FOREIGN EXCHANGE RISK IN STOCK PRICING: A FURTHER STUDY OF ASIAN MARKETS

Yung-Shi Liau**, Jack J. W. Yang**

Abstract

This study applies a two-factor asset pricing model (market and foreign exchange) to examine the stock pricing behaviors in export-oriented Asian markets (Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand) for the period 1994-2005. The three foreign exchange risk factors are Japanese yen, US dollar and EURO. GMM test results indicate only the US dollar exchange risk factor is priced in Asian stock markets, i.e., the appreciation/depreciation of the US dollar should affect investors' buying/selling decision to some extent. The empirical results are valid for both subperiods as well as the whole period.

Keywords: Asset pricing, Foreign exchange risk, GMM

** Corresponding author: Yung-Shi Liau*
National Yunlin University of Science & Technology, Douliou, Taiwan
Email address: g9120808@yuntech.edu.tw
Tel: 886-5-5342601 ext. 5042
Address: No.123, Sec. 3, Dasyue Rd., Douliou City, Yunlin County 640, Taiwan (R.O.C.)
*** National Yunlin University of Science & Technology, Douliou, Taiwan*

1. Introduction

Risk factors in asset pricing have always attracted the attention of both academics and practitioners. Since the earliest demonstration of the capital asset pricing model (CAPM) by Sharpe (1964), Lintner (1965) and Mossin (1966) in 1960s, market risk has become a key factor for explaining stock returns. Fama and French (1992, 1993) further indicated that firm size and book-to-market ratio could describe US stock returns. However, the market, firm size and book-to-market ratio normally are not priced in non-US countries. For instance, Chui and Wei (1998) detected that the relationship among average stock return, market beta, firm size and book-to-market ratio is weak in some export-oriented Asian stock markets. Therefore, recently various researchers have attempted to use foreign exchange risk to explain stock return in export-oriented stock markets. Using a two-factor asset pricing model with the assumption that the currency risk premium remaining constant over time, Iorio and Faff (2002) report that foreign exchange risk is a pricing factor in the Australian market. On the whole, Iorio and Faff's results are supported by Choi et al. (1998), Doukas et al. (1998), Wu (2000) and Tai (2007) in their studies of the export-oriented stock markets[1].

Generally, the increase(decrease) of trading revenue of export-oriented countries is strongly affected via exchange rate fluctuations. Therefore, exchange rates variations may also impact stock prices to a great extent. Ma and Kao (1990) show that stock returns are determined by economic exposure which is attributed to variations in firms' cash flows with exchange rates fluctuating. Ma and Kao investigate that a currency appreciation has a negative effect on the stock market for an export-oriented country, while generating a positive impact on the stock market for an import-oriented country[2]. The similar results with Ma and Kao (1990), Priestley and Ødegaard (2007) further find that the exchange rate impact on stock return is attributable to industries export. Doukas et al. (1999) use an intertemporal asset pricing testing procedure that allows risk premia to change through time in response to changes in macroeconomic conditions, and suggest that foreign exchange risk command a significant risk premium for multinationals and large Japanese exporters. By estimating a multifactor model, Homma et al. (2005) explore that export intensity and net foreign exchange position of the Japanese firms are

[1] Nevertheless, contrary findings are revealed by other empirical studies, for example Jorion (1990, 1991), Bondnar and Gentry (1993), Bartov and Bondnar (1994), He and Ng (1998) and Griffin and Stulz (2001) find that foreign exchange risk is not priced in the industrialized countries.

[2] The exchange rate exposure faced by a firm can be reduced using foreign exchange derivatives. Therefore, Allayannis and Weston (2001) discover that the application of foreign exchange derivatives is positively associated with firm value.

carefully observed by investors and are properly reflected in the stock prices. Therefore, whether foreign exchange risk in export-oriented markets is a pricing factor deserves investigation.

Previously, the most commonly used method for studying market and foreign exchange risk pricing behaviors was the ordinary least squares (OLS) (see Jorion (1990), He and Ng (1998) and Fraser and Pantzalis (2004)). Nevertheless, an OLS must be consistent with the assumptions of the residual series' non-autocorrelation, homogeneous variance and normal distribution. Owing to the significant restrictions on the implementation of the OLS, Hansen (1982) developed the generalized method of moment (GMM) and utilized instrumental variables to satisfy the orthogonality conditions. Thus, GMM is superior to OLS for examining asset pricing. Vassalou (2000) used GMM for the pricing of market, foreign exchange and inflation risk in global equities. They found that both foreign exchange and inflation risk factors can partially explain within-country cross-sectional variation in returns. Iorio and Faff (2002) employed GMM to implement a two-factor asset pricing model to demonstrate the pricing of market and foreign exchange risk in the Australian equities market. They detected that the pricing occurs during periods of economic decline and a secularly weak Australian dollar but does not apply to market risk. Therefore, GMM is a common model for inspecting the pricing of market and foreign exchange risks.

This paper is primarily motivated by several factors. First, previous studies focus on developed markets, with the paucity of empirical evidence in the area of foreign exchange pricing in the emerging markets. Therefore, this paper investigates the pricing of foreign exchange risk in Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand. According to the IMF International Financial Statistics in 2006, the share of export in their GDP is 1.669, 1.078, 0.403, 0.367, 0.615 and 0.634, respectively. This result further shows that the six Asian markets included in this study pursue an export-led approach to stimulate economic growth. Hence, firm in those markets face higher foreign exchange risk. To authors' knowledge, Pan et al. (2007) examine the Asian markets, no other relevant studies in this area. Further, the data in this study extends to 2005, the final year of Pan et al. (2007) is 1998.

Second, emerging markets such as Asian-Pacific basin are more inclined to intervene in setting exchange rate than their counterparts in other developed markets. Therefore, exchange rate might not fully reflect to stock price behavior, implying a higher foreign exchange risk in Asian markets. Thus, examining the tightly-control exchange rates in Asian markets enables us to check whether foreign exchange risk is a pricing factor in Asian stock markets. Third, based on the aforementioned, GMM is a good model to examine asset pricing. Therefore, we emphasize that foreign exchange risk is priced using GMM, while Pan et al. (2007) study dynamic linkages between exchange rate and stock price thru the vector autoregressive analysis. The empirical results show that US dollar exchange risk is priced for Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand. These results are valid for both for both subperiods as well as the whole period.

The reminder of this paper is organized as follows. Section 2 describes the data and study methodology. Section 3 then reports and compares the empirical results for the entire sample period as well as for the pre- and post-crisis subperiods. Finally, concluding remarks and suggestions for future research are presented in section 4.

2. Data and Methodology

2.1 Data and descriptive statistics

This study uses daily closing prices for the Hong Kong (HK), Malaysia (MAL), the Philippines (PHI), South Korea (KOA), Taiwan (TWN) and Thailand (THA) stock indexes. The MSCI world market index is used as a proxy for the market portfolio, while the foreign exchange factor return is based on the Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand currencies relative to: (a) the Japanese yen (HKJPY, KOAJPY, MALJPY, PHIJPY, TWNJPY, THAJPY); (b) the US dollar (HKUSD, KOAUSD, MALUSD, PHIUSD, TWNUSD, THAUSD); and (c) the EURO (HKEU, KOAEU, MALEU, PHIEU, TWNEU, THAEU). Moreover, money market and interbank interest rates for Asian markets are used as proxies of risk-free interest rate (HKRF, KOARF, MALRF, PHIRF, TWNRF, THARF). The data are retrieved from datastream. Since the one-day devaluation of the Thai Baht by 17% percent on July 2, 1997 ignited the Asian financial crisis, this study partitions the whole period into two subperiods to observe whether structural changes exist pre- and post-crisis. The whole period is from January 3, 1994 to February 28, 2005, the pre-crisis period runs from January 3, 1994 to July 1, 1997 and the post-crisis period runs from July 2, 1997 to February 28, 2005[3].

Daily returns for stock (exchange rate) series are calculated as the percent logarithmic difference in the daily stock index (exchange rate), i.e., $R_t=\ln(P_t/P_{t-1})\times 100$, where R_t, P_t and P_{t-1} represent the stock market return (exchange rate return) and closing price at dates t and t-1, respectively; ln is the continuous compounding factor. Table 1 lists the descriptive statistics for the daily stock, risk-free proxy and exchange rate return series used in this study. The

[3] Owing to the circulation of the EURO in 1999, therefore, the data of the Asian Pacific currencies against the EURO are from January 5,1999 to February 28, 2005.

mean returns for every stock market are positive except for Malaysia, the Philippines and Thailand. Further, the highest daily maximum is MAL (20.82%) and the lowest daily minimum is also MAL (-24.15%). KOA is observed to have the highest daily volatility, with a standard deviation of 2.04%, while the lowest standard deviation is MSCI (0.85%). The skewness statistics indicate either a negatively or positively skew for all return series. The kurtosis statistics suggest that all return series are leptokurtic except for TWNRF. However, when considering the returns on the three foreign exchange factors, the mean returns are negative except for KOAEU. The highest daily maximum is KOAUSD (20.12%) and the lowest daily minimum is also KOAUSD (-18.09%). KOAJPY is observed to have the highest daily volatility, with a standard deviation of 1.20%, while the lowest standard deviation is HKUSD (0.04%). We also applied Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests to examine whether all return series are stationary. Passing the unit root tests within the sample periods enables us to apply the time series statistical model adequately. The results demonstrate all return series are stationary except for risk-free proxy in Taiwan. Finally, the Chow test is used to examine whether return series differ between the pre- and post-crisis periods and the test results show that 18 out of the 25 series are significant at the 10% level, implying that there exists a structural change between the two subperiods.

2.2 Model

This investigation follows the two-factor asset pricing model using a system of equations framework designed by Iorio and Faff (2002) to examine whether stock returns can be explained based on market and foreign exchange risk. The model is described as follows[4]:

$$r_{it}=\beta_{im}r_{mt}+\beta_{ix}r_{xt}+\varepsilon_{it}, \quad (1)$$

$$r_{mt}=\lambda_m+\varepsilon_t, \quad (2)$$

$$r_{xt}=\lambda_x+\nu_t. \quad (3)$$

where r_{it} denotes the observed excess return for the ith market on day t, r_{mt} represents the observed excess return on the MSCI world market index and r_{xt} is the observed excess return for the foreign exchange rate factor. All excess returns are calculated after subtracting the risk-free rate.

Since OLS suffers limitations of correlated residual series, homogeneous variance, and normal distribution, Hansen (1982) developed the GMM to overcome these defects and this research employs GMM to estimate Eq.(1)-(3)[5]. To test the suitability of the model, we implement the Newey and West (1987) test,

$$GMM=T\times J \text{ statistic.} \quad (4)$$

where T denotes observations, and J statistic is the minimized value of the objective function.

Eq.(2) and Eq.(3) do not take into account structural change. To further investigate the validity/invalidity pricing of market and foreign exchange risk factor before and after the Asian financial crisis, we modify Eq.(2) and Eq.(3) and employ GMM to reestimate Eq.(1), Eq.(5) and Eq.(6).

$$r_{mt}=\lambda_m+\lambda_{md}D+\varepsilon_t, \quad (5)$$

$$r_{xt}=\lambda_x+\lambda_{xd}D+\nu_t. \quad (6)$$

where D equals zero for 1994/1/3~1997/7/1 and otherwise is unity.

3. Empirical Results

Table 2 lists the results of using daily data and including the estimation of a system of equations employing four different risk factors by GMM. First, the results show that the two-factor pricing model cannot be rejected for the full sample period since GMM statistics are insignificant at the 10% level in every case except for Hong Kong in which the US dollar exchange rate risk factor is used. Second, the results for the market risk premium are observed. Essentially, we detect that market risk premium is insignificant in all cases. Of all the insignificant coefficients, 10 are negative, and 8 are positive. This finding compares with the results of foreign exchange risk premium demonstrating that 9 out of the 18 coefficients are significant at the 10% level. Each coefficient is negative and the coefficients range from 0.0120 to 0.0504. Hence, although the asset pricing model cannot be rejected, the absence of any market risk premium flings into serious doubt on the validity of CAPM. Further, we observe three individual foreign exchange risk premium.

The Japanese yen exchange risk premium where 3 out of the 6 coefficients are significant, the US dollar exchange risk premium where 6 out of the 6 coefficients are significant while the EURO exchange risk premium where 1 out of 6 coefficients is significant. Overall, after comparing market risk premium, the Japanese yen, the EURO and the US dollar exchange risk premium, the Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand currencies against the US dollar exchange risk premium offer the best explanation of asset pricing.

Although the study period of the EURO exchange rate factor return is not consistent with the MSCI world index, the Japanese yen and the US dollar exchange rate factor return, this study still shows that

[4] For details see Iorio and Faff (2002).

[5] The instrumental variables of Eq.(1) include constant, excess market return and excess foreign exchange rate return. Eq.(2) and Eq.(3) include the same instrumental variable with constant.

the EURO exchange risk factor is not priced in the Asian stock markets since the entry of the EURO into the market.

Table 1. The descriptive statistics of stock, risk-free proxy and exchange rate returns

	Mean	Maximum	Minimum	Std. dev.	Skewness	Kurtosis	ADF	PP	Chow
HK	0.61	17.25	-14.73	1.70	0.08	12.91	-26.47***	-52.98***	0.91
KOA	0.53	10.02	-12.80	2.04	-0.09	6.69	-25.76***	-50.22***	0.28
MAL	-1.17	20.82	-24.15	1.69	0.55	41.06	-12.79***	-51.44***	2.17**
PHI	-1.52	16.18	-9.74	1.50	0.75	15.09	-12.62***	-45.17***	0.81
TWN	0.08	8.52	-9.94	1.63	-0.12	5.53	-13.71***	-53.13***	2.51*
THA	-2.82	11.35	-10.03	1.76	0.43	7.25	-12.37***	-48.23***	4.19***
MSCI	2.09	4.75	-4.78	0.85	-0.14	6.12	-23.48***	-45.38***	0.70
HKRF	1.18	11.1	0.01	0.01	1.24	16.61	-2.61*	-7.33***	2.79*
KOARF	2.41	8.02	0.00	0.01	1.00	4.16	-1.31	-3.83***	6.93***
MALRF	1.18	10.65	0.34	0.01	2.89	32.62	-2.07	-8.63***	24.39***
PHIRF	2.81	19.37	1.60	0.01	4.19	36.15	-4.67***	-10.60***	17.24***
TWNRF	1.27	2.86	0.25	0.01	-0.20	1.96	-1.31	-1.41	13.39***
THARF	1.55	6.63	0.24	0.01	1.17	3.35	-1.52	-2.59*	13.15***
HKJPY	-0.26	6.53	-7.74	0.74	-0.46	14.58	-56.21***	-56.20***	5.14***
KOAJPY	-0.97	19.70	-16.43	1.20	0.06	69.49	-8.25***	-47.19***	6.21***
MALJPY	-1.40	10.18	-9.21	0.89	-0.59	23.13	-11.02***	-50.61***	2.37**
PHIJPY	-2.54	10.37	-11.29	0.97	-0.42	24.09	-11.51***	-55.76***	2.11**
TWNJPY	-0.70	10.94	-11.38	0.74	-0.71	44.65	-29.40***	-59.06***	8.54***
THAJPY	-1.61	14.76	-16.96	1.01	-1.36	60.64	-9.45***	-59.15***	23.49***
HKUSD	-0.03	1.42	-1.11	0.04	9.02	650.67	-15.34***	-88.84***	22.28***
KOAUSD	-0.76	20.12	-18.09	0.97	-0.01	166.89	-8.18***	-36.79***	0.63
MALUSD	-1.18	7.97	-7.64	0.59	-0.05	61.27	-8.94***	-50.08***	0.86
PHIUSD	-2.34	10.15	-8.60	0.61	0.05	58.65	-9.68***	-46.29***	2.56***
TWNUSD	-0.54	3.27	-4.61	0.31	-1.27	49.33	-8.89***	-56.37***	0.48
THAUSD	-1.40	6.17	-17.07	0.75	-3.70	109.53	-9.29***	-52.31***	10.57***
HKEU	-0.76	3.37	-2.51	0.67	0.00	3.73	-42.73***	-42.72***	NA
KOAEU	0.33	2.93	-3.08	0.77	-0.05	3.67	-16.66***	-43.64***	NA
MALEU	-0.72	9.58	-9.08	0.84	0.05	34.30	-32.74***	-50.63***	NA
PHIEU	-2.87	9.56	-3.54	0.83	1.23	17.17	-31.09***	-44.07***	NA
TWNEU	-0.49	12.34	-11.92	0.95	0.05	63.74	-7.85***	-54.34***	NA
THAEU	-1.10	3.78	-3.67	0.70	0.16	5.48	-25.59***	-42.87***	NA

Notes: * 、** and *** denote significance at 10% 、5% and 1% level, respectively. Chow value is the Chow test statistics testing for a structural break in pre- and post-crisis subperiods. NA stands for the fact that the data of EURO currency began from 1999, therefore, no comparison can be made in pre- and post-crisis subperiods.

Table 2. GMM estimates of $r_{it}=\beta_{im}r_{mt}+\beta_{ix}r_{xt}+\varepsilon_{it}$, $r_{mt}=\lambda_m+\varepsilon_t$, $r_{xt}=\lambda_x+\nu_t$.

	HK	KOA	MAL	PHI	TWN	THA
GMM^a	0.2864	0.2067	0.3988	2.0057	0.1656	1.9213
	[0.5925]	[0.6494]	[0.5277]	[0.1567]	[0.6840]	[0.1657]
λ_m^a	0.0115	-0.0017	0.0110	-0.0018	0.0099	0.0101
	(0.0162)	(0.0165)	(0.0165)	(0.0164)	(0.0163)	(0.0164)
λ_x^a	-0.0152	-0.0338	-0.0247	-0.0498	-0.0191	-0.0304
	(0.0131)	(0.0190)*	(0.0162)	(0.0165)***	(0.0121)	(0.0171)*
GMM^b	3.2923	0.1153	0.1086	1.1964	0.0022	1.2139
	[0.0696]	[0.7342]	[0.7418]	[0.2740]	[0.9623]	[0.2706]
λ_m^b	0.0146	-0.0021	0.0102	-0.0031	0.0081	0.0091
	(0.0163)	(0.0164)	(0.0164)	(0.0164)	(0.0163)	(0.0164)
λ_x^b	-0.0120	-0.0312	-0.0231	-0.0491	-0.0181	-0.0278

	(0.0006)***	(0.0167)*	(0.0113)**	(0.0107)***	(0.0058)***	(0.0137)**
GMM^c	0.6352	0.4988	0.5277	0.2021	0.0005	1.1453
	[0.4255]	[0.4800]	[0.4676]	[0.6530]	[0.9816]	[0.2845]
λ_m^c	-0.0183	-0.0226	-0.0144	-0.0232	-0.0109	-0.0136
	(0.0230)	(0.0241)	(0.0246)	(0.0247)	(0.0243)	(0.0245)
λ_x^c	-0.0143	-0.0125	-0.0156	-0.0504	-0.0130	-0.0179
	(0.0156)	(0.0184)	(0.0168)	(0.0181)***	(0.0166)	(0.0153)

Notes: * 、** and *** denote significance at 10% 、5% and 1% level, respectively. Numbers in parentheses and brackets are standard errors and p-values. The GMM statistic testing that two-factor model holds, is distributed as a chi-square with N degrees freedom. The statistic applied following Newey and West (1987).

[a] The foreign exchange factor is the Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand currencies against the Japanese yen.

[b] The foreign exchange factor is the Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand currencies against the US dollar.

[c] The foreign exchange factor is the Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand currencies against the EURO.

In testing structural change pricing behavior between pre- and post-crisis subperiods, Table 3 lists the estimates of Eq.(1), Eq.(5) and Eq.(6). The results indicate that the two-factor pricing model cannot be rejected since GMM statistics are insignificant at the 10% level in each case. We observe the market risk premium and find that 12 out of the 5 coefficients are significant at the 10% level. All the coefficients are positive. The market risk premium coefficients range between 0.0143 and 0.0352. Moreover, the foreign risk premium where 12 out of the 5 coefficients are significant. The significant foreign risk premium coefficients are all the US dollar exchange risk factor. Furthermore, λ_{md} andλ_{xd} are used to test whether market and foreign exchange risk premium exhibit structural change before and after financial crisis. Essentially, we detect that the coefficients ofλ_{md} andλ_{xd} are insignificant in all cases except for Hong Kong in which the US dollar exchange risk factor is used. Of all the insignificant coefficients, 20 are negative, and 4 are positive. The results show that no serious structural change occurs between pre- and post-crisis subperiods. Notably, even though Hong Kong with the US dollar exchange risk factor exist structural change, but the US dollar exchange risk premium is still significant. Overall, a two-factor pricing model cannot be rejected, and the model is supported by the results of estimated risk premium. Furthermore, among the market risk factor, the Japanese yen and the US dollar exchange risk factors, the US dollar exchange risk factor is priced in Asian stock markets. The situation is valid for both the two subperiods and the whole period.

Table 3. GMM estimates of $r_{it}=\beta_{im}r_{mt}+\beta_{ix}r_{xt}+\varepsilon_{it}$, $r_{mt}=\lambda_m+\lambda_{md}D+\varepsilon_t$, $r_{xt}=\lambda_x+\lambda_{xd}D+\nu_t$.

	HK	KOA	MAL	PHI	TWN	THA
GMM^a	0.2911	0.2081	0.4017	2.0173	0.1668	1.9329
	[0.5895]	[0.6482]	[0.5262]	[0.1555]	[0.6830]	[0.1644]
λ_m^a	0.0352	0.0143	0.0338	0.0179	0.0307	0.0240
	(0.0184)*	(0.0187)	(0.0185)*	(0.0186)	(0.0187)*	(0.0186)
λ_{md}^a	-0.0346	-0.0232	-0.0331	-0.0287	-0.0303	-0.0202
	(0.0294)	(0.0291)	(0.0294)	(0.0293)	(0.0290)	(0.0291)
λ_x^a	-0.0120	-0.0420	-0.0054	-0.0227	-0.0187	-0.0162
	(0.0240)	(0.0229)*	(0.0232)	(0.0264)	(0.0220)	(0.0233)
λ_{xd}^a	-0.0047	0.0119	-0.0281	-0.0394	-0.0006	-0.0206
	(0.0286)	(0.0344)	(0.0313)	(0.0337)	(0.0264)	(0.0329)
GMM^b	0.9344	0.1159	0.1089	0.9752	0.0022	1.2343
	[0.3337]	[0.7336]	[0.9414]	[0.3234]	[0.9622]	[0.2666]
λ_m^b	0.0352	0.0143	0.0334	0.0162	0.0306	0.0239
	(0.0186)*	(0.0187)	(0.0185)*	(0.0189)	(0.0186)	(0.0186)
λ_{md}^b	-0.0324	-0.0238	-0.0338	-0.0350	-0.0328	-0.0214
	(0.0293)	(0.0291)	(0.0294)	(0.0309)	(0.0291)	(0.0291)
λ_x^b	-0.0146	-0.0442	-0.0083	-0.0271	-0.0222	-0.0207

	(0.0007)***	(0.0071)***	(0.0079)	(0.0118)**	(0.0070)***	(0.0093)**
λ^b_{xd}	0.0037	0.0190	-0.0215	-0.0363	0.0061	-0.0102
	(0.0010)***	(0.0252)	(0.0179)	(0.0223)	(0.0106)	(0.0227)

Notes: * 、** and *** denote significance at 10% 、5% and 1% level, respectively. Numbers in parentheses and brackets are standard errors and p-values. The GMM statistic testing that two-factor model holds, is distributed as a chi-square with N degrees freedom. The statistic applied following Newey and West (1987).

[a] The foreign exchange factor is the Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand currencies against the Japanese yen.

[b] The foreign exchange factor is the Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand currencies against the US dollar.

4. Conclusions

This investigation examines a two-factor asset pricing model for export-oriented Asian stock markets, including Hong Kong, Malaysia, the Philippines, South Korea, Taiwan and Thailand. Due to the facts that the trade size and the degree of capital and exchange rate regime control are quite difference between emerging and developed markets, this study is motivated to investigated the pricing of foreign exchange risk in Asian stock markets. The whole period is divided into two subperiods, using the Asian financial crisis as the cut-off point. GMM tests demonstrate that the US dollar exchange risk is priced in each market for the whole period. Furthermore, following considering the structural change, the US dollar foreign exchange risk is still priced in Asian markets for both the pre- and post-crisis subperiods. Consequently, the fluctuations of the Asian currencies against the US dollar will affect the export-oriented Asian markets.

References

1. Allayannis, G. and Weston, J. P. (2001), "The use of foreign currency derivatives and firm market value", Review of Financial Studies, Vol. 14, pp.243-276.
2. Bartov, E. and Bodnar, G. M. (1994), "Firm valuation, earnings expectations, and the exchange-rate exposure effect", Journal of Finance, Vol. 49, pp.1755-1785.
3. Bodnar, G. M. and Gentry, W. M. (1993), "Exchange rate exposure and industry characteristics: Evidence from Canada, Japan, and the USA", Journal of International Money and Finance, Vol. 12, pp.29-45.
4. Choi, J. J., Hiraki, T. and Takezawa, N. (1998), "Is foreign risk priced in the Japanese stock market?", Journal of Financial and Quantitative Analysis, Vol. 33, pp.361-382.
5. Chui, A. C. W. and Wei, K. C. J. (1998), "Book-to-market, firm size, and the turn-of-the-year effect: Evidence from Pacific-Basin emerging markets", Pacific-Basin Finance Journal, Vol. 6, pp.275-293.
6. Doukas, J., Hall, P. and Lang, L .H. P. (1999), "The pricing of currency risk in Japan", Journal of Banking and Finance, Vol. 23, pp.1-20.
7. Fama, E. F. and French, K. R. (1992), "The cross-section of expected stock returns", Journal of Finance, Vol. 47, pp.427-465.
8. Fama, E. F. and French, K. R. (1993), "Common risk factors in the returns on stocks and bonds", Journal of Financial Economics, Vol. 33, pp.3-56.
9. Fraser, S. P. and Pantzalis, C. (2004), "Foreign exchange rate exposure of US multinational corporations: A firm-specific approach", Journal of Multinational Financial Management, Vol. 14, pp.261-281.
10. Griffin, J. M. and Stulz, R. M. (2001), "International competition and exchange rate shocks: A cross-country industry analysis of stock returns", Review of Financial Studies, Vol. 14, pp.215-241.
11. Hansen, L. P. (1982), "Large sample properties of generalized method of moments estimators", Econometrica, Vol. 50, pp.1029-1054.
12. He, J. and Ng, L. K. (1998), "The foreign exchange exposure of Japanese multinational corporations", Journal of Finance, Vol. 53, pp.733-753.
13. Homma, T., Tsutsui, Y. and Benzion, U. (2005), "Exchange rate and stock prices in Japan", Applied Financial Economics, Vol. 15, pp.469-478.
14. Iorio, A. D. and Faff, R. (2002), "The pricing of foreign exchange risk in the Australian equities market", Pacific-Basin Finance Journal, Vol. 10, pp.77-95.
15. Jorion, P. (1990), "The exchange-rate exposure of U.S multinationals", Journal of Business, Vol. 63, pp.331-345.
16. Jorion, P. (1991), "The pricing of exchange rate risk in the stock market", Journal of Financial and Quantitative Analysis, Vol. 26, pp.363-376.
17. Lintner, J. (1965), "The valuation of risky assets and the selection of risky investments in stock portfolios and capital budgets", Review of Economics and Statistics, Vol. 47, pp.13-37.
18. Ma, C. K. and Kao, G. W. (1990), "On exchange rate changes and stock price reactions", Journal of Business Finance and Accounting, Vol. 17, pp.441-449.
19. Mossin, J. (1966), "Equilibrium in a capital asset market", Econometrica, Vol. 34, pp.768-783.
20. Newey, W. and West, K. (1987), "Hypothesis testing with efficient method of moments estimation", International Economic Review, Vol. 28, pp.777-787.
21. Pan, M. S., Fok, R. C. W. and Liu, Y. A. (2007), "Dynamic linkages between exchange rates and stock

prices: evidence from East Asian markets", International Review of Economics and Finance, Vol. 16, pp.503-520.
22. Priestley, R. and Ødegaard, B. A. (2007), "Linear and nonlinear exchange rate exposure", Journal of International Money and Finance, Vol. 26, pp.1016-1037.
23. Sharpe, W. (1964), "Capital asset pricing: a theory of market equilibrium under conditions of risk", Journal of Finance, Vol. 19, pp.425-442.
24. Tai, C. S. (2007), "Market integration and contagion: Evidence from Asian emerging stock and foreign exchange markets", Emerging Markets Review, Vol. 8, pp.264-283.
25. Vassalou, M. (2000), "Exchange rate and foreign inflation risk premium in global equity returns", Journal of International Money and Finance, Vol. 19, pp.433-470.
26. Wang, F. and Wu, Y. (2004), "What determines Chinese stock returns?", Financial Analysts Journal, Vol. 60, pp.65-77.
27. Wu, Y. (2000), "Stock prices and exchange rates in a VEC model-The case of Singapore in the 1990s", Journal of Economics and Finance, Vol. 24, pp.260-274.