Risk-Adjusted Performance of Real Estate Stocks: Evidence from Developing Markets

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Abstract   This paper examines the performance of real estate stocks listed in seven developing markets in East Asia between 1992 and 2002. Using panel regressions, the goal is to identify determinants of the risk-adjusted returns of real estate securities traded in these markets. The empirical evidence suggests that size, book-to-market value, capital structure and market diversification have significant influence on the performance of real estate securities. Asset structure and development exposure, however, do not appear to have any significant effect on the returns behavior, while dividend yield has limited influence. As expected, interest rates and market condition have significant impact on the returns of real estate stocks. The Asian Financial Crisis also has an adverse impact on stocks' performance.

Introduction

In their attempt to enhance returns and diversify risks, corporations and pension funds in the United States have increased their investment overseas since the 1990s (Carman, 1997). Following this trend, traded stocks of real estate-related organizations provide an indirect route for investors to gain international real estate exposure without being burdened with the chores of acquiring, managing and disposing the physical real estate in distant countries. The advantages of including global real estate stocks to achieve more efficient portfolios have been highlighted in numerous studies, the more recent ones being Eichholtz and Koedijk (1996), Eichholtz (1997), Ling and Naranjo (2002) and Hamelink and Hoesli (2002). International diversification through real estate stocks is, however, more complicated than previously thought. Despite the presence of a worldwide systematic risk factor, a successful diversification strategy would require the investors to critically consider how country-specific and company-specific factors affect securitized real estate returns across different markets. Generally, diversification opportunities are greater across continents as compared to within continents. Country-specific factors are important determinants of international real estate security returns (Ling and Naranjo, 2002; Hamelink and Hoesli, 2002;

and Bond, Karolyi and Sanders, 2003). Indeed, comparing the relative strength of country-specific and worldwide risk factors, Griffin (2002) concludes that the domestic factor is better able to explain time-series variation in stock returns than the global factor. Furthermore, potential diversification within countries should not be ignored given the existence of company-specific risk factors in international real estate returns.

This paper examines the historical performance of property-related stocks publicly traded in seven stock markets in East Asia: Hong Kong, Indonesia, Malaysia, Singapore, South Korea, Taiwan and Thailand. Until the mid 1990s, the dominant story in the region was one of strong economic growth with high asset inflation. Corresponding to massive inflows of foreign capital into the region, real estate values escalated rapidly. Investors were attracted to the region by potential capital gains rather than rental income, as reflected by the low initial yields associated with prime real estate located in major cities in Asia. Given the focus on capital growth, it was not surprising that real estate returns in Asia were more volatile than real estate investment trust (REIT) stocks in the U.S. The robust growth story, however, came to a dramatic halt when the Financial Crisis hit the region in 1997. Characterized by significant devaluation of regional currencies, the flight of foreign capital, the closing of many banks, and rapid deterioration in employment rates and domestic economies, the Asian Financial Crisis escalated the volatility of real estate returns in the region. The impact of the Financial Crisis was, nevertheless, felt in varying degree across the region, with the worst hit economies being Indonesia, Thailand and South Korea. At the peak of the crisis, the Indonesian rupiah was reported to have lost 84% of its value against the USD, while the loss suffered by the Korean and Thailand's currencies exceeded 50%.[1] Entering into the new millennium, many of the markets in East Asia are still undergoing restructuring and consolidation. Real estate securitization via commercial mortgage-backed securities and REITs is starting to gain popularity. As of the end 2003, REITs have been introduced in Japan, Singapore and South Korea; while active discussions on the legislative frameworks are on-going in Malaysia, Hong Kong and Taiwan. Furthermore, real estate stocks in East Asia are now regarded less as growth stocks as compared to what was the case prior to 1997.

There are a few reasons why we think the performance of real estate securities in the East Asia region provides an interesting arena for examination. First, from a global investor's perspective, there is more scope for risk diversification in segmented markets as compared to developed markets, which are already fully integrated into the global capital markets. Second, few studies have examined the return behaviors of real estate securities outside the U.S. or other western markets, particularly those in developing markets that have different institutional and market structures. Research on the performance of common stocks in emerging markets (such as Bekaert, Erb, Harvey and Viskanta, 1997) reveals three different market characteristics—high average returns, high volatility and low correlations both across the emerging markets and with developed markets. Bond, Karolyi and

Sanders (2003) also observe that there is a regional pattern with respect to the sensitivity of real estate returns to country-specific market risk, which is much more significant for real estate markets in the Asia-Pacific region than those in Europe or North America. Third, because of the volatile nature of real estate stocks in the region, this study will provide a better understanding on the returns behavior of securitized real estate in different business cycles, especially during a financial meltdown.

This empirical study will first examine the historical performance of real estate securities traded in East Asia, and then explain the variations in their risk-adjusted performance. The data shows that the financial attributes of real estate firms in East Asia have indeed undergone major changes post-1997. No significant abnormal returns associated with real estate securities traded in East Asia between 1992 and 2002 were found. However, significant variations in the returns of real estate stocks were observed across different markets as well as across different firms within a country. To examine the determinants of risk-adjusted returns, a series of regressions on the composite and country-specific portfolios were conducted. Unlike previous studies, panel regressions to control for time-varying risk factors were employed. This is important to ensure that any fundamental risk factors that have significant explanatory power are not merely picking up the impact of omitted macroeconomic factors (see Ling and Naranjo, 1998).

The regression results show that macroeconomic factors dominate the fundamental factors in explaining risk-adjusted returns of real estate stocks in East Asia. Nevertheless, the findings indicate that significant premiums are attached to small-cap and value stocks, which continue to exist after controlling for market risk factors. The degree of diversification and financial gearing of the individual stocks also play a significant role in explaining their performance. Dividend yields have a limited influence, while asset structure and development exposure do not appear to have any significant impact on the risk-adjusted returns of property companies.

The next section briefly reviews the literature on the performance of securitized real estate. This is followed by a presentation of the research framework and the data source as well as a description of the financial attributes in the sample. Next is an analysis of the historical performance of real estate securities in East Asia and an examination of how the returns are related to the fundamental and market factors. The paper finishes with some concluding remarks.

Literature Review

The performance of real estate-related organizations is a widely researched topic in the real estate literature. Focusing primarily on REITs in the U.S., numerous studies have analyzed the historical performance of real estate organizations as well as tested whether they offer superior returns. Earlier studies, such as Kuhle, Walther and Wurtzebach (1986), Firstenberg, Ross and Zisler (1988) and Sagalyn (1990), came to the conclusion that REITs offered superior returns especially from

the late 1970s to the mid-1980s. These findings were often interpreted as evidence that real estate is a particularly good investment that investors should add to their portfolios. However, recent studies employing a multifactor pricing model (as tabulated in Exhibit 1) failed to detect any superior returns. Chan, Hendershott and Sanders (1990) and subsequently, Peterson and Hsieh (1997), show that while abnormal returns could be earned using a simple capital asset pricing model (CAPM) framework, the return evaporates when a multifactor pricing model is employed. Liu, Grissom and Hartzell (1995), in a critical review of the literature on real estate performance, suggested that any superior real estate performance observed may be an illusion arising from an omission of certain fundamental factors in the estimates of risk.

Recent studies, in particular Ling and Naranjo (2002), Hamelink and Hoesli (2002) and Bond, Karolyi and Sanders (2003), have examined the performance of real estate securities from an international perspective. A consistent observation in these studies is that there are little abnormal returns to be earned in international real estate markets. However, substantial variations in real estate returns exist across different markets and over different periods. There is also a wide variation in the performance of individual companies within a country. Hence, one stream of the literature has focused on explaining the variations across firms (or countries) or over time by drawing inferences from asset pricing models.

According to the CAPM, the systematic risk of an asset is the only relevant factor in asset pricing. However, the influence of beta in explaining cross-sectional returns of REIT and common stocks has been diminishing over time (Chan, Hendershott and Sanders, 1990; and Fama and French, 1992). More recently, a worldwide systematic risk factor has been incorporated to the traditional CAPM to explain international real estate returns. Nevertheless, country-specific and firm-specific attributes continue to dominate the worldwide factor in explaining international real estate returns (see Griffin, 2002; Ling and Naranjo, 2002; and Bond, Karolyi and Sanders, 2003).

Time-series data have been employed to study how macroeconomics factors affect stock returns over time. Several authors have found that real estate returns are related inversely to interest rate movements (Chen and Tzang, 1988; Ling and Naranjo, 1998; and Devaney, 2001) and positively to economic and market conditions (Sagalyn, 1990; Ling and Naranjo, 1998; and Glascock, So and Lu, 2002). Cross-sectional studies on stock returns have also yielded results that indicate that fundamental factors play a significant role in explaining the behavior of stock returns. Some firm attributes that have been identified to explain common stock returns include size, book-to-market equity, leverage, dividend yield and asset structure.

The empirical evidence supports an inverse relationship between stock returns and size. This implies that smaller REITs tend to outperformed larger REITs (Banz, 1981; McIntosh, Liang and Tompkins, 1991; Sanders, 1997; and Ling and Naranjo, 1998).

Exhibit 1 | Previous Studies on Performance of Real Estate-Related Stocks

Authors	Sample (Period)	Measures	Results
Titman & Warga (1986)	36 REITs (1973)	Jensen alpha	No abnormal returns.
Chan, Hendershott & Sanders (1990)	30 EREITs (1973–1987)	Jensen alpha	EREITs do not offer superior risk-adjusted returns in the multifactor model.
Howe & Shilling (1990)	105 REITs (1973–1987)	Sharpe Ratio, Treynor ratio & Jensen alpha	No superior return with evidence of significant poor performance within several advisor categories.
Glascock (1991)	109 real estate firms (1965–1986)	Jensen alpha	Real estate firms did not outperform the market portfolio for either the entire test period or any sub-period of market conditions.
Kapplin & Schwartz (1995)	26 REITs, 15 master limited partnerships (MLPs) & 13 finite life REITs (1987–1989)	Coefficient of variation	MLPs provide superior returns, but REITs underperformed the S&P 500 Index.
Glascock & Davidson (1995)	31 real estate related companies (1977–1986)	Sharpe & Treynor ratios	Real estate firms underperformed the market on a nominal and on a risk-adjusted basis.
Redman & Manakyan (1995)	48 REITs (1986–1990)	Sharpe Ratio	REITs underperformed the market on a risk-adjusted basis.
Sanders (1997)	NAREIT and Wilshire REIT indices (1978–1996)	Modified Jensen alpha	NAREIT index (excluding healthcare REITs) earned positive risk-adjusted excess returns against long-term government and corporate bonds.
Wang & Erickson (1997)	144 MLPs (1981–1991)	Sharpe Ratio & Jensen alpha	MLP stocks underperformed the market.
Matysiak & Brown (1997)	18 property companies in U.K. (1980–1995)	Jensen alpha	Insignificant negative abnormal returns.

Exhibit 1 | (continued)

Previous Studies on Performance of Real Estate-Related Stocks

Authors	Sample (Period)	Measures	Results
Ling & Naranjo (2002)	600 property companies in 28 countries (1984–1999)	Treynor ratio & Jensen alpha	Little evidence of abnormal, risk-adjusted returns at the country level. Presence of a strong world-wide factor and country-specific factor in international real estate returns.
Bond, Karolyi & Sanders (2003)	238 property-related companies in 14 countries (1990–2001)	Multifactor asset pricing model	Evidence of strong global and country-specific market risks.

The finance literature generally classifies common stocks with high book-to-market stocks as value stocks and common stocks with low book-to-market value as growth stocks. Common and real estate stock returns in the U.S. and international equities markets are found to be positively related to the ratio of a firm's book-to-market value of common equity (Fama and French, 1992, 1998; Peterson and Hsieh, 1997; Sanders, 1997; and Bond, Karolyi and Sanders, 2003). 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. Hamelink and Hoesli (2002) further observe that the significance of the value/ growth factor in explaining real estate returns has increased over the last decade.

Debt ratio has also been found to significantly explain cross-sectional variations in common stock returns (Bhandari, 1988; and Fama and French, 1992). There is surprisingly scarce evidence on the direct relationship between financial leverage and risk-adjusted returns of real estate securities. Chan, Henderson and Saunders (1990) observe that highly levered equity REITs are more sensitive to macroeconomic factors than moderately levered REITs. This observation highlights the need to control for leverage when evaluating the relationship between macroeconomic factors and real estate returns.

The empirical evidence is not clear whether dividend yield plays any role in explaining REIT returns. While Sanders (1997) found the coefficient on his dividend variable to be negative and highly significant in a simplified model, its explanatory power ceased to be significant once a more well-defined asset pricing model was employed.

Another fundamental factor that may explain cross-sectional returns is the portfolio characteristics of individual REITs. Studies by Howe and Shilling (1990), Redman and Manakyan (1995), Gyourko and Nelling (1996) and Chen and Peiser (1999) conclude that property type specialization has a significant impact on individual REIT returns and risks. The impact of geographical concentration is, however, less conclusive. On the one hand, Gyourko and Nelling (1996) and Ambrose, Ehrlich, Hughes and Wachter (2000) conclude that diversification strategy by geographical regions has no significant benefit on REIT value. Chen and Peiser (1999), on the other hand, find geographical concentration has a positive impact on individual REIT returns.[2]

Regression Models

The panel regression employed to explain the risk-adjusted returns of real estate securities is specified as follows:

$$S_{it} = \alpha + \beta X_{it} + \gamma M_t + \mu_{it}, \qquad (1)$$

with the i and t subscripts denoting the cross-sectional and time-series dimensions respectively. The dependent variable, S_i, is the Sharpe index of the individual firms. X_{it} is the predetermined vector of firm-specific attributes, while M_t represents the time-variant macroeconomic factors. α is a scalar, while β and γ are column matrices of the partial regression coefficients for the explanatory variables to be estimated.

The error term, u_{it}, may be further specified as: $u_{it} = \mu_i + v_{it}$; where μ_i accounts for any unobservable firm- or country-specific effect that is not included in the regression model, and v_{it} represents the remaining disturbances in the regression, which varies with individual firm and time. In the estimation model, μ_i is fixed for each company over the study period.[3] This represents the effects of omitted variables unique to each company that stay constant over time. An obvious way to estimate the model is to introduce dummy variables into the regression model. The least squares dummy variable model may be specified as:

$$S_{it} = \alpha_i + \beta X_{it} + \gamma M_t + v_{it}, \qquad (2)$$

where α_i is the unique intercept for the individual ith firm in the sample. The fixed-effects model provides a common set of partial regression coefficients for the explanatory variables while allowing a different intercept for each of the cross-sectional units.

The Dependent Variable

The Sharpe Ratio, which scales the excess returns by total risks, is employed to measure the risk-adjusted returns of real estate securities in East Asia. The Sharpe Ratio is expressed as follows:

$$S_{it} = \frac{R_{it} - R_{ft}}{\sigma_{it}}, \tag{3}$$

where R_{it} is the mean rate of return of stock i during year t, R_{ft} is the mean risk-free during year t and σ_{it} is the standard deviation of the rate of return of stock i during year t. Closing prices of the individual real estate stocks on a weekly basis were employed to derive the annual mean returns and volatility of the individual real estate-related stocks. Consistent with Redman and Manakyan's (1995) contention that systematic risk may not capture all the risk inherent in REITs, total risks is employed to scale excess returns. Since many of the developing markets in East Asia are not fully integrated into world capital markets, the beta derived from the traditional CAPM may not be useful in explaining cross-sectional returns of average returns. Bekaert, Erb, Harvey and Viskanta (1997) argued that in completely segmented markets, volatility is a more appropriate measure of risk.

The Explanatory Variables

The explanatory variables in the regression models can be classified into two categories: X_{it} is the predetermined vector of firm-specific attributes, and M_t represents the time-variant macroeconomic factors. In total, five firm-specific attributes and three macroeconomic factors are incorporated into the regression models.

Five fundamental factors—size, book-to-market value ratio, debt ratio, dividend yield and property asset intensity ratio of the individual firms—were included in the regression models to explain the cross-sectional variations in real estate returns. The relationships between the first two factors and real estate returns are relatively clear from the results of previous studies. Essentially, small and value stocks are expected to outperform large and growth stocks. The influence of debt-equity ratio on the risk-adjusted returns of real estate securities is not as straightforward. Although unadjusted returns tend to be positively related to debt-equity ratio, the relationship is less clear when the returns are adjusted for risk. There is not a priori expectation on the relationship between dividend yield and risk-adjusted returns of real estate securities. One feature that contrasts real estate securities in Asia from U.S. REITs is their low dividend yields and REIT sponsors in Asia have frequently highlighted this feature as an attractive reason to prefer

REIT stocks over property stocks. The empirical results will show whether high dividend yielding property stocks indeed outperformed low dividend yielding stocks in East Asia. Property asset intensity is also included in the estimation model to control for the real estate business risk of individual stocks. It also addresses a limitation in the sample, which inadvertently includes developers/ contractors who may not hold significant real estate in their portfolio.

To examine the time-varying returns of real estate securities in East Asia, three macroeconomic factors are incorporated in the regression model. First, a binary variable is included to control for any regime shifts in the market conditions following the financial meltdown in 1997. The variable takes the value of one for observations after 1997 and zero otherwise. Second, the impact of interest rate movements is controlled for over the study period by incorporating the first difference in the risk-free rate observed in each economy in the regression models. Third, the market index's rate of returns is incorporated as a proxy for the general market condition. The risk-adjusted performance of real estate stocks is expected to be associated positively with economic performance and inversely with interest rate movements. The binary variable for Financial Crisis is expected to have a negative impact on the risk-adjusted returns of real estate stocks in East Asia.

Data

The study sample comprises 212 real estate-related corporations: Hong Kong (61 companies), Indonesia (23 companies), Malaysia (42 companies), Singapore (20 companies), South Korea (27 companies), Taiwan (15 companies) and Thailand (24 companies). It covers most of the companies listed on the real estate-related indices in the respective stock markets in East Asia as at end-2002. The study period starts from 1992 to coincide with the period when financial information on the individual firms is available. Any potential bias due to the specific time period will be minimal since the study period covers the boom and bust phases of the most recent real estate and economic cycles in the region. The study period can be further divided into two sub-periods: (a) from 1992 to 1997, which is characterized by strong growth and high asset inflation in most of the East Asian economies; and (b) from 1998 to 2002, which reflects the recessionary and recovery stages of the markets following the Financial Crisis.

Weekly stock returns and annual financial attributes of the individual firms were extracted from Datastream. Excess returns ($R_{it} - R_{ft}$) are measured based on the difference between the individual firm's nominal rates of return and the local risk-free rate, which is represented by the yield on the local 3-month Treasury bills.[4] Consistent with the approach adopted in previous studies, log transformation is applied to the size variable. In addition, the preceding year's closing values are employed to measure the pre-determined attributes of the individual firms, which are known to the investors at the beginning of each period (see Fama and French, 1992; and Ling and Naranjo, 1998).

Macroeconomic Statistics and Market Development

Exhibit 2 presents some statistics on the economy and stock markets of the seven East Asian markets. The corresponding statistics for three developed markets, namely U.S., U.K. and Australia are also included in Exhibit 2 for comparison. Between 1992 and 2000, the annual growth rate for the whole region averaged 3.53%, which is higher than the growth rate experienced in U.S. and U.K. over the same period. The combined market capitalization as of yearend-2000 was $US 1,368.68 billion. This is only approximately half the market capitalization in U.K. and less than 10% of that in U.S. Nevertheless, relative to the size of their respective national income, the stocks markets in Singapore and Malaysia are as significant as in U.S. (1.70) and U.K. (1.84). The Hong Kong stock market with a market capitalization of 3.78 times its national income is considered as one of the largest in the world.

With the exception of Hong Kong (17.4%) and Singapore (8.7%), the publicly-traded real estate sector only constitutes a small percentage of the overall market capitalization of the stock markets in East Asia. While the markets covered in the sample are located in the same region, the data shows that they are clearly in different stages of development. Based on the gross national income (GNI) per capita as of yearend-2000, Singapore and Hong Kong can be classified as more developed economies. As a percentage of GNI, foreign direct investment (FDI) constituted a high 10.35% in Hong Kong and 7.94% in Singapore. This reflects the openness of these two economies in welcoming global investors. In addition, the size of the stock market relative to the economy (3.78 in Hong Kong and 1.60 in Singapore) indicate that these two economies are closely integrated with the world capital markets. The long-term sovereign risk ratings also vary from AAA for Singapore to B for Indonesia.

The average size of the firms listed on the East Asian stock markets was $US 297.2 million, which is comparable to the average firm in Australia. However, they are still relatively small when compared to U.S. or U.K. companies. In terms of market liquidity, the statistics suggest there the stock value turnovers for Hong Kong, Malaysia, Singapore and Thailand were comparable to the markets in Australia and U.K. Indeed, the stock value turnover of South Korea (3.76 times) and Taiwan (3.15 times) were ranked second and third most highest in the global ranking by Standard & Poor's.

Sample Description

The financial characteristics of the sampled firms over the whole sample period as well as the two sub-periods are tabulated in Exhibit 3. Results of the analysis of variance tests indicate significant differences across markets as well as over the two sub-periods.

The market capitalization for the average real estate firm in East Asia was $US 154.28 million. It ranges from $US 17.42 million in Indonesia to $US 480.29

Exhibit 2 | Economic & Stock Market Statistics (as of yearend-2000)

		Hong Kong	Indonesia	Malaysia	Singapore	South Korea	Taiwan	Thailand	U.S.	U.K.	Australia
Long-term Sovereign Ratings		AA-	B	A	AAA	A	AA+	A-	AAA	AAA	AAA
Gross National Income (GNI)[a]	$US billion	165.12	125.04	76.94	95.43	397.91	257.96	121.05	8,879.50	1,403.84	397.35
GNI Per Capita (1999)[a]	$US pa	22,570	2,660	7,640	22,310	15,530	13,080	5,950	31,910	22,220	23,850
Foreign Direct Investments (FDI)[b]	$US billion	17.08	1.02	4.58	7.58	3.63	2.10	2.85	44.98	124.48	6.86
FDI / GNI (%)		10.35	0.81	5.96	7.94	0.91	0.82	2.36	0.51	8.87	1.73
Annual Real Growth (GNI per Capita) (%)[c]		1.9	3.0	4.7	4.7	4.7	5.5	3.8	2.0	2.1	2.9
Inflation Rate (%)[c]		5.2	3.9	3.9	1.6	5.8	2.7	4.6	3.0	3.0	1.3
Stock Market Capitalization	$US billion	623.40	26.83	116.94	152.83	171.59	247.60	29.49	15,104.04	2,576.99	372.79
Market Capitalization ($\times$ GNI)		3.78	0.21	1.52	1.60	0.43	0.88	0.24	1.70	1.84	0.94
Value Traded ($\times$ market cap)		0.61	0.32	0.45	0.52	3.76	3.15	0.53	2.01	0.67	0.57
No. of Companies		779	290	795	418	1,308	531	381	7,524	1,904	1,330
Average Firm Size	$US million	800.3	92.5	147.1	365.6	131.2	466.3	77.4	2,007.4	1,353.5	280.3
Real Estate-Related Stocks (% of stock market) (%)[d]		17.4	1.0	1.6	8.7	0.3	n.a.	0.3	0.6	1.3	5.5

Source: Standard & Poor's Emerging Stock Markets Factbook 2001

[a] As of yearend-1999.

[b] Annual average for 1992–2001 using data from United Nations Conference on Trade and Development.

[c] Annual average rate for period 1992–2000.

[d] Computed by authors using data from DATASTREAM.

Exhibit 3 | Attributes of Property Companies in East Asia

	Market Value (USD million)	Debt-Equity Ratio	Property Asset Intensity Ratio	Book-to-Market Value Ratio	Dividend Yield (%)
Panel A: Mean Values					
Whole Period: 1992–2002					
Hong Kong	366.75	1.011	0.646	2.474	3.87
Indonesia	17.42	2.288	0.670	1.628	2.91
Malaysia	107.59	0.848	0.634	1.312	2.66
Singapore	480.29	1.062	0.705	1.524	2.15
South Korea	83.51	3.107	0.305	1.784	2.45
Taiwan	237.54	1.612	0.115	1.500	3.54
Thailand	36.65	1.862	0.286	1.613	2.05
All	154.28	1.439	0.549	1.811	2.95
F-ratio1	81.5*	48.6*	16.6*	17.7*	92.5*
Sub-Period 1: 1992–1997					
Hong Kong	798.26	0.637	0.653	1.782	4.29
Indonesia	134.03	1.571	0.662	1.121	3.00
Malaysia	249.50	0.395	0.598	0.742	2.66
Singapore	988.28	0.693	0.694	1.219	1.83
South Korea	158.18	2.909	0.284	1.013	2.14
Taiwan	482.89	0.833	0.121	0.862	1.27
Thailand	107.91	1.502	0.250	1.396	3.44
All	368.29	1.079	0.534	1.238	2.99
F-ratio	31.1*	47.3*	90.4*	17.6*	14.3*
Sub-Period 2: 1998–2002					
Hong Kong	174.50	1.367	0.640	3.134	3.47
Indonesia	4.77	3.101	0.679	2.204	2.81
Malaysia	47.34	1.289	0.670	1.868	2.65
Singapore	205.06	1.497	0.718	1.883	2.52
South Korea	28.31	3.443	0.339	3.091	2.98
Taiwan	137.81	2.211	0.111	1.990	5.28
Thailand	14.03	2.183	0.317	1.805	0.82
All	64.15	1.815	0.566	2.409	2.91
F-ratio 1	99.2*	18.5*	78.7*	10.7*	6.74*
F-ratio 2	22.2*	47.2*	20.3*	4.36*	2.86*

million in Singapore. The debt–equity ratio of the sampled firms averaged 1.439. Real estate firms in Malaysia, Singapore, Hong Kong and Taiwan employed noticeably less debt in their capital structure. In contrast, real estate firms in Thailand, Indonesia and South Korea, which incidentally were also most severely affected by the Financial Crisis, employed high debt ratios. The property asset intensity ratio, which indicates the proportion of asset held by the individual firms in real estate assets, averaged 54.9% over the study period. Comparisons across the markets indicate that the sampled firms in Hong Kong, Indonesia, Malaysia

Exhibit 3 | (continued)

Attributes of Property Companies in East Asia

	Market Value (USD million)	Debt-Equity Ratio	Property Asset Intensity Ratio	Book-to-Market Value Ratio	Dividend Yield (%)
Panel B: Standard Deviations					
Whole Period: 1992–2002					
Hong Kong	7.41	1.225	0.236	2.006	3.50
Indonesia	6.03	2.353	0.220	1.552	4.74
Malaysia	3.40	1.296	0.207	1.319	2.82
Singapore	5.21	1.246	0.250	1.112	2.50
South Korea	4.39	2.243	0.103	1.989	2.93
Taiwan	2.91	1.994	0.105	1.373	5.82
Thailand	5.92	2.161	0.253	1.832	3.88
All	6.87	1.804	0.280	1.747	3.57
Sub-Period 1: 1992–1997					
Hong Kong	7.56	0.814	0.239	0.924	2.89
Indonesia	2.57	1.894	0.204	1.066	3.47
Malaysia	2.77	0.705	0.207	0.727	2.81
Singapore	5.10	0.801	0.271	0.774	1.47
South Korea	3.43	2.129	0.076	0.552	1.89
Taiwan	2.31	1.525	0.120	1.276	1.19
Thailand	5.65	2.045	0.223	2.235	4.72
All	7.56	0.814	0.239	1.113	2.89
Sub-Period 2: 1998–2002					
Hong Kong	5.36	1.431	0.233	2.484	3.96
Indonesia	1.81	2.570	0.239	1.807	5.89
Malaysia	2.14	1.565	0.200	1.517	2.83
Singapore	3.37	1.514	0.224	1.329	3.30
South Korea	3.38	2.404	0.131	2.737	4.10
Taiwan	2.46	2.118	0.092	1.249	7.23
Thailand	3.22	2.224	0.274	1.366	2.35
All	5.46	1.946	0.279	2.060	4.10

Notes: F-ratio 1 and F-ratio 2 are tests for equality across countries and time-periods.
*Significant at the 0.01 level.

and Singapore held more real estate assets. This also implies a higher proportion of developers, builders and contractors amongst the sampled firms in South Korea, Thailand and Taiwan. Although these firms carry less real estate assets in their balance sheet, they still derived a significant proportion of their income from real estate activities. Hence, their inclusion in the real estate-related sector indices. The dividend yield averaged 2.95% over the sample period, with the highest recorded by Hong Kong and Taiwan real estate stocks. Dividend yields of real estate

securities in the other five economies were in the 2%–3% range. The low dividend yields are not surprising because real estate firms in East Asia do not enjoy any tax advantages from income disbursement.[5]

Exhibit 3 also shows that the real estate sectors in East Asia have undergone major changes post-1997. In particular, they have become more risky after the Financial Crisis. The average size of the sampled firms shrunk dramatically— from $US 368.29 million before the Financial Crisis to $US 64.15 million afterwards. The average debt–equity ratios of the sampled real estate corporations have also increased from 1.079 to 1.815 over the two sub-periods. In addition, the mean book-to-market value ratios increased from 1.238 to 2.409, suggesting that real estate securities in East Asia behaved more like growth stocks during the expansionary phase (from 1992 to 1997) and more like value stocks after the Financial Crisis. Hamelink and Hoesli (2002) came to a similar conclusion that real estate companies in Asia and Oceania have become less and less growth oriented towards the end of the 1990s.

Empirical Results

Performance Analysis

Panel A of Exhibit 4 presents the historical performance of property stocks over the whole sample period as well as over the two sub-periods. No superior returns were detected with the Jensen's alphas, derived from single index model, which were insignificant for most of the sampled firms.[6] From a total risk perspective, the returns from real estate securities in East Asia are very volatile. Consider the example of real estate stocks in Singapore, which despite being the least volatile amongst the seven economies in the sample had a high standard deviation of 44.7%. In addition, the average real estate security in the sample has a beta of 1.13, which indicates that it is more volatile than the market portfolio. In contrast, the betas of REIT stocks in the U.S. are generally less than one (Chan, Hendershott and Sanders, 1990; Howe and Shilling, 1990; Glascock, 1991; and Sanders, 1997).

On a nominal basis, real estate stocks in Thailand gave the highest return, averaging 23.06% per annum. The annual returns achieved in the other markets, ranked from highest to lowest, are as follows: South Korea (22.56%), Indonesia (18.76%), Malaysia (14.25%), Hong Kong (10.68%) and Singapore (8.26%). Taiwan has the distinction of being the only market that registered negative returns (−7.26%) over the sample period. In line with the risk–return tradeoff, it is not surprising to observe that real estate securities in Thailand had the highest volatility over the sample period. Real estate securities in Singapore and Hong Kong were the most profitable from a risk-adjusted basis. This reflects the attractiveness of these two markets to international investors in the 1990s, probably due to their open economy and close integration with the global capital markets.

Exhibit 4 | Historical Returns of Real Estate Securities in East Asia

	Mean Return	Std. Dev.	Excess Return	Sharpe Ratio	Beta
Panel A: Property Stocks					
Whole Period: 1992–2002					
Hong Kong	0.1068	0.5447	0.0496	0.1313	1.07
Indonesia	0.1876	0.8649	0.0027	−0.0925	1.28
Malaysia	0.1425	0.5941	0.0890	0.0948	1.21
Singapore	0.0826	0.4473	0.0658	0.1360	1.46
South Korea	0.2256	0.6718	0.1112	0.0910	0.84
Taiwan	−0.0726	0.4785	−0.1199	−0.1890	0.87
Thailand	0.2306	0.8968	0.1611	−0.1079	1.09
All	0.1268	0.6186	0.0568	0.0493	1.13
Sub Period: 1992–1997					
Hong Kong	0.3854	0.3955	0.3352	0.8427	1.08
Indonesia	0.2854	0.5154	0.1507	0.3022	1.52
Malaysia	0.4532	0.4980	0.3901	0.5974	1.10
Singapore	0.3044	0.3279	0.2908	0.6883	1.47
South Korea	0.1242	0.4786	−0.0135	−0.0961	0.75
Taiwan	0.2681	0.3655	0.2127	0.5958	0.89
Thailand	−0.2602	0.4906	−0.3587	−0.7682	1.09
All	0.2777	0.4386	0.2039	0.4221	1.13
Sub Period: 1998–2002					
Hong Kong	−0.0641	0.6360	−0.1256	−0.3051	1.07
Indonesia	0.1281	1.0776	−0.0873	−0.3328	1.68
Malaysia	−0.0463	0.6525	−0.0940	−0.2107	1.15
Singapore	−0.0968	0.5437	−0.1160	−0.3106	1.48
South Korea	0.3769	0.9602	0.2973	0.3704	0.79
Taiwan	−0.2113	0.5245	−0.2554	−0.5088	0.85
Thailand	0.5008	1.1205	0.4472	0.2557	1.22
All	0.0275	0.7370	−0.0400	−0.1961	1.16

Exhibit 4 shows a clear shift in the risk–return characteristics of the sampled real estate securities over the two sub-periods. While the real estate securities registered a positive Sharpe Ratio of 0.422 for the 1992–1997 period, the average risk-adjusted returns fell to −0.196 post-1997. The data, nevertheless, shows that the performance of real estate securities in South Korea and Thailand has started to show improvement. Driven by a robust recovery in the equities markets, real estate securities in Thailand registered phenomenal rates of return after the crisis: 131.9% in 1998, 57.0% in 1999, 103.2% in 2001, and 24.1% in 2002. Similarly, the performance of real estate securities in South Korea in the second sub-period was enhanced by record high rates of return in 1998 (105.1%) and 2001 (127.1%).

Exhibit 4 | (continued)

Historical Returns of Real Estate Securities in East Asia

	Mean Return	Std. Dev.	Excess Return	Sharpe Ratio
Panel B: General Stocks				
Whole Period: 1992–2002				
Hong Kong	0.1131	0.2452	0.0607	0.4478
Indonesia	0.1045	0.2455	−0.0672	−0.0665
Malaysia	0.0911	0.2718	0.0369	0.4189
Singapore	0.0312	0.1866	0.0150	0.2274
South Korea	0.1003	0.3365	−0.0138	−0.1807
Taiwan	0.0510	0.2701	0.0024	0.0348
Thailand	0.0135	0.3037	−0.0542	−0.1258
All	0.0721	0.2656	−0.0029	0.1080
Sub Period: 1992–1997				
Hong Kong	0.2206	0.2239	0.1635	0.9904
Indonesia	0.1686	0.1922	0.0274	0.5307
Malaysia	0.1450	0.2463	0.0776	0.8557
Singapore	0.0359	0.1356	0.0186	0.4311
South Korea	−0.0446	0.2544	−0.2013	−0.6826
Taiwan	0.1494	0.2495	0.0907	0.3460
Thailand	−0.0034	0.2719	−0.0963	−0.2225
All	0.0959	0.2248	0.0115	0.3212
Sub Period: 1998–2002				
Hong Kong	−0.0160	0.2708	−0.0627	−0.2034
Indonesia	0.0275	0.3095	−0.1807	−0.7831
Malaysia	0.0263	0.3025	−0.0121	−0.1052
Singapore	0.0255	0.2479	0.0105	−0.0169
South Korea	0.2743	0.4351	0.2112	0.4216
Taiwan	−0.0672	0.2947	−0.1035	−0.3387
Thailand	0.0337	0.3418	−0.0038	−0.0097
All	0.0435	0.3146	−0.0202	−0.1479

Notes: The reported figures are mean values for each of the market portfolios are computed using an equally weighted portfolio of all the real estate-related stocks in each market. Total risk is represented by standard deviation of the returns.

Panel B in Exhibit 4 provides a comparison of the performance of real estate securities against the corresponding returns of the market portfolios in each of the market. Based on the earlier observations, it is not surprising to observe that real estate securities in Thailand and South Korea have performed better than the general equities markets. On the other hand, those in Hong Kong, Indonesia, Malaysia, Singapore and Taiwan have fared worse than the general stocks. For example, the Sharpe Ratio of the general stock market in Singapore over the whole

period (1992–2002) was 0.227, which is significantly higher than the 0.136 derived from an equally-weighted portfolio of Singapore real estate stocks.[7]

Determinants of Risk-Adjusted Performance

To identify the determinants of the risk-adjusted returns of real estate securities in East Asia, the Sharpe Ratio of the individual firms is regressed against a set of firm-specific and time-variant variables. For the regressions, all the real estate stocks in the sample are pooled on an equally weighted basis. After omitting observations with missing and extreme values, the final sample has 1,237 firm-year observations. Exhibit 5 tabulates the explanatory variables, the proxies used to measure the explanatory variables, as well as the pair-wise relationships between each of the variables in the regression models.

The parameters of Equation (2) were estimated for the whole sample period (1992–2002), as well as over two sub-periods: 1992–1997 and 1998–2002. In addition, another regression was also conducted that omitted observations that had a property asset intensity ratio of less than 30% from the study sample. This process effectively filtered out sampled firms that do not have substantial real estate assets. Preliminary tests using the Lagrange multiplier and Hausman statistic confirmed that the fixed-effects model is the most appropriate specification for the data set. The estimation results are presented in Exhibit 6. The R^2 values indicate that the explanatory variables together with the firm dummies were able to explain between 47.7% and 74.3% of the variations in the risk-adjusted returns of real estate stocks in East Asia.

As expected, the three market factors are highly significant in explaining the risk-adjusted performance of real estate securities. The Asian Financial Crisis and interest rate movements have an adverse effect, while the underlying economic performance has a strong positive influence on the risk-adjusted returns of real estate securities in the East Asia region. Consistent with existing literature on asset pricing, size and book-to-market value ratio captured most of the cross-sectional variations in the real estate stock returns. The premium attached to small and value stocks persisted even after controlling for the influence of macroeconomic factors. The empirical evidence, therefore, indicates that stocks with small capitalization and high book-to-market value yield higher returns on a risk-adjusted basis.

The empirical results also show that real estate firms that employed high gearing tend to underperformed those that employed less debt in their capital structure. This result appears to suggest that although nominal returns are related positively to financial gearing, this is offset by the additional volatility imposed on the returns. Consequently, the net effect is that high gearing leads to lower risk-adjusted returns for real estate stocks. The estimation results on the filtered sample show a significant and positive coefficient for dividend yield. This suggests that dividend yield plays a role in explaining the risk-adjusted returns of real estate

Exhibit 5 | Explanatory Variables: Proxies & Pair-wise Correlation Matrix

Variables	Proxy	SZE	D-E	BMV	DY	PAI	AFC	INT	MKT
Firm Size (SZE)	Natural Log (market value equity expressed in $US)	1.000	−0.395	−0.338	0.016	0.103	−0.201	0.141	−0.058
Debt-equity ratio (D-E)	Book value of debt / market value of equity		1.000	0.402	0.017	−0.178	0.210	−0.022	0.067
Book-to-market value (BMV)	Book value of equity / market value of equity			1.000	0.183	0.167	0.315	−0.124	0.138
Dividend yield (DY)	Dividend income / market value of equity				1.000	0.072	0.067	−0.103	0.094
Property asset intensity (PAI)	Book value of property assets / book value of total assets					1.000	0.039	0.007	0.026
Asian Financial Crisis (AFC)	Dummy variable = 1 post-1997; 0 otherwise						1.000	−0.066	−0.151
Interest rate movements (INT)	First different in risk-free rate							1.000	0.010
Market condition (MKT)	Returns on the market index								1.000
Sharpe Ratio	Excess return / standard deviation	−0.063	0.013	0.106	0.133	0.032	−0.190	−0.201	0.523

Exhibit 6 | Determinants of Risk-Adjusted Returns (Composite Portfolio)

	Full Sample			Filtered Sample
Sample Period	Sub-Period 1 (1992–1997)	Sub-Period 2 (1998–2002)	Whole Period (1992–2002)	Whole Period (1992–2002)
Explanatory Variables				
Firm size	−0.4166	−0.9008	−0.4644	−0.4665
	(4.14)**	(4.98)**	(6.17)**	(4.89)**
Debt-equity ratio	−0.0899	0.0428	−0.0822	−0.0809
	(2.65)**	(0.52)	(2.77)**	(2.26)*
Book-to-market value	0.1772	0.3663	0.1612	0.1414
	(2.84)**	(3.19)**	(3.18)**	(2.42)*
Dividend yield	0.0332	0.0170	0.0176	0.0350
	(3.09)**	(0.50)	(1.56)	(2.61)**
Property asset intensity	−0.6170	−0.3746	−0.0021	0.1232
	(1.26)	(0.76)	(0.01)	(0.39)
Asian Financial Crisis	—	—	−0.7510	−0.8270
			(10.07)**	(10.42)**
Interest rate change	−0.0271	−0.0690	−0.0308	−0.0342
	(5.42)**	(3.74)**	(6.65)**	(6.72)**
Market performance	0.8418	2.3523	1.4536	1.3959
	(7.61)**	(13.22)**	(13.62)**	(11.72)**
No. of Observations	802	436	1,238	950
R^2	0.477	0.743	0.494	0.5250
F-value	2.55**	5.18**	4.69**	4.86**

Notes: This Exhibit reports the results of regressing estimated Sharpe Ratio on selected firm-specific and time-variant factors based on a panel data of 1,237 firm-year observations over the whole sample period (1992–2002), as well as over two sub-periods (1992–1997; 1998–2002). The last regression is carried out on a filtered sample, which omitted real estate securities that have a property asset intensity ration of less than 0.30. The white-corrected absolute value of the *t*-Statistic is in parentheses.
*Significant at the 5% level.
**Significant at the 1% level.

firms, especially for securities that owned more real estate assets. Furthermore, the results revealed that the importance of dividend yield in explaining stocks returns has declined over the two sub-periods. Prior to the Asian Financial Crisis, real estate securities that paid high dividends outperformed those that paid lower dividends but after 1997, dividend yield does not appear to have any significant impact.

The asset structure of a real estate firm, as represented by the property asset intensity ratio, does not have any significant influence on the risk-adjusted returns of real estate companies in East Asia. To check the robustness of the results, another set of regressions was conducted by substituting the property asset intensity ratio with the firm's development exposure. This is measured by the percentage of total assets represented by vacant land and projects under constructions. It would be interesting to know whether real estate returns are related to development activities, which usually involve higher business risks. The estimation results, which are not presented, show that property development exposure does not significantly affect the risk-adjusted returns of real estate stocks. In another regression, the R^2 value (derived from a market model using weekly returns of the individual firm) was included as a measure of the individual firm's level of market diversification.[8] The estimation results, as reported in the first regression in Exhibit 7, show that firm diversification has a negative but significant impact on the risk-adjusted returns of real estate securities in East Asia. This observation indicates that firms that are more focused on a specific sector of the economy, on average, performed better than diversified firms.

Decomposed Regression by Country-Portfolios

Exhibit 7 presents the regression results of different equally-weighted portfolios comprising real estate stocks traded in each of the markets covered in the study. Decomposing the real estate stocks into individual market portfolios permits a discrimination of the factors' influence in each market. The F-ratios for the joint significance of the explanatory variables are significant in all the decomposed regressions. The R^2 values indicate that the explanatory variables together with the set of dummy variables for firms were able to explain between 44.3% and 77.4% of the variations in the risk-adjusted returns of real estate securities.

Overall, the estimation results achieved on the individual market portfolios are consistent with the earlier results reported for the composite portfolio. The general market condition dominates firm attributes in terms of its ability to explain risk-adjusted returns of real estate stocks in East Asia. There is also a significant downward shift in the risk-adjusted returns of real estate stocks in most of the East Asian economies since 1998. The performance of real estate securities is also related negatively to interest rate movements, with the exception of real estate stocks in Taiwan, which appeared to benefit from interest rate hikes.

With respect to the cross-sectional attributes, the most consistent factor is firm size. It is statistically significant in five out of the seven regressions. The level of market diversification also has an inverse and significant relationship in four regressions involving portfolios of real estate stocks listed in Indonesia, Malaysia, Singapore and South Korea. An earlier observation was that the value premium is persistent over different sub-periods. The decomposed results revealed that most of this effect comes from Indonesia and South Korea, and to a lesser extent,

Firm Attributes	Composite	Hong Kong	Indonesia	Malaysia	Singapore	S. Korea	Taiwan	Thailand
Firm size	−0.4533	0.5260	0.1544	−0.2433	−1.1541	−0.3861	−0.9467	0.0361
	(6.02)***	(1.90)*	(1.33)	(2.16)**	(6.82)***	(1.76)*	(2.40)**	(0.15)
Debt-equity ratio	−0.0775	0.1713	0.0938	−0.2073	−0.2683	−0.1290	−0.6125	−0.0329
	(2.62)***	(1.59)	(1.29)	(2.41)**	(1.86)*	(2.26)**	(3.73)***	(0.43)
Market-to-book value	0.1474	−0.0889	0.3499	0.0899	0.0248	0.4561	0.5594	0.1942
	(2.88)***	(0.57)	(3.71)***	(1.07)	(0.22)	(3.37)***	(1.46)	(1.99)*
Dividend yield	0.0174	−0.0205	0.0244	0.0565	0.0166	0.1018	0.0278	0.0028
	(1.54)	(0.88)	(1.38)	(3.30)***	(0.40)	(3.04)***	(0.33)	(0.13)
Diversification	−0.5741	0.1053	−1.4444	−0.5526	−0.8375	−1.9388	−0.2241	0.0179
	(3.15)***	(0.25)	(2.10)**	(2.12)**	(1.98)**	(4.06)***	(0.28)	(0.02)
Asian Financial Crisis	−0.7394	−0.8191	−0.4574	−0.5483	−0.9845	−0.7704	−1.5616	0.4682
	(10.02)***	(6.23)***	(1.61)	(4.18)***	(6.80)***	(3.27)***	(5.48)***	(0.97)
Interest rate change	−0.0322	−0.0995	−0.0340	−0.1172	−0.0898	−0.0112	0.5529	−0.0093
	(6.95)***	(5.09)***	(6.48)***	(5.13)***	(1.89)*	(0.89)	(3.29)***	(0.25)
Market performance	1.4391	1.5801	0.5115	1.6027	1.7539	0.6904	1.5297	2.3158
	(13.57)***	(7.75)***	(1.77)*	(7.94)***	(8.37)***	(4.01)***	(4.04)***	(4.44)***
R^2	0.500	0.4430	0.5106	0.6433	0.7741	0.6117	0.7042	0.4880
F-value	4.83***	3.57***	2.50***	9.09***	16.60***	5.20***	4.31***	2.92***
No. of Observations	1,237	358	103	297	153	143	60	123

Notes: This Exhibit reports the regression results using a one-way fixed effects model comprising 1,237 firm-year observations over the whole sample period (1992-2002). The dependent variable is the individual firm's Sharpe Ratio in the respective year, whie the explanatory variables are shown in the first column. While the first regression pooled all the observations in our sample on an equally-weighted basis, the remaining regressions are for specific market portfolios. The White-corrected absolute value of the *t*-Statistic is in parentheses.
*Significant at the 5% level.
**Significant at the 1% level.
***Significant at the 10% level.

Thailand. Since these three economies were the worst affected by the Financial Crisis, the observation suggests that the premium attached to value stocks became more significant in more volatile and uncertain market condition. The partial coefficients for debt ratios were negative and statistically significant in four of the market portfolios, namely Malaysia, Singapore, South Korea and Taiwan. In addition, dividend yield appears to play a significant role in explaining the risk-adjusted returns of real estate stocks in Malaysia and South Korea.

Conclusion

This research adds to the existing literature by examining the risk-adjusted returns of real estate securities traded in developing economies, which have different institutional and market structures from developed economies. Panel regressions were employed to shed light on how firm-specific attributes and time-varying factors affect the risk-adjusted returns of real estate stocks across different markets and over time.

The empirical results provide an indication of the type of returns foreign investors would have received from investing in real estate stocks publicly traded in developing markets. Real estate stocks in Singapore and Hong Kong were the most profitable on a risk-adjusted basis, while real estate stocks in Taiwan, Thailand and Indonesia registered negative risk-adjusted returns. The finding also indicate that the traded real estate sector in five of the East Asian economies (namely Hong Kong, Indonesia, Malaysia, Singapore and Thailand) under-performed the general stocks between 1992 and 2002. The estimation results suggest that the risk-adjusted returns of real estate stocks in East Asia are dictated to a large extent by macroeconomic factors. However, investors should not neglect the fundamentals of individual stocks when constructing their asset portfolio. The empirical results suggest a bright prospect for REIT stocks in East Asia. Their tendency to pay high dividends and adopt low gearing generally augurs well for their performance from a risk-adjusted perspective.

Endnotes

[1] Mera and Renaud (2000) and Kallberg, Liu and Pasquareillo (2002) provide a good overview of the Asian Financial Crisis and its impact on the real estate markets in the region.

[2] With respect to specific locality, Redman and Manakyan (1995) noted investments in the western U.S. increase REIT returns, which they attribute to the expanding economies of California, Washington and Oregon in the late 1980s. Howe and Shilling (1990), on the other hand, found that properties located in the Northeast were positively associated with Jensen alpha primarily in the 1979–1987 period. This coincided with a period during which house values rose at extraordinary rates.

[3] An alternative specification prescribed in the econometric texts is to assume that the joint-effects of the omitted (unobserved) variables can be appropriately summarized by

a random variable. Panel data model with such error structure specification is called the random effects model (see Balestra, 1992; 26–27).

[4] Where the yield on Treasury bills is not available (such as in Hong Kong, Malaysia, Taiwan and Thailand), the 3-month savings deposit rate was used as a proxy for the risk-free rate. Admittedly, there creates a slight downward bias in the reported excess return.

[5] This point is made by an anonymous reviewer. It is anticipated that dividend yields of real estate securities in the region will increase over time as the real estate markets grow in maturity and as more REITs are introduced in the region. For example, the tax transparency status linked to full income disbursement was achieved only when the maiden REIT was launched in Singapore at end of 2002.

[6] The percentage of alphas that was significant at the 0.05 level for each of the market economies in the study sample is as follows: Hong Kong (3.5%), Indonesia (6.3%), Singapore (3.0%), South Korea (3.2%), Taiwan (5.2%) and Thailand (7.5%).

[7] Although the market indices used to compute the market portfolio returns included real estate-related companies, their inclusion does not alter the conclusions on the relative performance of real estate securities vis-à-vis the overall equities markets. Moreover, real estate-related stocks only constituted a small percentage of the total stock market capitalization, as shown in Exhibit 1.

[8] For a single security, the R^2 of a market model represents the market estimate of the intrinsic diversification within the firm. In so far as the market index reflects the entire economy, this measure reflects the degree to which a firm is related to the economy in the aggregate (see Barnea and Logue, 1973; and Chung, 1993).

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