Regime Switches in Asian Equity and Real Estate Markets

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Abstract

The recent Asian financial crisis has emphasized the volatility of modern financial markets. This crisis, and other recent financial shocks, suggest that returns may switch regimes: that is, randomly change from one distribution to another. This paper analyzes regime shifts in real estate and equity markets in ten Far Eastern countries, focusing on the period 1994 - 1998. We find little evidence for regime shifts in equity markets. However, with striking regularity, we find that Asian real estate markets generally are shifting between one (low probability) regime with very high returns and another with slightly negative returns. This suggests that there was a structural difference between the behavior of Asian real estate and equity markets during the study period: the former switching between periods of boom and quiescence, the latter exhibiting more stationary behavior.

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1. Introduction

> *"It's like there are two businesses here. The old business, which works fine under normal conditions, and this stand-by business, when the world goes mad."*
>
> Eric Rosenfeld of Long-Term Capital, quoted in the *New York Times Magazine*, Jan. 24, 1999.

The recent economic upheaval in the Far East has made economists re-evaluate the dynamics of international financial markets. The crisis, commonly dubbed the Asian flu and thought to have begun in July 1997, quickly spread through all of the Far Eastern nations. As the above quote suggests, some observers have come to believe that these sudden switches in the behavior of returns indicate that markets may operate in distinct regimes. For example, one regime may be characterized by "good" returns and "low" volatilities and another by strongly negative returns and high volatilities. One may think of the first regime as normal conditions and the second as an aberration, as Rosenfeld's remark suggests.

A commonly reported driver of this crisis was the exposure of major Asian banks to real estate. Allegedly, as real estate markets plummeted, banks suffered enormous losses due to their exposures to real estate developers, these problems then spread to the rest of the financial sector. An interesting observation comes from Paul Krugman's recent book, *The Return of Depression Economics*:

"*How did a few bad real estate loans and a botched devaluation in Thailand - a small, faraway country of which most people knew little - sent dominoes toppling from Indonesia to South Korea*?"

It is thus interesting to ask whether or not real estate markets and equity markets behaved differently in the time period surrounding the Asian crisis and also to investigate if these shocks affected returns and volatilities in the same way. An excellent overview of the role of real estate in the Asian crisis focusing on Thailand is Renaud (1999); see also his earlier analysis of global real estate cycles: Renaud (1997).

Since the basis of modern portfolio theory is the identification of means and covariances of returns, the existence of multiple regimes clearly has an important impact on investment and portfolio decisions. If a portfolio manger could identify the regimes and, perhaps even anticipate shifts between regimes, then a more efficient allocation of resources can be achieved. In this paper we address the first issue by testing whether or not we can identify distinct regimes in real estate or equity returns. A companion piece, Kallberg, Liu and Pasquariello (1999) analyzes the timing of regime shifts using the same indices and including foreign exchange factors.

We analyze equity and real estate indices in ten major Far Eastern countries: Australia, China, Hong Kong, Indonesia, Japan, Malaysia, The Philippines, South Korea, Taiwan and Thailand. We find major differences in the regime structure of these two types of markets. Briefly stated, we find that Asian real estate markets generally are shifting between one (low probability) regime with high returns and another with slightly negative returns. In other words, real estate markets apparently shift between periods of boom and "normal" negative return periods. In contrast, most Asian equity markets do not seem to exhibit any regime shifts. This suggests that there was a structural difference between the behavior of Asian real estate and equity markets during the study period. This is somewhat surprising since we are studying real estate equity returns rather than direct investment in real estate.

The organization of the paper is as follows: Section 2 describes the statistical methodology adopted; Section 3 describes the data set, presents general statistical properties of the series in question, and overviews our results. The final section presents our conclusions.

2. Methodology

The methodology used here is developed in Quandt and Ramsey (1958), henceforth QR.[1] It attempts to determine whether or not observations are drawn from statistically distinct distributions. An important limitation of the QR model is the assumption that these observations represents a mixture of (at most) two normal densities. The null hypothesis is that there exists one underlying normal distribution; the alternative hypothesis is that observations are randomly drawn from two distinct normal distributions. The QR technique estimates the parameters of two normal distributions and λ, the probability that the observations are drawn from a first normal distribution. Thus, the null hypothesis is that $\lambda = 1$.

Formally, we model the two different regimes as:

$$R_t \sim N(\mu_1, \sigma_1^2) \quad with \ probability \ \lambda$$
$$R_t \sim N(\mu_2, \sigma_2^2) \quad with \ probability \ (1 - \lambda)$$

where the parameters λ, μ_1, μ_2, σ_1^2 and σ_2^2 are unknown; R_t is the month t return on the equity or real estate index for each of the ten countries. The two distributions of returns intuitively represent two statistically different return regimes with λ measuring the probability that nature chooses the first distribution. This method cannot identify which observations belong to a particular regime.

[1] See Quandt (1960, 1972) for further details and development.

However, in this study, we are mainly interested in the existence of two regimes; identification of the regime to which an observation belongs is less important.

To estimate the mixture of normal distributions and λ, the moment generating function (mgf), $E(e^{\theta y})$, is minimized using weighted nonlinear least squares with the number (q) of values of θ set equal to fifteen to ensure that the corresponding normal equations are of full rank:[2]

$$\left(\sum_{i=1}^{n} \frac{e^{\theta_j y_i}}{n} \right) = \lambda e^{\mu_1 \theta_j + \sigma_1^2 \theta_j^2 / 2} + (1 - \lambda) e^{\mu_2 \theta_j + \sigma_2^2 \theta_j^2 / 2} \qquad j = 1, 2, ..., 15$$

Since θ's determine the weights for the moments of the data by the mgf estimator, relatively small θ's were chosen (to the extent possible) so that low-order moments receive more weight.[3] The Davidon-Fletcher-Powell algorithm is used to minimize the mgf. The parameters are estimated using nonlinear weighted least squares where the weights are the reciprocals of the disturbance variances.

Quandt and Ramsey (1978) argue that the preceding mgf has several advantages over using a maximum likelihood (MLE)approach.[4] Most importantly, the mgf can be used with relatively small samples having considerable overlap in the two populations and the parameters obtained are unique estimates. The mgf method also yields consistent and asymptotically normal estimates. The asymptotic distribution of the mgf is independent of the θ parameters. In conjunction with the estimation of the mixture of normals, we use a Wald statistic to determine if the two normal distributions are identical (H_0: $\mu_1 = \mu_2$ and $\sigma_1^2 = \sigma_2^2$).[5]

3. Empirical Results

The data analyzed here are monthly equity and real estate index returns. All figures are obtained from Bloomberg. Table 1 describes the indices used in the study. Note that the varying composition of the real estate indices has to be taken into consideration when interpreting our results. For example, the real estate index for China is composed of only five real estate related stocks. Furthermore, as Table 2 shows, the dates for which data were available differs across each of the countries, again making

[2] This approach can be generalized to switching regressions. For further details, see Quandt and Ramsey (1978).

[3] While Quandt and Ramsey (1978) note that the choice of θ is important when $q = 5$, Schmidt (1982) has found that all reasonable choices of θ lead to the same asymptotic covariance matrix when $q = 15$ and that this matrix represents the lower bounds for the asymptotic variances. This is further justification for our use of $q = 15$.

[4] Known difficulties with the MLE method include the fact that the estimate may not be obtainable due to the unboundedness of the likelihood function. The possibility of a singular matrix of second partials of the log-likelihood function might also exist when unequal variances are allowed in the components of the mixture. In addition, the finite sample properties of the resulting estimates are unknown.

[5] It would be simple to construct other hypothesis tests, for example, to test just that the means were equal.

cross-country comparisons a little more awkward. Finally, note that throughout we are dealing with real estate returns derived from real estate related equities, not in more direct measures of real estate performance, since the latter are extremely difficult to obtain in these markets.

The means and standard deviations shown in Table 2 show quite different patterns in the ten selected countries. The mean real estate returns were negative in four countries: Thailand, Taiwan, Indonesia and Korea. Equity returns were negative in the Philippines and Thailand. The standard deviations for real estate and equity returns are comparable except in the case of Australia (3.7% and 5.7% respectively) and Japan (9.1% and 6.1% respectively), which show relatively less volatility.

Figure 1 presents the monthly returns and volatilities for the ten countries. The volatilities represent a rolling 6-month average. Table 3 presents the correlation matrices for returns across the ten countries on both equity and real estate. The differences across countries are quite distinct. For example, the Chinese real estate index returns seem to behave quite independently of the other nine real estate indices; its correlation with Hong Kong is negative but insignificant. Australia as well seems to function independently of the other Asian markets. The strongest correlations are among Malaysia, the Philippines, Thailand, Hong Kong and Indonesia. These five countries appear to have a large common factor in returns.

For equity returns the correlations are generally quite similar to those obtained for real estate. In almost all cases the equity index returns are more highly correlated than the real estate index returns, which in significant for any diversification strategy using real estate and equity securities. China again is essentially uncorrelated with the other nine countries; for example, its correlation with Hong Kong is negative but insignificant. Again, Hong Kong, Indonesia, Malaysia, Philippines and Thailand appear to have a very strong common factor. Australian equity returns are much more positively correlated with the rest of Southeast Asia than are it s real estate index returns. Japan shows a surprisingly high correlation (.611) with Indonesia.

The final panel shows the correlations between equity and real estate returns within each country. These are generally quite high: ranging from .592 (Indonesia) to .954 (Hong Kong). Again, the rather different composition of the real estate index in each country plays a role in these figures.

Volatility correlations across the ten countries are generally significantly higher than the return correlations. They show a very wide dispersion of values, suggesting that the lead-lag relationships among these countries are complex. For example, note the negative correlations between China and the other nine. With the exception of Taiwan (.342), the correlations of real estate and equity volatilities are even higher than observed for returns: ranging from .544 (Japan) to .954 (Hong Kong).

Table 4 shows the results of the analysis of the mixture of normals. Beginning with equity index returns, we see for the majority of countries analyzed, Australia, China, Hong Kong, Korea, Malaysia, Philippines and Thailand, that only one return distribution exists. This is indicated by an insignificant λ. For Indonesia, the λ of .92 suggests that there is a 92% probability that equity index returns are drawn from a normal distribution with a monthly mean of 1.8% and standard deviation of 10.2%; there is an 8% probability that returns are drawn from a normal with mean –23.1% and a standard deviation of 9.0%. This result indicates that Indonesian real estate returns are typically high positive (roughly 24% annualized), but have relatively infrequent periods with very low negative returns (approximately –121% annualized). Japan's results are close to those of Indonesia. In contrast, Taiwan's estimates indicate a 3% probability of an extremely high return (567% annually) and a 97% probability of a near zero return.

Real estate index returns show much more evidence of regime shifting; only for Australia and Taiwan are the λs insignificant. For seven of the ten countries a strikingly similar pattern emerges: a low probability of a *very high* return (averaging 577% annually) and a high probability of a low return (averaging –19% annually). This is strong evidence of the existence of two regimes: an infrequent boom period and a much more common period of poor returns. Indonesia is the only country showing the reverse pattern. Our estimates show an 81% probability of a monthly return of 1.6% and a 19% probability of a monthly return of –23.1%. The regimes here are a relatively infrequent crash period and a period of relatively good returns.

4. Conclusions

The investigation here reveals a number of perhaps surprising facts about these markets. The structure of the correlations in Table 3 shows fairly clearly the existence of a major subgroup - Hong Kong, Indonesia, Malaysia, Philippines and Thailand - that has a large common factor in both returns and volatilities. Another important observation is that volatility correlations are generally higher than return correlations. This suggests that shocks to returns are transmitted more easily across these countries than returns are.

In summary, the analysis seems to show very different patterns in the regime structure of real estate and equity markets in these ten Asian countries. For most, real estate markets seem to exhibit jumps between infrequent boom periods and poor return periods. This pattern is much less apparent in equity markets. For the majority of the countries, we see a very distinct regime pattern in real estate returns: one low-probability regime with extremely high returns; another regime with low (typically negative) returns. Regime shifts seem to be less frequent in equity markets. We find that only two

countries - Indonesia and Japan shift between periods of crash and quiescence. Conversely, Taiwan shifts between regimes of boom and zero return. This difference in the behavior of equity and real estate markets is especially interesting given that our real estate returns represent real estate related equities rather than direct real estate investment.

This research however begs the issue of the timing of these regime shifts. This is analyzed in the companion article: Kallberg, Liu and Pasquariello (1999). As well, further research is required to determine the factors that lead to regime shifts.

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Table 1: Index Description

	Real estate index	Equity index
Australia	AS20: The AS20 Australian Property Trusts Index is a capitalization-weighted index designed to measure the performance of the property trusts sector of the ASE.	ASX All Ordinaries Index
China	Real Estate Index: SIPRO: The China Stock Exchange Shenz Sub Prop Index is a capitalization-weighted index of the following five stocks: Dongguan Win-A, Shenz SP Econ-B, Shenz Zhenye-A, Shenz SP Econ-A, Shenz Changche-A.	China Stock Exchange Composite Index
Hong Kong	AOP-HKSE: The Hong Kong All Ordinaries Properties Index is a capitalization-weighted index of all stocks that represent the properties sector of the HKSE. The index was developed with a base value of 2333.77 as of January 2nd 1992.	HKSE Equity Index
Indonesia	JAKPROP: The Jakarta Construction, Property and Real Estate Index is a capitalization-weighted index of all stocks involved in the business of construction, property and real estate of the Jakarta Composite Index. The index was developed with a base value of 100 as of December 28th 1995.	JCI Jakarta Composite Index
Japan	TOPIX Real Estate Index: The TOPIX Real Estate Index is a capitalization-weighted index designed to measure the performance of the real estate sector of the TOPIX equity index. The benchmark was developed with a base value of 100 as of January 4th 1968.	Nikkei 225
Malaysia	Kuala Lumpur Property Index: The Kuala Lumpur Property Index is a capitalization-weighted index of all stocks representative of the property sector of the EMAS Index.	EMAS Equity Index
Philippines	PSE: The PSE Property Index is a capitalization-weighted index composed of stocks representative of the property sector of the PSE.	PSE Philippine Stock Exchange Index
South Korea	Korea Property Index. It is capitalization-weighted index of all stocks that represent the properties sector of the Kospi 200.	Kospi 200
Taiwan	TWSECON: The TWSE Construction Index is a capitalization-weighted index that measures the performance of the construction sector of the TWSE Index.	TWSE Stock Index
Thailand	SETPROP: The Thai Property Dev Index is a capitalization-weighted index of all stocks that represent the properties sector of the Thailand Stock Exchange Index.	Thailand Stock Exchange Index

Table 2: Means, standard deviations and correlations

	Real Estate returns		Equity returns		Sample Size
	mean	stdev	mean	stdev	
Malaysia	0.405%	14.629%	0.191%	10.188%	Oct 92 - Mar 99
Thailand	-2.335%	19.013%	-0.668%	11.841%	Feb 93 - Mar 99
Hong Kong	0.472%	13.702%	0.754%	9.832%	Nov 93 - Mar 99
Taiwan	-0.405%	8.294%	1.023%	9.379%	Mar 93 - Mar 99
China	1.064%	14.829%	1.936%	9.253%	Feb 95 - Mar 99
Philippines	0.190%	14.039%	-0.288%	10.059%	Oct 94 - Mar 99
Indonesia	-3.284%	11.888%	0.056%	11.883%	Dec 95 - Mar 99
Japan	0.708%	9.055%	0.524%	6.119%	Jan 82 - Mar 99
Korea	-0.337%	13.497%	0.104%	10.473%	Dec 89 - Mar 99
Australia	0.493%	3.735%	0.953%	5.726%	Dec 79 - Mar 99

Correlations

Real Estate Monthly Returns Correlation over the entire sample

	Malaysia	Thailand	Hong Kong	Taiwan	China	Philippines	Indonesia	Japan	Korea	Australia
Malaysia	1	0.560	0.595	0.229	0.063	0.473	0.533	0.118	0.191	0.298
Thailand	0.560	1	0.683	0.226	-0.080	0.776	0.399	0.271	0.331	0.321
Hong Kong	0.595	0.683	1	0.434	-0.012	0.669	0.427	0.190	0.179	0.334
Taiwan	0.229	0.226	0.434	1	0.217	0.339	0.367	0.164	-0.144	0.210
China	0.063	-0.080	-0.012	0.217	1	-0.018	0.150	0.044	0.127	0.037
Philippines	0.473	0.776	0.669	0.339	-0.018	1	0.470	0.404	0.211	0.196
Indonesia	0.533	0.399	0.427	0.367	0.150	0.470	1	0.312	0.286	0.338
Japan	0.118	0.271	0.190	0.164	0.044	0.404	0.312	1	0.208	0.112
Korea	0.191	0.331	0.179	-0.144	0.127	0.211	0.286	0.208	1	0.045
Australia	0.298	0.321	0.334	0.210	0.037	0.196	0.338	0.112	0.045	1

Equity Indices Monthly Returns Correlation over the entire sample

	Malaysia	Thailand	Hong Kong	Taiwan	China	Philippines	Indonesia	Japan	Korea	Australia
Malaysia	1	0.591	0.660	0.424	0.085	0.691	0.466	0.148	0.319	0.509
Thailand	0.591	1	0.591	0.434	-0.017	0.663	0.481	0.214	0.531	0.458
Hong Kong	0.660	0.591	1	0.552	-0.061	0.687	0.306	0.236	0.263	0.622
Taiwan	0.424	0.434	0.552	1	0.311	0.330	0.181	0.218	0.196	0.358
China	0.085	-0.017	-0.061	0.311	1	-0.029	-0.030	0.028	0.009	-0.095
Philippines	0.691	0.663	0.687	0.330	-0.029	1	0.541	0.301	0.382	0.530
Indonesia	0.466	0.481	0.306	0.181	-0.030	0.541	1	0.611	0.460	0.555
Japan	0.148	0.214	0.236	0.218	0.028	0.301	0.611	1	0.309	0.339
Korea	0.319	0.531	0.263	0.196	0.009	0.382	0.460	0.309	1	0.221
Australia	0.509	0.458	0.622	0.358	-0.095	0.530	0.555	0.339	0.221	1

Equity vs Real Estate Indices Monthly Returns Correlation over the entire sample

	Malaysia	Thailand	Hong Kong	Taiwan	China	Philippines	Indonesia	Japan	Korea	Australia
Malaysia	0.850									
Thailand		0.838								
Hong Kong			0.954							
Taiwan				0.767						
China					0.699					
Philippines						0.924				
Indonesia							0.592			
Japan								0.754		
Korea									0.743	
Australia										0.652

Real Estate Annual Return Volatility Correlation over the entire sample

	Malaysia	*Thailand*	*Hong Kong*	*Taiwan*	*China*	*Philippines*	*Indonesia*	*Japan*	*Korea*	*Australia*
Malaysia	1	0.829	0.960	0.363	-0.842	0.902	0.833	0.247	0.537	0.686
Thailand	0.829	1	0.889	0.476	-0.769	0.987	0.650	0.555	0.433	0.788
Hong Kong	0.960	0.889	1	0.503	-0.864	0.911	0.839	0.259	0.602	0.818
Taiwan	0.363	0.476	0.503	1	-0.409	0.416	0.730	0.177	0.275	0.621
China	-0.842	-0.769	-0.864	-0.409	1	-0.782	-0.836	-0.211	-0.415	-0.703
Philippines	0.902	0.987	0.911	0.416	-0.782	1	0.689	0.551	0.420	0.805
Indonesia	0.833	0.650	0.839	0.730	-0.836	0.689	1	-0.143	0.458	0.934
Japan	0.247	0.555	0.259	0.177	-0.211	0.551	-0.143	1	0.086	-0.083
Korea	0.537	0.433	0.602	0.275	-0.415	0.420	0.458	0.086	1	0.364
Australia	0.686	0.788	0.818	0.621	-0.703	0.805	0.934	-0.083	0.364	1

Equity Indices Annual Return Volatility Correlation over the entire sample

	Malaysia	*Thailand*	*Hong Kong*	*Taiwan*	*China*	*Philippines*	*Indonesia*	*Japan*	*Korea*	*Australia*
Malaysia	1	0.916	0.933	0.339	-0.931	0.922	0.943	0.292	0.571	0.589
Thailand	0.916	1	0.918	0.335	-0.900	0.834	0.945	0.242	0.672	0.557
Hong Kong	0.933	0.918	1	0.383	-0.896	0.815	0.951	0.221	0.697	0.774
Taiwan	0.339	0.335	0.383	1	-0.130	0.089	0.507	0.436	0.045	0.661
China	-0.931	-0.900	-0.896	-0.130	1	-0.815	-0.864	-0.477	-0.632	-0.643
Philippines	0.922	0.834	0.815	0.089	-0.815	1	0.825	0.307	0.410	0.430
Indonesia	0.943	0.945	0.951	0.507	-0.864	0.825	1	0.753	0.559	0.756
Japan	0.292	0.242	0.221	0.436	-0.477	0.307	0.753	1	-0.027	-0.039
Korea	0.571	0.672	0.697	0.045	-0.632	0.410	0.559	-0.027	1	0.324
Australia	0.589	0.557	0.774	0.661	-0.643	0.430	0.756	-0.039	0.324	1

Equity vs Real Estate Indices Annual Return Volatility Correlation over the entire sample

	Malaysia	*Thailand*	*Hong Kong*	*Taiwan*	*China*	*Philippines*	*Indonesia*	*Japan*	*Korea*	*Australia*
Malaysia	0.966									
Thailand		0.861								
Hong Kong			0.954							
Taiwan				0.342						
China					0.794					
Philippines						0.993				
Indonesia							0.953			
Japan								0.544		
Korea									0.881	
Australia										0.868

Table 3:Tests for regime shifts using normal mixtures

To estimate the mixture of normals, the following moment generating function (mgf) is minimized using weighted nonlinear least squares with $j = 15$ to ensure that the corresponding normal equations are of full rank:

$$\sum_{i=1}^{n} \frac{e^{\theta_j y_i}}{n} = \lambda e^{\theta_j \mu_1 + \theta_j^2 \sigma_1^2 / 2} + (1 - \lambda) e^{\theta_j \mu_2 + \theta_j^2 \sigma_2^2 / 2} \qquad j = 1, 2, ..., 15$$

Here y_i represents the index return (in percentage) in month i. Parameter restrictions are tested using a Wald test with the level of significance reported in the last column of the following table. The null hypothesis is that $\mu_1 = \mu_2$ and $\sigma_1 = \sigma_2$, i.e., that observations are drawn from a single normal distribution.

Country	Asset	λ	μ_1	μ_2	σ_1	σ_2	$\sigma_{Residual}$	Max θ_j	Min θ_j	Wald Test
Australia	Real Estate	.21	13.2[b]	-5.2[a]	8.1[a]	6.5[b]	.0003	.15	.01	.000[a]
	Stock	.01	47.0	-0.9	7.1	8.2[a]	.0001	.09	-.06	.125
China	Real Estate	.05[a]	48.1[a]	-1.2[a]	4.8	10.8[a]	.0006	.11	-.04	.000[a]
	Stock	.18	16.0	-1.1	5.3	6.4	.0013	.07	-.08	.882
Hong Kong	Real Estate	.05[a]	38.1[a]	-2.5[a]	8.1	9.6[a]	.0007	.11	-.04	.000[a]
	Stock	.01	28.0	-0.1	9.8	9.0	.0002	.09	-.06	.547
Indonesia	Real Estate	.81[a]	1.6	-23.1	6.9	7.1	.0009	.07	-.08	.065[b]

	Stock	.92[a]	1.8	-23.1	10.2[a]	9.0	.0005	.07	-.08	.469
Japan	Real Estate	.01[a]	44.9[a]	0.4[a]	3.2	8.6[a]	.0033	.17	-.15	.000[a]
	Stock	.99[a]	0.5[a]	-17.9	6.1[a]	7.1	.0007	.15	-.17	.724

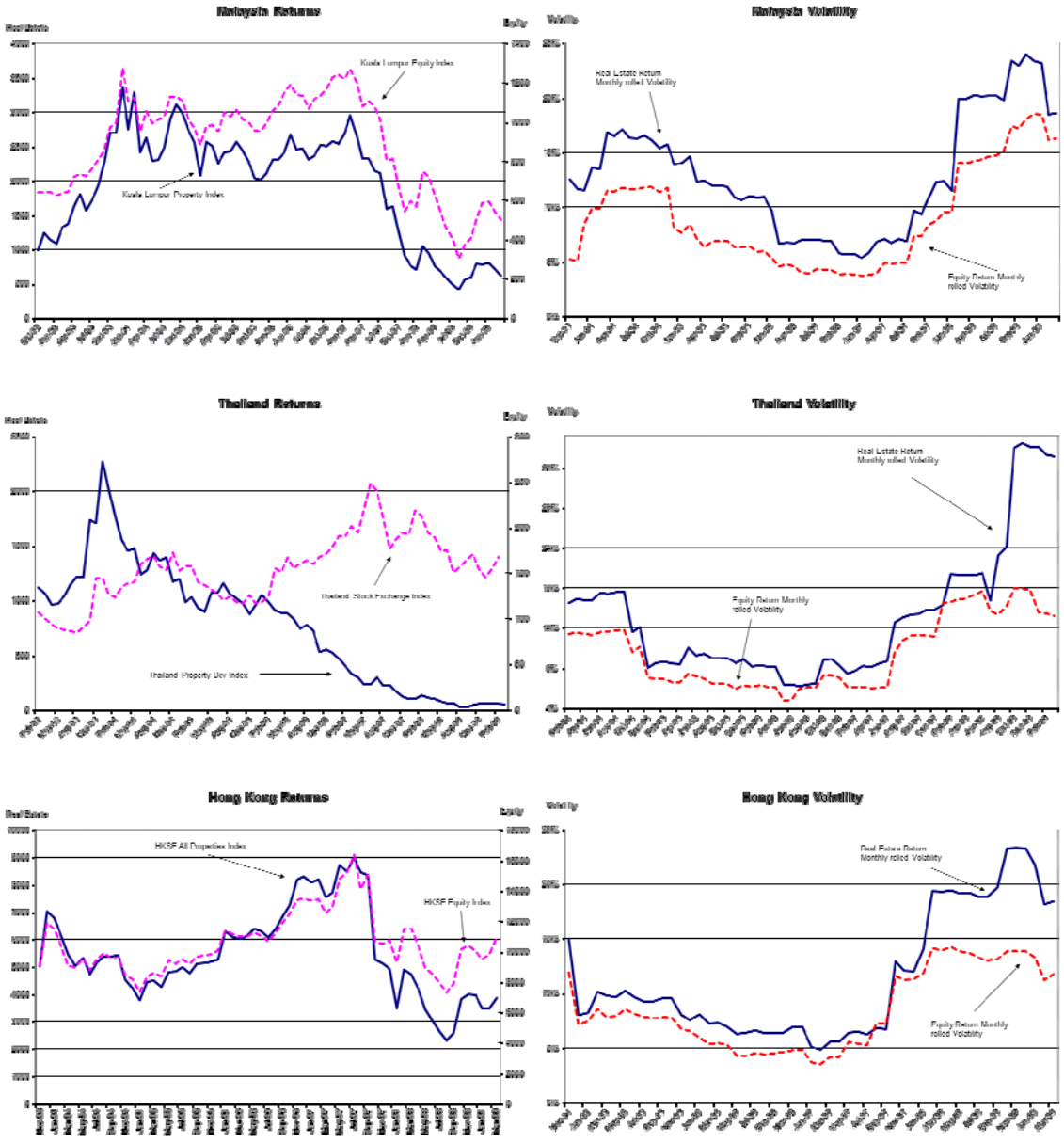
[a]Significant at the 5% level [b]Significant at the 10% level

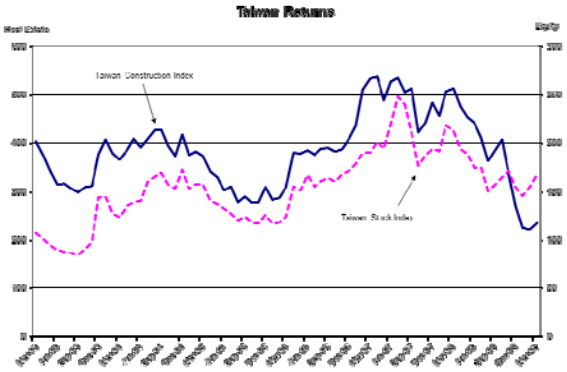
Table 3:Tests for regime shifts using normal mixtures (continued)

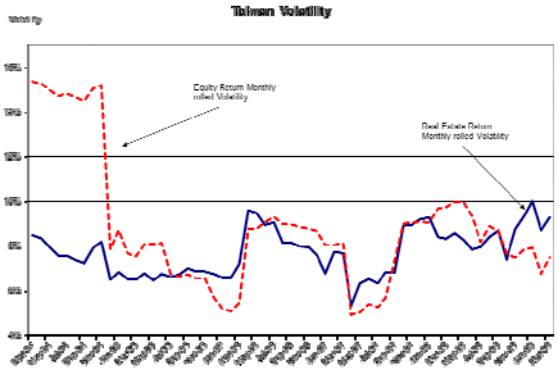
Country	Asset	λ	μ_1	μ_2	σ_1	σ_2	$\sigma_{Residual}$	Max θ_j	Min θ_j	Wald Test
Korea	Real Estate	.99[a]	-0.3[b]	-39.0[a]	10.7[a]	1.7	.0026	.11	-.21	.000[a]
	Stock	.01	52.0[a]	-0.6	2.6	8.9[a]	.0113	.15	-.17	.000[a]
Malaysia	Real Estate	.15[a]	22.0[a]	-3.2[a]	13.3[a]	11.0[a]	.0001	.07	-.08	.000[a]
	Stock	.01	27.0	-0.1	9.7	9.6	.0029	.07	-.08	.998
Phillipines	Real Estate	.02[a]	67.0[a]	-1.0[a]	4.9	11.3[a]	.0002	.07	-.08	.000[a]
	Stock	.01	39.0	-0.3	7.7	10.1	.0109	.13	-.19	.142
Taiwan	Real Estate	.06	8.0	-0.8	9.8	7.9	.0001	.09	-.06	.999
	Stock	.03[a]	40.0[a]	0.01	7.3	7.0[a]	.0002	.07	-.08	.000[a]
Thailand	Real Estate	.01[a]	83.0[a]	-3.0[a]	2.2	16.7[a]	.0004	.11	-.04	.000[a]
	Stock	.08	27.1	-3.0	5.0	8.9	.0042	.07	-.08	.678

[a]Significant at the 5% level [b]Significant at the 10% level

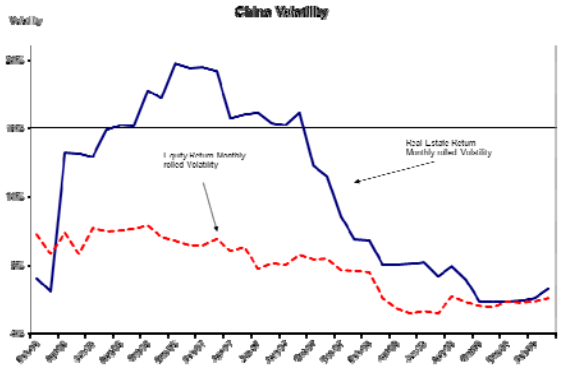
Figure 1: Monthly Returns and Volatilities

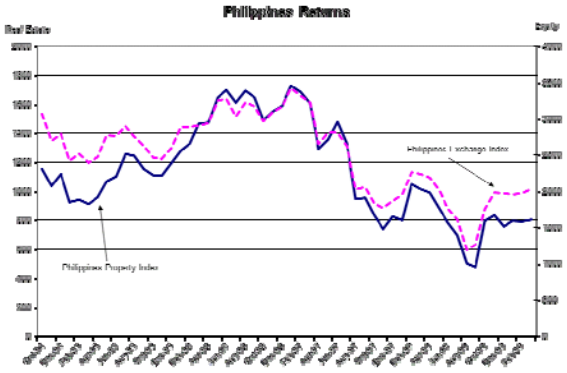


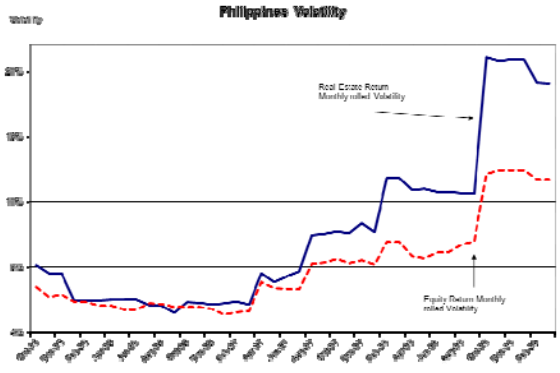

Taiwan Returns
Taiwan Construction Index
Taiwan Stock Index

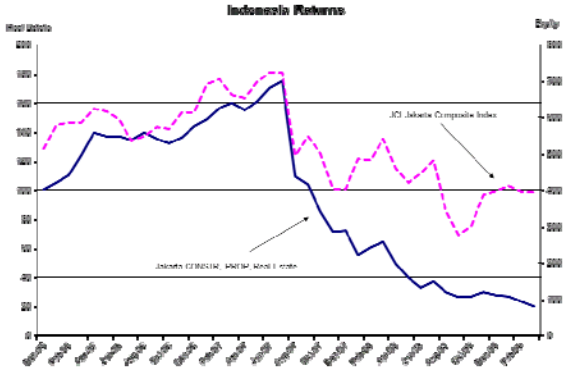

Taiwan Volatility
Equity Return Monthly rolled Volatility
Real Estate Return Monthly rolled Volatility

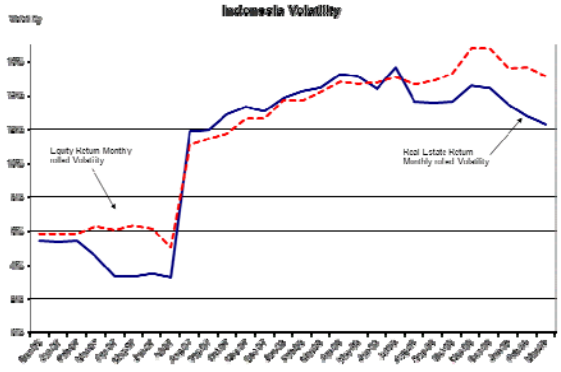

China Returns
China SE Shenz Sub Property
China SL Composite Index

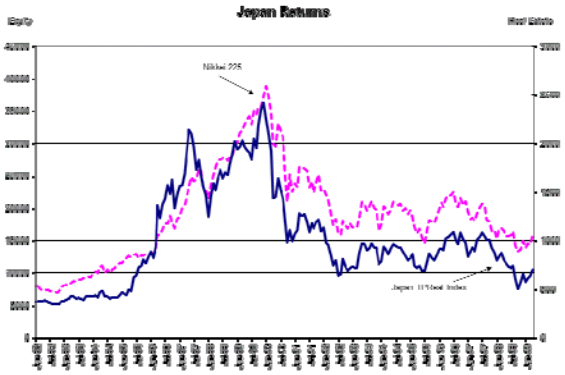

China Volatility
Equity Return Monthly rolled Volatility
Real Estate Return Monthly rolled Volatility

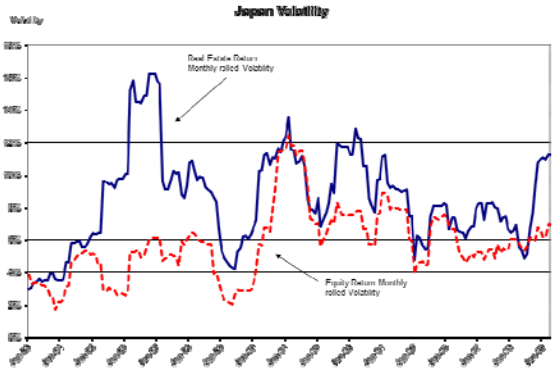

Philippines Returns
Philippines Exchange Index
Philippines Property Index

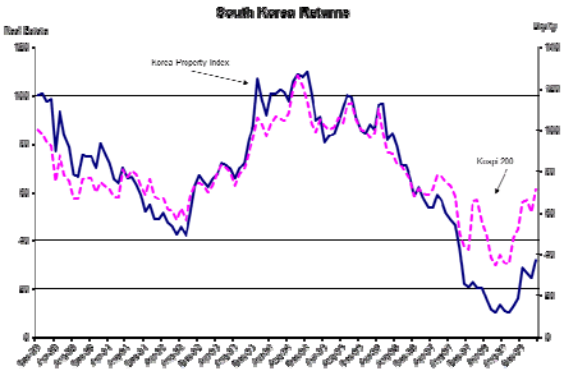

Philippines Volatility
Real Estate Return Monthly rolled Volatility
Equity Return Monthly rolled Volatility

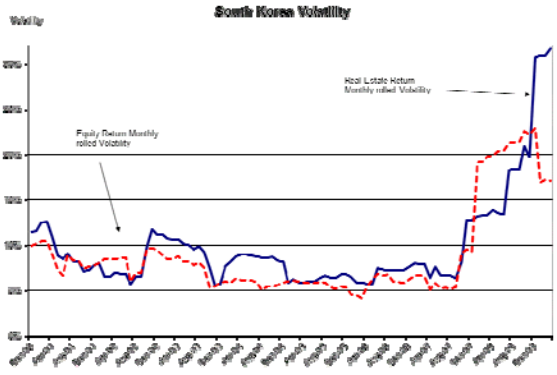

Indonesia Returns
JCI Jakarta Composite Index

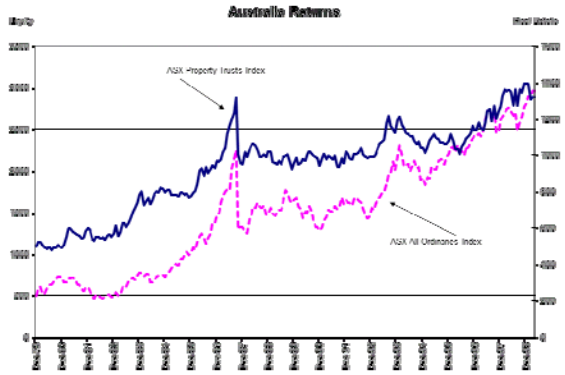

Indonesia Volatility
Equity Return Monthly rolled Volatility
Real Estate Return Monthly rolled Volatility

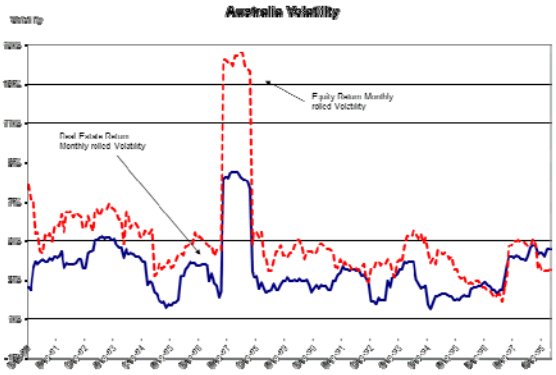

Japan Returns
Equity
Real Estate
Nikkei 225
Japan REIT Total Index


Japan Volatility
Volatility
Real Estate Return
Monthly rolled Volatility
Equity Return Monthly
rolled Volatility


South Korea Returns
Real Estate
Equity
Korea Property Index
Kospi 200


South Korea Volatility
Volatility
Real Estate Return
Monthly rolled Volatility
Equity Return Monthly
rolled Volatility


Australia Returns
Equity
Real Estate
ASX Property Trusts Index
ASX All Ordinaries Index


Australia Volatility
Volatility
Equity Return Monthly
rolled Volatility
Real Estate Return
Monthly rolled Volatility