

行政院國家科學委員會專題研究計畫成果報告

亞洲金融風暴與不動產投資風險貼水之研究 On the Impacts of Asian Financial Crisis on Real Estate Risk Premiums

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一、中文摘要

在1997年亞洲金融風暴後，亞洲許多經濟體深受經濟衰退之苦。該次金融危機肇始於泰國銀行大量不動產放款的壞帳導致金融風險的提高。泰銖因為投資人擔心泰國銀行體系崩解而狂跌。泰銖的狂貶產生了骨牌效應而波及到鄰近國家，包括新加坡、馬來西亞、印尼、香港、台灣、與南韓等國。1997年亞洲金融風暴對世界金融市場亦產生了重大影響。1997年十月底，紐約證券交易所因此而創下單日最大跌點紀錄。幾乎所有投資亞洲的投資人皆遭受重大損失。銀行過度曝露於不動產風險之上是廣為一般接受導致亞洲金融風暴發生的主要原因之一。因此，目前是探討在亞洲金融風暴前後，不動產風險與報酬特徵發生是否改變的好時機。本研究的目的即是再探討在亞洲金融風暴前後，這些受創的經濟體中不動產風險與報酬特徵是否發生了結構性的改變？這些受創的國家包括：Thailand, Indonesia, Philippines, Malaysia, Hong Kong, Singapore, and Japan。本研究同時將探討非亞洲區域國家的不動產風險貼水變化以作為對照，包括：Australia, Belgium, France, Ireland, Italy, Norway, Portugal, Spain, UK, and the U.S.。本研究發現，受金融風暴影響的亞洲國家中，不論由本地觀點或全球觀點而言，其系統風險結構皆沒有發生顯著改變。此結論顯示，亞洲金融風暴對風險性資產市場的影響是全面性的，而此影響也未對不動產市場與整體市場相對關係產生結構性改變。

關鍵詞：亞洲金融風暴、不動產風險貼水

Abstract

Asian economies have suffered severe recession since the financial crisis started in 1997. The financial turmoil began with the adverse risk

exposure to real estate loans of Thailand banks. Fearing that the economy of Thailand would collapse caused the plunge of the Thailand Baht. The downfall of Thailand currency caused a domino effect to the neighboring countries, including Singapore, Malaysia, Indonesia, Hong Kong, Taiwan, and South Korea. The crisis in Asia also had a major impact in the financial markets all over the world, which caused the New York stock market to plummet in the late October 1997. It is obvious that almost all investors in this area have suffered painful losses. Since it is widely accepted that the one of the root causes of the crisis is that the banks of this area overly expose to real estate risk. It is good timing now to exam whether the real estate investors demand higher risk premiums after the crisis. This study tries to investigate whether there is a structural change of risk/return relationship in real estate property stocks in countries most affected by the crisis, such as Thailand, Indonesia, Philippines, Malaysia, Hong Kong, Singapore, and Japan. In the meantime, this study will also examine the same characteristics of non-Asian real estate property stocks as a contrast. These non-Asian property stocks include Australia, Belgium, France, Ireland, Italy, Norway, Portugal, Spain, UK, and the U.S. The study finds that no significant changes happen in the systematic risk structures of these suffered Asian countries, neither from local perspective nor from international perspective. The result may reveal that the Asian financial crisis exerted its impacts not only on the real estate markets but also on the overall markets. The systematic relationship between real estate market and the overall market is not changed.

Keywords: Asian Financial Crisis, Real Estate Risk Premiums

I. Introduction

Over exposure to real estate risk has been one of the major causes of the 1997 financial crisis around the world. The recent financial turmoil in the Asia began with the adverse risk exposure to

real estate loans of Thailand banks. Fearing that the economy of Thailand would collapse caused the plunge of the Thailand Baht. The downfall of Thailand currency caused a domino effect to the neighboring countries, including Singapore, Malaysia, Indonesia, Hong Kong, Taiwan, and South Korea. The crisis in Asia also had a major impact in the financial markets all over the world, which caused the stock market to plummet in the late October 1997. After this crisis, investors' attention has been drawn to the return and risk characteristics of the real estate property markets in the crisis area. Do the risk/return characteristics of real estate investment change in this area after the crisis? Does the similar change, if there is, happen in non-Asia economies? The answers of the above two questions are very important for international investors in making their asset allocation decisions. The purpose of this study is therefore to empirically answer the above two questions.

Due to the lack of data and the lack of the awareness of the risk involved in international real estate investments, the literature in risk/return features of international real estate investment is little. Among the little literature, some of them are worth noting. Geurts and Jaffe (1996) first provides some preliminary empirical investigation on this issue. They, however, examine only the institutional characteristics for the potential of international diversification. Though they do not address the risk/return relationship empirically and only discuss correlation among various risk measures, its discussion of the possible risk variables involved in international real estate investment provides some background for the current study. Liao and Mei (1999) provides an empirical study on the relationship between institutional framework and real estate returns from an asset pricing perspective. They use data from both developed and emerging market countries. Their empirical results show that institutional factors do influence real estate returns and are probably not appropriately priced by traditional mean-variance pricing framework. Lu and Mei (1999) empirically examines the return process of the emerging equity markets, and that of property indices in particular. They found that the emerging market property indices are more volatile than both the respective market indices and the real estate investment trust indices in the United States. Gordon and Canter (1999) does a

preliminary test of the stability of the correlation between property stocks and equity indices in fourteen countries. The study finds that in many countries, the correlation coefficients are not stable over time, and in several countries there is a discernable trend toward integration or segmentation. Chua (1999) examines whether the inclusion of international real estate would enhance the risk–return characteristics of an internationally diversified investment portfolio that already invested in bonds, cash, equity, and gold. The study concludes that international real estate investment does have a viable role to play in global mixed-asset investment portfolios.

From the above four studies, probably the most recent four, we can see that risk/return study of real estate investment in an international framework is still in its sprouting stage. The study on the change of risk/return structure of real estate investment after 1997 Asian financial crisis will be important both to the literature and the related industry.

The rest of the paper is arranged as follows. In Section II, we introduce the data and methodologies. Section III shows the empirical results. Section IV is the conclusion.

II. Data and Methodologies.

This study tries to investigate whether there is a structural change of risk/return relationship in real estate property stocks in countries mostly affected by the crisis, such as Thailand, Indonesia, Philippines, Malaysia, Hong Kong, Singapore, and Japan. In the meantime, this study will also examine the same characteristics of non-Asian real estate property stocks as a contrast. These non-Asian property stocks include Australia, Belgium, France, Ireland, Italy, Norway, Portugal, Spain, UK, and the U.S. This study uses the property stock index to proxy returns on real estate investment. The data needed for this study, therefore, are the index returns of both property stock and equity market of each country. In addition, a world index return is also needed to bring this study to the perspective of international investment framework. All the above data can be found in Datastream database.

(I) The Data

The data required for this study are described as follows.

Equity market, world market return index, and property stock returns data are derived from the total quarterly return index constructed by Datastream.

The data covers 24 countries reporting property stock index in local security markets. The return index for each country ends at the third quarter of 1997. However, according to the data availability, the beginning dates of the indices are not the same among countries. The countries included and the beginning date of the indices are as followed. The countries of which data begins at the first quarter 1986 are: Australia, , Belgium, Canada, France, Hong Kong, Ireland, Italy, Japan, Malaysia, Netherlands, Norway, Singapore, Sweden, UK, and US. The beginning date for the others are Austria (1992 1st Q), Indonesia (1992 3rd Q), Denmark (1994 3rd Q), New Zealand (1988 1st Q), Peru (1994 1st Q), Philippines (1990 2nd Q), Portugal and Thailand (1990 1st Q), and Spain (1987 1st Q). To avoid a selection bias, we have included data from both developed and developing markets.

In order to do cross-country analysis, all of the return series are converted into U.S. dollar returns. The formula used to transform returns on foreign assets into dollar terms is as follows:

$$(1) \quad \$R_t = \left(\frac{X_{t-1}}{X_t}\right)[1 + R_t] - 1$$

where X_t is the spot exchange rate (stated as units of foreign currency per dollar) at the month t . R_t denotes the local currency return and $\$R_t$ indicates the dollar return.

(II) Methodology

Total Risks of Real Estate Indexes Returns before and after the Crisis

To examine the change of total risks of the real estate investments, we use F-test to examine the equality of the variance of property index returns before and after the crisis. We can test the market returns indexes in a similar way. The F test is applied as follows:

$$F = \frac{s_1^2}{s_2^2}, \quad \text{where } s_1^2 \text{ and } s_2^2 \text{ represent the}$$

sample variances of the rate of returns in the prior and after the crisis periods respectively.

Systematic Risks of Real Estate Indexes Returns before and after the Crisis---local perspective

To examine the change of country specific systematic risks of the returns on property stock index, the Chow test is used. Chow test is one of the popular methods of testing for difference between two (or more) regressions. In this study, we first combine all the rate of return observations of the two periods (before and after the crisis) and run a single "pooled" single-index market model regression as follows:

$$(2) \quad R_i = r_i + S_i R_{im} + V_i$$

Where R_i is the property index returns of country i and R_{im} is the equity market returns of country i . From the regression, we obtain the sum of squares of the least-square residuals, say, S_1 , with degree of freedom equal to $N_1 + N_2 - k$, where N_1 and N_2 are the observations and k is the number of parameters estimated. In this study, $k=2$. Next, we run two single index market model regressions, one for period before the crisis and one for after the crisis. We then obtain the sum of squares of the least-square residuals, say S_2 and S_3 , with degree of freedom equal to $N_1 - k$ and $N_2 - k$, respectively. Let $S_4 = S_2 + S_3$, with degree of freedom equal to $N_1 + N_2 - 2k$, and let $S_5 = S_1 - S_4$, with degree of freedom equal to k . A F test is then applied to test whether the systematic risks (that is β 's) estimated in the two periods are the same. The F test is performed as follows:

$$F = \frac{S_5 / k}{S_4 / (N_1 + N_2 - 2k)},$$

with $df = N_1 + N_2 - 2k$.

If the F exceeds the critical, reject the hypothesis that the two regressions are the same.

Systematic Risks of Real Estate Indexes Returns before and after the Crisis --- International perspective

To examine the change of systematic risks of the returns on property stock index within an international framework, a similar procedure as that of local perspective is adopted. However, we change the single index model from equation (2) to equation (3) as follows:

$$(3) \quad R_i = r_i + S_i R_{wm} + V_i$$

Where R_{wm} is the world equity market returns.

III. Empirical Results

Comparison of the total risk of real estate stock returns before and after the Asian financial crisis

The first column of Table 1 and Table 2 reports the F statistics of the tests of changes of real estate risk before and after the crisis for Asian and non-Asian countries respectively. The results show that there are no consistent risk behavior changes in different countries. Only three of the sampled eight Asian countries have a significant increase in their real estate return volatility. These countries are Indonesia, Malaysia, and Singapore. On the other hand, the non-Asian countries exhibit similar results. The real estate return volatility significantly increases only in four of the sampled ten countries. It seems that the Asian financial crisis does not cause different impacts between Asian and non-Asian countries. However, the crisis does impact real estate risk of some sampled countries either in Asian or non-Asian countries.

[Table 1 and Table 2 Here]

Comparison of the Systematic Risks of Real Estate Stock Returns before and after the Asian Financial Crisis --- Local perspective

The second column of Table 1 and Table 2 reports the F statistics of the chow tests of the changes of local systematic risk before and after the crisis for Asian and non-Asian countries respectively.

For Asian countries, the results show that systematic risk structures of most countries are not changed. Among them, only Taiwan's real estate related stocks have significantly changes in their systematic risk structure. On the other hand, half of the sampled non-Asian countries have significantly changes in their systematic risk structures of real estate stocks. These results may surprise us. However, it could be explained if we explore the further. The crisis has an

all-inclusive impact on Asian countries. Though the collapse of real estate market is widely accepted as the detonator of the crisis, the impact is not just on real estate markets but also on whole system. In addition, among the sampled Asian countries, the only exception, Taiwan's economy, was little influenced by the crisis. Therefore, comparing to the whole economic system, real estate market might be impacted more by the crisis. The same reasoning could be applied to explain the results of non-Asian countries, too. The results are hence quite reasonable.

Comparison of the Systematic Risks of Real Estate Stock Returns before and after the Asian Financial Crisis --- International perspective

The third column of Table 1 and Table 2 reports the F statistics of the chow tests of the changes of world systematic risk before and after the crisis for Asian and non-Asian countries respectively.

For Asian countries, the results show that systematic risk structures of all countries are not changed. It means that from a global investor's perspective, the crisis does not change the systematic risk of the real estate returns of the sampled Asian countries. The similar results happen in the group of the sampled non-Asian countries. Only two of the ten countries (Italy and the UK), have significant changes in world systematic risk. All the results imply that the crisis in the long run (at least at the sampled period) does not change the world systematic structures of real estate stocks.

IV. Conclusion

This study tries to investigate whether there is a structural change of risk/return relationship in real estate property stocks in countries most affected by the crisis, such as Thailand, Indonesia, Philippines, Malaysia, Hong Kong, Singapore, and Japan. In the meantime, this study will also examine the same characteristics of non-Asian real estate property stocks as a contrast. These non-Asian property stocks include Australia, Belgium, France, Ireland, Italy, Norway, Portugal, Spain, UK, and the U.S. The study finds that no significant changes happen in the systematic risk structures of these suffered Asian countries,

neither from local perspective nor from international perspective. The result may reveal that the Asian financial crisis exerted its impacts not only on the real estate markets but also on the overall markets of these Asian countries. The systematic relationship between real estate market and the overall market is not changed. From international perspective, the systematic risk structure does not change in these Asian countries, either. It implies that global investors can consider no changes in the investment characteristics of the real estate stocks in these Asian countries after the crisis.

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Table 1
The results of tests of changes of risk structures of real estate stocks of Asian countries

Country	F test of change of variance (F _{20,20} =2.12, Indonesia F _{10,20} =2.35)	Chow test of Local systematic risk Structure (F _{2,38} =3.24, Indonesia F _{2,28} =3.34)	Chow test of World systematic risk Structure (F _{2,38} =3.24, Indonesia F _{2,28} =3.34)
HK	0.90	0.38	0.22
Indonesia	3.55*	1.18	0.00
Japan	1.40	1.81	2.43
Malaysia	3.20*	0.52	1.58
Philippines	1.82	0.18	0.97
Singapore	4.65*	0.91	1.10
Taiwan	0.76	3.36*	1.51
Thailand	0.98	1.45	0.38

Table 2
The results of tests of changes of risk structures of real estate stocks of Non-Asian countries

Country	F test of change of variance (F _{20,20} =2.12)	Chow test of Local systematic risk Structure (F _{2,38} =3.24)	Chow test of World systematic risk Structure (F _{2,38} =3.24)
Australia	2.13*	3.56*	1.19
Belgium	4.08*	3.61*	0.67
France	1.04	3.82*	0.03
Ireland	1.47	2.11	0.77
Italy	15.49*	19.93*	16.73*
Norway	1.73	3.92*	0.90
Portugal	1.47	0.01	0.23
Spain	1.14	4.30*	2.35
UK	0.71	3.12	3.65*
US	2.13*	1.26	1.47