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Diversification as a Value-Adding Strategy for Asian REITs: A Myth or Reality?

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This study tests the impact of diversification strategies on the cash flows, expenses, risks and returns of REITs in Asia. Hirschman-Herfindahl indices (HHI) are computed based on 2281 properties owned by 63 sample Asian REITs for the periods from 2002 to 2007 to measure the levels of diversification by property type and geographical region. In our empirical tests that use weighted least square regressions, we find no significant effects of diversification by property types on cash flows, expenses and risk premiums of Asian REITs. However, significant variations in expenses and risk premiums of the REITs are explained by a geographical diversification strategy. REITs with assets distributed across different countries incur higher total expenses, interest expenses,general and administrative expenses and capital expenditure. Regionally diversified REITs have higher risk premiums. The results remain unchanged after controlling for country factor and simultaneity between the cash flows, expenses, risk and return variables.

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Keywords

Diversification and focus strategies; Asian REITs; Illiquidity premiums

1. Introduction

Real estate investment trusts (REITs) have a long history of existence in the United States since 1961.[1] In comparison, REITs in Asia have been a relatively recent phenomenon. REITs were formally listed in Japan in September 2001. Singapore and Hong Kong followed suit by introducing the securitized real estate vehicle in their stock exchanges in 2002 and 2005, respectively. Currently, seven Asian countries have REIT listings which are Japan, Singapore, Hong Kong, Malaysia, Thailand, Taiwan and Korea. There were 102 REITs listed across Asia bourses with an aggregate market capitalization of US$79.51 billion as of 24 December 2007. Japan is the largest market in Asia, constituting about 55.8% of the market share followed by Singapore and Hong Kong, contributing 26.6% and 10.5% to the aggregate market capitalization in Asia, respectively, as of December 2007.

REITs grow their asset portfolios through new real estate acquisitions and/or enhancement to existing real estate. REITs acquire a wide range of property assets which range from retail, office, residential and industrial properties to more sophisticated asset classes like carparks, hotels, healthcare and hospitals, and plantations. However, the Hirschman-Herfindahl index (HHI) computed based on assets owned as of 2007 (See Table 2) shows that diversification by property type is still not prevalent among REITs in Asia. The portfolios of Hong Kong REITs are the most diversified by property type among others. Regional diversification through investing in overseas real estate is not in the short-term plans of many Asian REITs. Asian REITs, except for Singaporean REITs (S-REITs), do not invest outside their home markets.[2]

In Singapore, local REITs like the Mapletree Logistics Trust and Ascott Residence Trust grow their asset portfolios by acquiring overseas properties. The Singapore Exchange has also been successful in attracting REITs with overseas properties, which include Fortune REIT, LippoMapleTree Indonesia Retail Trust, Ascendas India Trust, CapitaRetail China Trust and Saizen REIT, to list on the Singapore's bourse by creating a favorable tax environment and pro-REIT legislation. Based on a sample of 245 real estate assets owned by 17 S-REITs in 2006 and 2007, 55 of the assets, which constitute 21.14% of the

[1] According to the National Association of REITs (NAREIT), there were 152 REITs in the US with a market capitalization of US$312 billion by the end of 2007.

[2] Hong Kong actually listed the Guang Zhou Investment Trust with properties in mainland China; however, since its return to China, the REIT is no longer considered geographically diversified.

total assets valued at US$20.17 billion, are located outside Singapore.

Do Asian REITs with homogenous portfolios perform better than comparable REITs that diversify by asset type and geographical location? Why do Asian REITs (excluding S-REITs) not diversify outside the domicile markets and/or hold real estate in more than one sector in the portfolios? In the US, studies show that diversification has no significant effects on economies of scale and synergy values in REIT portfolios (Bergs and Springer, 1997; and Ambrose, Ehrlich, Huges and Wachter, 2000). Capozza and Seguin (1999), however, show significant liquidity discounts in REITs with property type diversification, but the same discounts are not found in REITs diversified by region.

Based on the stock performance indicators of sample Asian REITs in Table 3, we expect positive risk premiums for REITs diversified by property type. The results, however, show no significant variations in the performance between cross-border REITs and REITs that focus on domicile real estate markets. If we analyze only the sub-sample S-REITs, regional diversification commands a premium of about 1.58% after controlling for property type variations in the portfolios. This study aims to empirically test the causal effects of diversification by type and geographical region on stock performance of the sample Asia REITs. We will also carry out sub-sample analyses of regional diversification strategies of S-REITs. The findings of the study will have important implications for investors who intend to use Asian REITs to diversify property type and geographical risks in portfolios.

This paper is organized as follows. Section 2 reviews the literature on REIT diversification. Section 3 discusses the empirical methodology that includes data collection, data sources, testable hypotheses and empirical model specifications. Section 4 analyzes the empirical results. Section 5 concludes the study.

2. Literature Review

2.1 Diversification by General Firms

The value of a diversified firm is less than the sum of its parts. Lamont and Polk (2001) find that diversification destroys the value of firms. Using the excess value concept to measure the effects of diversification, Berger and Ofek (1995) estimate that the loss of value associated with overinvestment and cross-subsidization of under-performing segments by diversified firms amounted to 13% to 15% on average during the periods 1986-1991. Globally diversified firms also do not create shareholder value. Denis, Denis and Yost (2002) find negative relationships between global diversification by firms and the excess values. The results support the internal capital market inefficiency hypothesis.

Laeven and Levine (2005) find no significant diversification premiums for

financial conglomerates. Diversification intensifies agency problems in financial conglomerates. The running costs outweigh the benefits associated with economies of scale effects of conglomeration. Burch, Nanda and Narayanan (2003) find that the degree of conglomeration of an industry is negatively related to the growth opportunities and concentration in the industry. The firms' motives of conglomeration were consistent with the market power and resource hypotheses.

2.2 Diversification by REIT Firms

Gyourko and Nelling (1996) find that stock market-based measures of diversification do not significantly capture the effects of diversification by property type and economic region. They, however, show that systematic risks vary by the types of properties in REIT portfolios. Retail-REITs have higher returns and systematic risks than industrial and warehouse REITs. In a separate study by Capozza and Lee (1995), they find that warehouse REITs are highly diversified by region, whereas apartment-REITs are more concentrated by location. Diversified REITs have above average expense ratios (ratio of general and administrative expenses (GAEXP) to total assets). Chen and Peiser (1999) who analyzed risk and return characteristics of REITs from 1993 to 1997 find that diversified REITs significantly under-perform concentrated REITs. They also show that geographically diversified REITs are more sensitive to market variance than geographically focused REITs.

By partitioning GAEXP into a structural component and a style component, Capozza and Seguin (1998) find that the style component of GAEXP that is related to the diversification decisions of firms increases project-level cash flows. The discretionary GAEXP, however, has no effects on corporate level cash flow and shareholder equity. Capozza and Seguin (1999) reaffirm in a separate study that diversification brings about higher project level cash flows, but also higher management and interest expenses to REITs. The net effects on corporate cash flows for focus and diversified REITs are insignificantly different. However, they found that focus portfolios are easier to monitor and more transparent than diversified ones. Focus REITs have higher liquidity premiums than diversified risks (Capozza and Seguin, 2001).

Bergs and Springer (1997), and Ambrose, Ehrlich, Hughes and Wachter (2000) examine the asset characteristics (diversified or focused) of REITs and find insignificant incremental impact of property type and geographic diversifications on scale economies

2.3 Diversification by Real Estate Investors

Eichholtz, Hoesli, MacGregor and Nanthankumaran (1995) test the effects of diversification by property type and geographical region on the real estate portfolios of investors. They find that holding single property type across

different regions is the most effective diversification strategy in the UK. Lee and Stevenson (2005) who used Investment Property Databank (IPD) data show that portfolios diversified by property type within London are comparable in performance to portfolios with regional diversification. The above studies suggest that investment strategies that focus in one sector and/or one region give undesirable risk and return trade-off for direct real estate investors.

Sing and Patel (2001) find no cointegration relationships between stock prices and diversification strategies of real estate firms. However, they find a weak causality of prices of large net asset value (NAV) property stocks on small NAV property stock prices. Glascock and Kelly (2007) compare diversification strategies of 250 global securitized real estate firms and find that property type diversification is not as effective as country diversification in risk reduction for the firms.

3. Empirical Methodology

3.1 Data Collection

Our test samples include 63 REITs listed on four major exchanges in Asia, which include Singapore (17), Japan (30), Malaysia (10) and Hong Kong (6). The list of sample Asian REITs is given in the Appendix. We collected annual financial data and valuation of properties in the portfolios of the sample REITs for the period from 2002 to 2007. The values of 2,281 properties, in US$ owned by REITs over the sample periods, were collated. Among the sample properties, the largest real estate was Citibank Plaza in Hong Kong owned by Champion REIT, which is valued at US$3.16 billion. The smallest real estate is Stop Parking Yokkaido, a car park in Chiba, Japan, owned by TGR Investment Inc. which was valued at US$245,596 in 2007. The values of properties in the portfolios of sample REITs were aggregated each year to derive at 96 pooled observations. The annual financial data were then mapped into the pooled observations. After removing the samples with missing financial data, we have a final sample of 80 pooled observations for our empirical tests.

The data are collected from three main sources, which are Datastream, annual reports and corporate websites of the sample REITs. The financial data include property-level income, earnings before interest and taxes, corporate-level income (net income), total expenses, interest expenses, GAEXP, capital expenditures (CAPEX), Q-ratio and return on equity (ROE). The property level data include valuations of property assets, year of valuation, property type, geographical location (country) of property and net floor areas, which are available in the annual reports and on the websites of the sample REITs. The time-series data on market capitalization, exchange rates, stock prices and stock market indices, (including Singapore's STI Index, Japan's TOPIX,

Malaysia's KLSE and Hong Kong's Hang Seng Index) are also collected. Table 1 gives the descriptions of the data and their respective sources. Data in local currency denomination are converted into US dollar denomination, based on the year-end exchange rate.

REITs in Thailand, Taiwan and Korea are not included because of the lack of yearly property data. Except for Singapore, REITs in some Asian countries are not required to publish yearly valuation of properties in portfolios. Some REITs listed in 2006 and 2007 are omitted from our sample because they do not have complete financial and property data as of the cut-off date of study in 2007.

3.2 Descriptive Statistics

The descriptive statistics of the cash flows, expenses and risk-return variables are summarized in Table 1. The statistics for S-REIT sub-samples are also included for comparison purposes.

The average property-level cash flows of Asian REITs are estimated at US$31.415 million and the average corporate-level income, which is also referred to as distributable income, is estimated at US$23.63 million. The standard deviations of the two income streams are US$79.369 million and US$72.675 million, respectively. The total expenses are estimated at US$13.017 million on average. In comparison, S-REITs have higher mean property-level and corporate-level cash flows of US$72.194 million and US$54.698 million, respectively. The mean total expenses of S-REITs are also higher at US$23.128 million.

GAEXP is the largest expense component estimated at US$5.984 million for the whole sample and US$11.142 million for S-REITs on average. Following Capozza and Seguin (1998), we decompose the GAEXP into structural and style components by regressing GAEXP on the aggregate property value (PVAL) and squared PVAL ($PVAL^2$) as follows:

$$GAEXP = \alpha + \beta_1 \times PVAL + \beta_2 \times PVAL^2 + \varepsilon \quad (1)$$

where α, β_1 and β_2 are regression parameters, and ε is the error term. The predicted value and the error term represent the structural GAEXP and the style GAEXP, respectively. The discretionary style GAEXP expenses are associated with managerial decisions related to diversification by property type and/or geographical region.

Table 1 Summary of Variables and Descriptive Statistics (All Sample and Singapore REITs)

Symbol	Description	Source	All-Sample Mean	All-Sample Standard Deviation	Singaporean REITs only Mean	Singaporean REITs only Standard Deviation
A) Cash Flows						
PRINC	Property-level cash flows / income	Datastream / annual reports	31.415	79.369	72.194	115.597
EBIT	Earnings before interest and tax	Datastream/annual reports	27.196	76.216	62.537	113.752
COINC	Corporate level cash flows/distributable income	Datastream/ annual reports	23.630	72.675	54.698	111.115
B) Expenses						
TEXP	Total expenses	Datastream / annual reports	13.017	16.220	23.128	16.492
INEXP	Interest expenses	Datastream/annual reports	2.833	4.206	6.132	4.649
GAEXP	General & administrative expenses	Datastream/ annual reports	5.984	9.258	11.142	10.580
GASTR	General & administrative structural expenses	See Equation 1	5.928	4.305	5.856	3.907
GASTY	General & administrative style expenses	See Equation 1	0.000	8.095	4.756	7.935
CAPEX	Capital expenditure	Datastream / annual reports	2.838	5.780	6.650	7.864
C) Risk & Return						
QRATIO	Q-ratio	Datastream	0.888	1.356	0.840	0.475
ROE	Return on Equity	Datastream	0.101	0.086	0.106	0.096
RCOF	Coefficient of determination of the single factor market model	See Equation 2	0.389	0.235	0.433	0.269
D) Firm Value and Asset						
MCAP	Market capitalization of REIT stock	Datastream/ annual reports	252.096	399.945	586.084	467.054
PVAL	Aggregate net property value	Annual reports/corporate websites	1358.143	1309.039	1152.817	879.117
$PVAL^2$ ('000)	Squared aggregate net property value		3536.717	7615.671	2076.905	3195.342

CAPEX which includes costs of upgrading and asset enhancement are expensed beyond a typical financial year. The average CAPEX of the sample REITs are estimated at US$2.838 million. S-REITs expended an average of US$6.65 million on capital and asset enhancement.

In terms of return performance, the Tobin's Q-ratio (QRATIO), which is defined as the ratio of market capitalization to net book value of property (replacement costs) is estimated at 0.888 for all sample REITs and 0.840 for S-REITs on average. The Asian REITs (inclusive of S-REITs) and S-REITs (independently) yield an average ROE of 10.1% and 10.6% over the sample periods from 2002 to 2007.

We compute the risk indicator in a standard single market factor model as follows:

$$\left(R_i - R_f\right) = \alpha_i + \beta_i \times \left(R_m - R_f\right) + \varepsilon_i \quad (2)$$

where R_f is risk-free return; R_i is individual REIT i stock return and R_m is stock market return of the respective exchanges on which REIT i is listed. α_i and β_i are regression parameters, and ε_i is the error term. We run the regression for each sample REIT over the matching sample periods and use the coefficient of determination (RVAL) to represent the correlation between REIT return and stock market return. The average RVAL estimates are 0.389 for the full sample and 0.433 for the S-REITs sub-sample.

The average market capitalization for the full REIT sample is estimated at US$252.096 million, whereas the S-REIT sub-sample has a higher average market capitalization of US$586.084. In terms of PVAL, the full Asian REIT sample (inclusive of S-REITs) has a larger asset base of US$1.358 billion in the portfolios compared to US$1.152 billion in the portfolios of the S-REIT sub-sample.

3.3 Diversification Strategies of REITs

REITs that adopt diversification strategies will have properties of different types and/or from different geographical regions in the portfolios. Compared with diversification within the US market, diversifying across different Asian markets expose REITs to country risks and exchange rate risks. Cross-border Asian REITs mostly pursue natural hedging against currency risks. In our empirical analyses, values of properties and other cash flows variables are converted from local currency to a common denominator in US dollar. Risk premiums associated with geographically diversified portfolios of cross-border REITs, if tested significance, are attributed mainly to liquidity and country risks.

The unit-free HHI is used to measure the degree of diversification by firms. Two HHIs are computed to separately represent diversification by property

type (PEHERF) and by geographical region (GEHERF), [k = GEHERF, PEHERF]. The HHI equation is written as:

$$HHI_k = \sum_{i=1}^{n} S_i^2 \tag{3}$$

where n denotes the number of properties in a portfolio; S_i denotes the proportion of properties in the respective geographical region and property type categories weighted in US$ value term by aggregate property in REIT portfolios. HHI has a value that ranges from [1/n] to 1, where [1/n] indicates a fully diversified REIT and 1 indicates a focused REIT.

We compute PEHERF and GEHERF indices for both the pooled sample of 80 REITs and the sub-samples by countries. Table 2 show a PEHERF of 0.807 and a GEHERF of 0.955, which imply that portfolios of Asian REITs are relatively more diversified by property type. By country comparison, except for S-REITs with a GEHERF of 0.883, other Asian REITs are geographical-focused as reflected by the GEHERF of 1. Hong Kong REITS have the highest level of diversification by property type in the portfolios with a PEHERF of 0.583. From Figure 1 which shows the PEHERF and the GEHERF over the years, we observe that diversification is the most significant in 2005. There was a reversal in the diversification trend by the sample Asian REITs in 2006 and 2007.

Table 2 Diversification by Property Type and Geographical Region

Country	Pooled sample	Descriptive Statistic	Property Type Herfindahl	Geographical Herfindahl
			PTHERF	**GEHERF**
Singapore	31	Mean	0.822	0.883
		Std. Deviation	0.243	0.265
Japan	31	Mean	0.836	1.000
		Std. Deviation	0.256	0.000
Malaysia	9	Mean	0.882	1.000
		Std. Deviation	0.182	0.000
Hong Kong	9	Mean	0.583	1.000
		Std. Deviation	0.248	0.000
Total	80	Mean	0.807	0.955
		Std. Deviation	0.252	0.173

Figure 1 Herfidahl Diversification Indices by Years

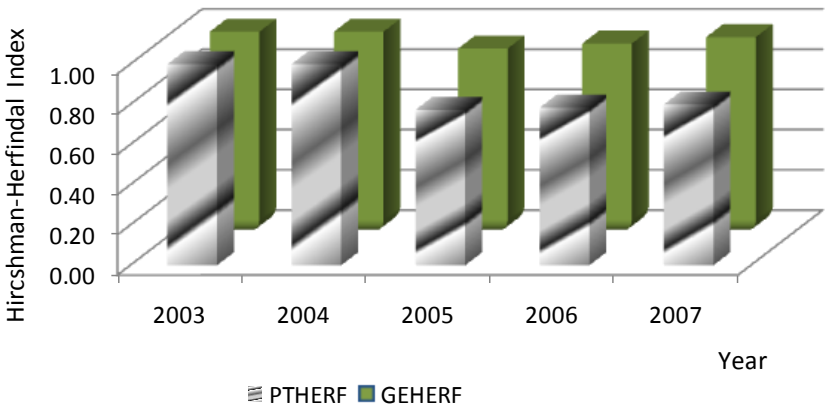

Table 3 summarizes the descriptive statistics by diversification strategies and the equal-variance t-statistics for tests of difference in means in the variables. Diversified REITs both by property type and geographical region generate higher cash flows, at the property level, before interest and tax level, and corporate level cash flows compared to focus REITs. Geographically diversified REITs also incur higher total expenses, style GAEXP and CAPEX than focus REITs with no regional exposure. In term of book to market value as indicated by the Q-ratio, only REITs diversified by property type have a positive ratio of market value over book value for the assets. REITs with diversified portfolios across different markets command have a higher total market-based risk premium of 0.649. By the asset size, REITs diversified by property type have the largest asset portfolio of US$1.41 billion on average. Regionally diversified REITs with an average portfolio size of US$0.82 billion are the smallest among the sample REITs. The t-test results show no significant differences in the statistics between diversified REITs and focus REITs by property type. However, geographically diversified REITs (GEHERF < 1) incur higher style administrative GAEXP and have higher total market risks.

4. Empirical Methodology and Analysis

4.1 Model Specification

To empirically test the effects of diversification on cash flows, expenses and risk-return of Asian REITs, the response variables, Y_i = [PRINC, EBIT, COINC, TEXP, INEXP, GAEXP, GASTR, GASTY, CAPEX, QRATIO, ROE, RCOF], are regressed against the two diversification indices, PEHERF and GEHERF. The non-linear scale elasticity is controlled in the regressions. The model specification is written as follows:

Table 3 Tests of Difference in Means

Variables		Diversification by Property type		t-test for Equality of Means (Equal variances assumed)			Diversification by geographical region		t-test for Equality of Means (Equal variances assumed)		
		Focus (PEHERF=1)	Diversified (PEHERF<1)	Mean Difference	t-stat.	Sig. (2-tailed)	Focus (GEHERF=1)	Diversified (GEHERF<1)	Mean Difference	t-stat	Sig. (2-tailed)
A) Cash flows:											
Property-level cash flows	PRINC	20.424	47.215	-26.790	-1.478	0.144	30.245	45.461	-15.216	-0.449	0.655
Earnings before interest and tax	EBIT	16.403	42.710	-26.307	-1.512	0.135	26.262	38.402	-12.140	-0.373	0.710
Corporate level cash flows	COINC	13.600	38.361	-24.761	-1.498	0.138	23.305	27.584	-4.279	-0.138	0.891
B) Expenses											
Total expenses	TEXP	13.214	12.754	0.460	0.104	0.917	12.120	20.492	-8.372	-1.199	0.236
Interest expenses	INEXP	2.347	3.504	-1.157	-1.130	0.262	2.668	4.570	-1.902	-1.059	0.293
General and administrative (GA) expenses	GAEXP	5.605	6.552	-0.947	-0.368	0.714	5.852	7.059	-1.207	-0.299	0.766
Structural GA expenses	GASTR	5.606	6.412	-0.807	-0.819	0.415	6.029	4.686	1.342	0.733	0.466
Style GA expenses	GASTY	0.045	-0.068	0.113	0.050	0.960	-0.290	2.372	-2.663	-0.758	0.452

(*Continued…*)

(*Table 3 Continued…*)

Variables		Diversification by Property type		t-test for Equality of Means (Equal variances assumed)			Diversification by geographical region		t-test for Equality of Means (Equal variances assumed)		
		Focus (PEHERF=1)	Diversified (PEHERF<1)	Mean Difference	t-stat.	Sig. (2-tailed)	Focus (GEHERF=1)	Diversified (GEHERF<1)	Mean Difference	t-stat	Sig. (2-tailed)
Capital expenditure	CAPEX	3.428	2.011	1.418	1.026	0.308	2.290	8.863	-6.573	-2.791	0.007
C) Risk & Return											
Q-ratio	QRATIO	0.726	1.132	-0.406	-1.319	0.191	0.895	0.807	0.088	0.152	0.879
Return on Equity	ROE	0.093	0.112	-0.019	-0.806	0.424	0.100	0.109	-0.009	-0.227	0.821
Total stock market risk	RCOF	0.394	0.382	0.012	0.200	0.842	0.371	0.649	-0.278	-2.367	0.021
D) Firm Value & Asset											
Market capitalization of REIT stock	MCAP	195.318	337.263	-141.945	-1.569	0.121	239.223	410.857	-171.634	-1.011	0.315
Aggregate net property value	PVAL	1323.179	1410.590	-87.411	-0.291	0.772	1401.657	821.472	580.185	1.045	0.299
Squared aggregate net property value	$PVAL^2$ ('000)	3573.330	3481.799	91.531	0.052	0.958	3767.674	688.256	3079.418	0.952	0.344

$$Y_j = \alpha + \beta_1 \times PVAL + \beta_2 \times PVAL^2 + \beta_3 \times PEHERF + \beta_4 \times GEHERF + \varepsilon_i \quad (4)$$

where α and β_i are regression estimates. The weighted-least-squares (WLS) method is used for the regression estimation to account for potential heteroskedasticity in the error term, ε, which has a zero mean and a constant standard deviation of $[\sigma^2 x_i^w]$. We use the *PVAL* raised to a power of *w* as the proxy of the weighting variable x_i, such that $\varepsilon \sim N\left(0, \sigma^2 PVAL^w\right)$. In Model (4), the significance of diversification effects by property type and geographical region is not rejected, if $[\beta_3 \neq 0]$ and $[\beta_4 \neq 0]$.

4.2 Empirical Results

Table 4 summarizes the regression results. The results show no significant effects of property type diversification on cash flows, expenses, and risk-return variables. However, the effects of geographical diversification on expense and risk variables are significant. The coefficients, β_4, are significant and negative for the expense variables including total expenses (TEXP), interest expenses (INEXP), GAEXP, the style and the structural components of the GAEXP, and CAPEX. The negative signs imply that expenses are higher when REITs become more diversified by geographical region. The results are consistent with the findings in Capozza and Seguin (1998 and 1999). REITs with regionally diversified portfolios employ more managerial resources in managing the assets in different countries. More expensive off-shore capital used to finance overseas acquisitions is also reflected in the higher costs of debt of the REITs. Cross-border REITs put in higher CAPEX to enhance the values of assets in portfolios compared to domestic portfolios. Unlike Capozza and Seguin (1999), the impact of diversification on cash flows is insignificant in our results.

Capozza and Seguin (1999) argue that REITs that invest across different markets face higher liquidity and transparency risks. Higher risk premiums are expected for geographically diversified REITs vis-à-vis focused REITs. Our results support the hypothesis, and we find that variations in the market-based proxy of risks, RCOF, which measure the correlation between REIT return and stock market return, are significantly explained by the geographical diversification variable (GEHERF).

Table 4 Tests of Diversification Effects in Weighted Least Squares Regressions

Dependent Variable		(Constant)	PVAL	$PVAL^2$	PTHERF	GEHERF	R^2	Adjusted R^2
Property level cash flows	PRINC	92.807	0.019	0.000	-47.307	-45.144	0.053	0.001
		[1.549]	[1.187]	-[0.945]	-[1.445]	-[0.855]		
Gross earnings	EBIT	84.741	0.012	0.000	-45.932	-35.056	0.043	-0.010
		[1.517]	[0.808]	-[0.633]	-[1.505]	-[0.712]		
Corporate-level cash flows	COINC	64.776	0.008	0.000	-38.948	-19.138	0.030	-0.022
		[1.223]	[0.584]	-[0.477]	-[1.347]	-[0.410]		
Total expenses	TEXP	16.194***	0.014***	0.000*	3.420	-20.020***	0.611	0.580
		[2.736]	[5.097]	-[1.860]	[1.448]	-[3.807]		
Interest Expenses	INTEXP	3.353**	0.003***	0.000	0.418	-3.807***	0.440	0.405
		[2.234]	[3.868]	-[0.988]	[0.632]	-[2.994]		
General & Administrative (GA) expenses	GAEXP	7.008**	0.005***	0.000	1.293	-8.264***	0.494	0.454
		[2.437]	[3.279]	-[0.457]	[1.111]	-[3.227]		
Style GA	GASTY	8.217***	-0.004**	0.000	1.293	-8.264***	0.232	0.170
		[2.857]	-[2.595]	[1.662]	[1.111]	-[3.227]		
Capital expenditure	CAPEX	8.963**	0.002	0.000	2.901	-10.830***	0.183	0.134
		[2.088]	[1.570]	-[1.269]	[1.142]	-[3.192]		
Q-Ratio	QRATIO	1.031	0.000	0.000	-0.295	0.071	0.012	-0.040
		[1.423]	[0.180]	-[0.147]	-[0.892]	[0.115]		
Return on Equity	ROE	0.161**	0.000	0.000	-0.035	-0.019	0.042	-0.032
		[2.463]	-[0.974]	[0.792]	-[0.882]	-[0.329]		
Total market risks	RCOF	0.995***	0.000	0.000	-0.054	-0.523**	0.163	0.107
		[4.358]	-[1.181]	[0.681]	-[0.535]	-[2.440]		

Notes: The numbers in the first row of each dependent variable represent regression coefficients of the independent variables indicated on the first row, and the numbers in squared brackets in the second row are t-statistics of regression. *** 1% significance; ** 5% significance; * 10% significance.

The above results show that geographically diversified Asian REITs are expensive to manage, but they do not generate higher cash inflows compared to local REITs. Investors also expect higher risk premiums for REITs with regional exposure. The results are not surprising, and they explain why many Asian REITs, at this infancy stage of development, choose to focus on their local markets. For REITs that expand the portfolios across countries, what are the motivations behind their diversification strategies? From the S-REIT experience, REITs that diversify by geographic region are made up of REITs in logistics, serviced apartments, and healthcare services sector. These REITs build a competitive edge in business by having wide regional networks and coverage to serve multi-national companies/clients. Therefore, regional diversification strategies, despite high managerial and operating expenses, are indispensable for these REITs. The second group of cross-border REITs consists of foreign REITs listed on the Singapore Exchange. The transparency and liquidity of the REIT market in Singapore attract some foreign REITS to raise capital in Singapore through the REIT listings.

5. Robustness Tests

In the dividend discount model, unit stock price (P) is a function of discounted future dividends per share (DPS), that is, P = DPS / (ROE – g), where *ROE* is the return on equity and *g* is the growth rate. Diversification strategies affect REIT stock prices through cash flows and discount rate channels (Capozza and Seguin, 1999). Cash flows and discounting factors are not exogenous; they interactively influence REIT stock price. In this section, we control for endogeneity between cash flows and discounting factors while testing the diversification effects.

Given the definitions of ROE, Tobin Q (QRATIO) and property market yield (y) as follows:

$$ROE = \frac{Net\ operating\ income}{Market\ capitalization} = \frac{COINC}{MCAP} \tag{5}$$

$$QRATIO = \frac{Market\ Capitalization}{Net\ Asset\ Value} = \frac{MCAP}{PVAL} \tag{6}$$

$$y = \frac{Property-level\ Income}{Net\ Asset\ Value} = \frac{PRINC}{PVAL} \tag{7}$$

The ROE and QRATIO equations are expanded to incorporate cash flows, expenses and discount rate variables as follows (derivations are given in Appendix 2):

$$QRATIO = \left(1 + \frac{CAPEX}{EBIT}\right) \times \left(\frac{COINC}{PRINC}\right) \tag{8}$$

$$ROE = \left(\frac{COINC + (INEXP + GAEXP)}{PVAL}\right) \times \left(1 + \frac{CAPEX}{EBIT}\right) \tag{9}$$

We could also define the R_i term in Equation (2) by using the total asset return model that includes dividend yield and growth as follows:

$$R_i = \frac{COINC}{MCAP} + g = \frac{COINC}{MCAP} \times \left(1 + \frac{CAPEX}{EBIT}\right) = \alpha + \beta \times (R_m - R_f) \tag{10}$$

Based on Equations (8), (9) and (10), we could test the effects of cash flows and diversification strategies on the risk and return of REITs by using the specifications below:

$$QRATIO = f\begin{bmatrix} WPRINC, WEBIT, WCOINC, \\ CAPEX, PEHERF, GEHERF \end{bmatrix} \tag{11}$$

$$ROE = f\begin{bmatrix} WEBIT, WCOINC, INTEXP, GAEXP, \\ CAPEX, PVAL, PEHERF, GEHERF \end{bmatrix} \tag{12}$$

$$RCOF = f\begin{bmatrix} WEBIT, WCOINC, CAPEX, \\ MCAP, PEHERF, GEHERF \end{bmatrix} \tag{13}$$

where PEHERF and GEHERF are included in the above equations to capture the effects of diversification by property type and geographical region.

To control for simultaneity in the models, the two-stage least-squares (2SLS) estimation is used, where we first estimate three cash flow variables by using WLS estimation weighted by the NAV variable:

$$PRINC = \alpha_1 + \beta_{11} \times PVAL + \beta_{12} \times PVAL^2 + \varepsilon_1 \tag{14}$$

$$EBIT = \alpha_2 + \beta_{21} \times GAEXP + \beta_{22} \times PVAL + \beta_{23} \times PVAL^2 + \varepsilon_2 \tag{15}$$

$$\begin{aligned} COINC = {} & \alpha_3 + \beta_{31} \times GAEXP + \beta_{32} \times INTEXP \\ & + \beta_{33} \times PVAL + \beta_{34} \times PVAL^2 + \varepsilon_3 \end{aligned} \tag{16}$$

where α_i and β_{ij} are regression estimates, and ε_i is the WLS residual error, $\varepsilon \sim N\left(0, \sigma^2 PVAL^w\right)$. The weighted predicted values for the cash flow variables, as denoted with a prefix "W" in Equations (11) to (13), are derived by multiplying the predicted value in the above WLS models by the factor $\sqrt{PVAL^2}$. The weighted predicted values are used in the second-stage estimation of Models (11) to (13).

5.1 Analyses of Results

The regression results are summarized in Table 5. Consistent with the definitions in Equations (8) to (10), the COINC coefficient is significantly positive in the QRATIO and RCOF models, and EBIT is negatively significant in all the return models. When structural GAEXP (GESTR) and style GAEXP (GESTY) are separately included in Model 3 for ROE, the results do not significantly change. The geographical diversification variable GEHERF is negatively significant in explaining variations in the market-based return of REITs, RCOF. The negative coefficient implies that cross-border REITs are more sensitive to market shocks than domestic REITs.

Investors expect higher risk premiums from REITs that diversify across different countries. Capozza and Seguin (1999) argue that diversified REITs are illiquid, and information costs in monitoring diversified assets are higher.

As geographically diversified REITs in our samples are all listed in Singapore, we repeat the estimations of Equations (11) to (13) using only Singapore REIT samples. The results in Table 6 show that GEHERF is still significant and negative in the RCOF model. The estimated coefficient of -0.606 is not significantly different from the earlier estimate of -0.630. Consistent with Capozza and Seguin's (1999) findings, Singapore's investors price illiquidity risks into REITs with regionally diversified portfolios. Unfamiliarity with the regional markets adds information costs to investors when evaluating cross-border REITs.

6. Conclusions

The Asian REIT history is relatively short. Except for selected S-REITs, the diversification of REITs outside home markets has not occurred. In Singapore, geographically diversified REITs include foreign REITs that choose to list on the local exchange. The Singapore Exchange has successfully attracted cross-border listings of REITs from China, India, Indonesia and Hong Kong. Diversification by having geographically distributed property portfolios is also a common strategy adopted by the homegrown S-REITs in logistics, serviced apartments and healthcare services sector. In line with the business operation needs of clients, these REITs are required to own a broad network of properties in different countries to be competitive.

In this study, the effects of diversification by property type and geographical region on cash flows, risks and returns of REITs are examined. The results show no significant effects of diversification by property type on cash flows, expenses and risk premiums of Asian REITs. However, significant variations in expenses and risk premiums are observed in Asian REITs diversified by geographical region. REITs with assets diversified across different countries incur higher total expenses, interest expenses, and GAEXP, including both discretionary and non-discretionary components of the expenses. The CAPEX of geographically diversified REITs is higher than local REITs. Higher risk premiums are also expected of geographically diversified REITs to compensate for high information costs and illiquidity risks associated with portfolios of assets outside the home markets. After controlling for the simultaneity between cash flows and risk-return variables in the tests for robustness, the negative impact of geographically diversification strategies on returns of REITs is still significant.

Table 5 Results of 2-Stage Least Squares Regressions on the Effects of Diversification Strategies on Risk-Return of REITs (All Samples)

Dependent Variable		Model 1: QRATIO		Model 2: ROE		Model 3: ROE		Model 4: RCOF	
		Coefficients	t-statistics	Coefficients	t-statistics	Coefficients	t-statistics	Coefficients	t-statistics
Constant		0.309	[0.801]	0.170**	[2.136]	0.167*	[2.017]	0.997***	[3.617]
Predicted property level cash flows	WPRINC	0.000	-[0.391]						
Predicted gross earnings	WEBIT	-2.363*	-[1.856]	-1.163*	-[1.928]	-1.191*	-[1.832]	-1.533**	-[2.133]
Predicted corporate-level cash flow	WCOINC	18.249**	[2.556]	4.589	[1.612]	4.783	[1.467]	8.068*	[1.983]
Interest expenses	INTEXP			-0.020**	-[2.305]	-0.021*	-[2.018]		
General & Administrative (GA) expenses	GAEXP			0.015**	[2.554]				
Structural GA	GASTR					0.015*	[1.892]		
Style GA	GASTY					0.015**	[2.457]		
Capital Expenditure	CAPEX	0.008	[0.548]	0.000	[0.115]	0.000	[0.095]	-0.027**	-[2.254]
Aggregate Property value	PVAL			0.000	-[0.981]	0.000	-[0.965]		
Market capitalization	MCAP							0.000	[1.513]
Property type diversification	PTHERF	0.039	[0.169]	-0.036	-[0.750]	-0.036	-[0.745]	0.069	[0.480]
Geographical diversification	GEHERF	0.340	[1.088]	-0.007	-[0.119]	-0.007	-[0.106]	-0.630**	-[2.464]
Adjusted R^2		0.081		0.033		0.005		0.164	

Notes: *** 1% significance; ** 5% significance; * 10% significance

Table 6 Results of 2-Stage Least Squares Regressions on the Effects of Diversification Strategies on Risk-Return of REITs (Singapore REITs Only)

Dependent Variable:		Model 1: QRATIO		Model 2: ROE		Model 3: ROE		Model 4: RCOF	
		Coefficients	t-statistics	Coefficients	t-statistics	Coefficients	t-statistics	Coefficients	t-statistics
Constant		0.362	[0.508]	0.207	[1.406]	0.213	[1.462]	1.056***	[3.185]
Predicted property level cash flows	WPRINC	20.506	[1.710]	2.261	[0.539]	2.314	[0.560]	6.934	[1.288]
Predicted gross earnings	WEBIT	-2.007	-[0.924]	-0.559	-[0.863]	-0.934	-[1.308]	-1.602*	-[1.972]
Predicted corporate-level cash flow	WCOINC	-0.002	-[0.861]						
Interest expenses	INTEXP			-0.013	-[0.915]	-0.017	-[1.152]		
General & Administrative (GA) expenses	GAEXP			0.012*	[1.823]				
Structural GA	GASTR					0.042	[1.588]		
Style GA	GASTY					0.015*	[2.169]		
Capital Expenditure	CAPEX	0.008	[0.442]	0.002	[0.767]	0.002	[0.617]	-0.028*	-[2.080]
Aggregate Property value	PVAL			0.000	-[0.513]	0.000	-[1.227]		
Market capitalization	MCAP							0.000	[1.180]
Property type diversification	PTHERF	-0.069	-[0.111]	-0.122	-[1.388]	-0.080	-[0.857]	0.069	[0.284]
Geographical diversification	GEHERF	0.494	[1.122]	-0.007	-[0.097]	-0.054	-[0.700]	-0.606**	-[2.199]
Adjusted R^2		0.002		0.033		0.060		0.209	

Notes: *** 1% significance; ** 5% significance; * 10% significance.

What are possible implications of the findings for investors of Asian REITs and new REITs that seek overseas listings? Managing assets across different countries requires more managerial and operating resources. Asset managers of geographically diversified Asian REITs are expected to deliver higher returns to justify the economic feasibility of pursuing the diversification strategy. Otherwise, it will be better off for investors to internally undertake diversification strategy by having mixed portfolios of different focus REITs managed by asset managers with local knowledge in the respective markets. On cross-border REIT listings, illiquidity premiums of foreign listings increase costs of listing REITs on overseas exchanges. Foreign REITs will not have competitive advantages relative to local REITs if the costs of raising equity capital on foreign exchanges are expensive. However, there are other non-price factors, such as depth of the equity markets, ease of listings and brand image that motivate listing of REITs on overseas exchanges.

We are constrained by the small number of regionally diversified REITs in our sample to test on the interactive effects of diversification by property type and geographical region on the cash flows and performance of Asian REITs. Due to unavailability of property valuation data in other Asian markets like Taiwan, Thailand, and Korea, our empirical analysis is not extended to cover the entire Asian REIT market at this stage.

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Appendix 1. List of Sample Asian REITs

S/N	REIT	Country of listing
1	Capitamall Trust	Singapore
2	Allco Commercial REIT	Singapore
3	Ascott Residence Trust	Singapore
4	Ascendas REIT	Singapore
5	Ascendas India Trust	Singapore
6	Cambridge Industrial Trust	Singapore
7	CapitaCommercial Trust	Singapore
8	CapitaRetail China Trust	Singapore
9	CDL Hospitality REIT	Singapore
10	First REIT	Singapore
11	Fortune REIT	Singapore
12	Frasers Centrepoint Trust	Singapore
13	K-REIT Asia	Singapore
14	MacarthurCook Industrial REIT	Singapore
15	Macquarie MEAG Prime REIT	Singapore
16	Mapletree Logistics Trust	Singapore
17	Suntec REIT	Singapore
18	Frontier REIT	Japan
19	Fukuoka REIT	Japan
20	Advance Residence Investment Corporation	Japan
21	Creed Office Investment Corporation	Japan
22	DA Office Investment Corporation	Japan
23	eASSET Investment Corporation	Japan
24	FC Residential Investment Corporation	Japan
25	Hankyu REIT	Japan
26	Japan Real Estate Investment Corporation	Japan
27	Japan Retail Fund Investment Corporation	Japan
28	Kenedix Realty Investment Corporation	Japan
29	MID REIT, Inc.	Japan
30	Mori Hills REIT Investment Corporation	Japan
31	MORI TRUST Sogo Reit, Inc.	Japan
32	Nomura Real Estate Office Fund, Inc.	Japan
33	ORIX JREIT Inc.	Japan
34	Premier Investment Company	Japan
35	Prospect Residential Investment Corporation	Japan
36	re-plus residential investment inc.	Japan
37	TGR Investment Inc.	Japan
38	TOKYU REIT, Inc.	Japan
39	Top REIT, Inc.	Japan

S/N	REIT	Country of listing
40	United Urban Investment Corporation	Japan
41	Japan Excellent, Inc.	Japan
42	Japan Hotel and Resort, Inc.	Japan
43	Japan Logistics Fund, Inc.	Japan
44	Japan Prime Realty Investment Corporation	Japan
45	Nippon Accomodations Fund Incorporated	Japan
46	Nippon Building Fund	Japan
47	Nippon Commercial investment Corporation	Japan
48	AmanahRaya REITs	Malaysia
49	AMFirst REITs	Malaysia
50	Axis REITs	Malaysia
51	Al-'Aqar KPJ REITs	Malaysia
52	Al Hadharah Bous. REITs	Malaysia
53	Heketar REITs	Malaysia
54	Quill Capita Trust	Malaysia
55	Starhill REITs	Malaysia
56	Tower REITs	Malaysia
57	UOA REITs	Malaysia
58	Champion REIT Trust	Hong Kong
59	GZI REIT Trust	Hong Kong
60	Link Real Estate Investment Trust	Hong Kong
61	Prosperity REIT	Hong Kong
62	RREEF China Commercial Trust	Hong Kong
63	Sunlight REIT	Hong Kong

Appendix 2. Derivations of QRATIO and ROE

ROE is defined as net operating (corporate-level) income, *COINC*, divided by equity value, or market capitalization, *MCAP*. The *ROE* is equated to the overall (property) yield, *k*, minus growth, *g*. By expanding the *k* and *g* terms in the *ROE* equation, we obtain the following:

$$ROE = \frac{COINC}{MCAP} = k - g = \frac{PRINC}{PVAL} - \left(\frac{CAPEX}{EBIT} \times ROE \right) \quad \text{(A1)}$$

In Equation (A1), property-level yield, *k*, is defined as the gross income generated from the property, *PRINC*, divided by the property value, *PVAL*. Growth in earnings, *g*, is defined as reinvestment rate times *ROE*, where reinvestment rate is a function of capital expenditure on a property, *CAPEX*, divided by net property-level earnings before interest expenses, *EBIT*.

By bringing the last right-hand term in Equation (A1) to the left, the *ROE* equation is rewritten as follows:

$$ROE = \frac{COINC}{MCAP} = \left(\frac{PRINC}{PVAL}\right) \times \left(\frac{EBIT}{EBIT + CAPEX}\right) \tag{A2}$$

We re-arrange Equation (A1) to derive at *QRATIO*,which is defined as the ratio of market capitalization (equity value) over net property value:

$$QRATIO = \frac{MCAP}{PVAL} = \left(1 + \frac{CAPEX}{EBIT}\right) \times \left(\frac{COINC}{PRINC}\right) \tag{A3}$$

Based on the Equations (A2) and (A3), we derive the empirical models for *QRATIO* and *ROE* in Equations (11) and (12) in the paper as functions of the financial variables. They are rewritten as follows:

$$QRATIO = f\begin{bmatrix} WPRINC, WEBIT, WCOINC, \\ CAPEX, PEHERF, GEHERF \end{bmatrix} \tag{'11}$$

$$ROE = f\begin{bmatrix} WEBIT, WCOINC, INTEXP, GAEXP, \\ CAPEX, PVAL, PEHERF, GEHERF \end{bmatrix} \tag{'12}$$

The market model of total *REIT* return, R_i, can also be represented as a function dividend yield and growth as follows:

$$\begin{aligned} R_i &= \frac{D}{MCAP} + g \\ &= \frac{\phi \times COINC}{MCAP} + \left(\frac{CAPEX}{EBIT} \times \frac{COINC}{MCAP}\right) \\ &= \alpha + \beta \times R_m \end{aligned} \tag{A4}$$

Assuming a 100% distribution of corporate-level cash flows by REITs, [ϕ = 1.0], the total REIT return is reduced to the following form:

$$R_i = \frac{COINC}{MCAP} \times \left(1 + \frac{CAPEX}{EBIT}\right) = \alpha + \beta \times R_m \tag{A5}$$

The coefficient of determination, *RCOF*, of the asset pricing model that regresses excess *REIT* return against excess market return, represents the total risk premiums for both systematic and abnormal risks.