining expected return on REITS, the results should be considered with reservation, since only time-series returns are used in their study.

Considering the conditional market excess return, we also investigate the relationship between expected return with more variables under two circumstances. Table 3 presents the results of regressions of expected return against beta and size, beta and BE/ME. Under the situation of positive and negative market excess return, the mixed results are appeared. As the market excess returns are positive, the coefficients of beta are significant from zero when size factor or be/me is added. The significance of beta is disappeared when the market excess returns are negative. These results are conflict with the finding of Dusan Isakov (1999) on common shares. He find that beta is consistently significant when size factor is either included or not in the model.

However, size factor has no explaining role under both cases, which is in line with the results of table 2. Therefore we suggest that, for predicting the expected return, size factor for property shares is not as important as for common shares.

Table 3. Average slope from regressions of stock returns on variables under conditional market excess returns

	$(R_{mt} - R_{ft}) > 0$		$(R_{mt} - R_{ft}) < 0$	
Beta	0.010 (2.52) (0.007)	0.011 (1.61) (0.055)	-0.005 (-0.96) (0.17)	-0.00297 (-0.27) (0.39)
Ln(ME)	0.003 (0.86) (0.20)		-0.0040 (-0.43) (0.33)	
Ln(BE/ME)		0.004 (2.24) (0.014)		-0.00295 (-0.49) (0.31)

The reason of poor results of beta in Table 2 and the part of Table 3 may come from the correlation between beta and other explanatory variables such as Size and BE/ME. For the purpose of comparison between common shares and property shares in terms of risk return characteristics, only well known explanatory variables i.e. size and BE/ME are taken into account in this study. If there is a strong relation between beta and other variables, the true correlation between beta and expected return may be distorted. Therefore, we investigate the correlation between beta, Size and BE/ME in the following part.

C. Beta vs. Size and BE/ME

Table 4 shows the correlation between beta and Size, beta and BE/ME of UK property shares based on the cross-sectional data in last 10 years.

Table 4 Correlation between beta and size, beta and BE/ME

	Ln(ME)	Ln(BE/ME)
Beta	0.023	-0.11
T-statistics	1.25	-1.15
P-value	0.12	0.13

It is obvious that there is no strong relation between beta and size or beta and BE/ME. Particularly, our evidence of extremely low correlation between beta and size (0.023) is contrast with the finding of Fama and French (-0.988), which again demonstrates the significant different role of size factor in explaining expected returns of common shares and property shares.

Conclusion

The roles of common risk factor in REITS are explored extensively in recent years. Our research expands the coverage of property shares to the European market. This paper analysed the risk return characteristics of UK property shares. We find that beta of property shares has consistent relation with expected return under two categories of market access return. Also, size of property company has explaining power of expected return, while BE/ME has no strong relation with return variation.

However, when more than one factor included in the model, none of them shows significant correlation with expected return. Further, we find no evidence of correlation between beta and size or beta and BE/ME. This result implies that there might be other factors important to risk premium of property shares. Clearly, further research is needed.

Nevertheless, our results have two important implications for property investors. First, reliable relation between beta and expected return indicated that decreasing beta of property shares provides the diversification potential in the future. Second, size of shares is not an explanatory variable for expected returns of property shares despite it's significant role in common shares. Third, the three factor model of Fama and French is not efficient to explain the expected return of property shares, which indicates possibility of existing of other risk factors related to returns of property shares. Since only UK property shares are studied here, further research is needed to cover other markets and risk factors.

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