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ASYMMETRIC FOREIGN EXCHANGE EXPOSURE: A CROSS COUNTRY SECTOR ANALYSIS IN THE ASIA PACIFIC

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ABSTRACT

Standard finance theory argues that changes in exchange rate carry transaction and economic exposures on a firm's expected future cash flows, which in turn affect the firm value. An extension of the theory further suggests that the foreign exchange effect may also be asymmetric. Although numerous empirical studies have attempted to detect the sensitivity of stock returns to exchange rate changes, conclusive evidence is far and between. The overall mixed findings in the literature could in part due to two specification problems, namely omission of relevant factors proposed by several theories and the presence of conditional heteroskedasticity in share price and exchange rate changes. The aim of this paper is to investigate the foreign exchange effect on returns by explicitly incorporating these two problems using the generalised autoregressive conditional heteroscedasticity model. With the dramatic devaluation of several Asian currencies following the 1997 financial crisis, analysis of foreign exchange exposure will be of practical important to investors and finance managers interested in the area. This study focuses on analysis of US dollar exposure on sector returns in the Asia Pacific, as firms in this region tend to be more export oriented and often with the US as their largest export market.

1 INTRODUCTION

The subject of exchange rate exposure has long been of interest to academic researchers. Standard finance theory argues that changes in exchange rate carry transaction and economic exposures on a firm's expected future cash flows, which in turn affect the firm value. An extension of the theory further suggests that the foreign exchange effect may also be asymmetric. Sources of the asymmetric exposures include pricing to market behaviour (Froot and Klemperer, 1989; Marston, 1990; Knetter, 1994), hysteresis (Ljungqvist, 1994; Christophe, 1997), and asymmetric hedging (Booth, 1996).

Although numerous empirical studies have attempted to detect the sensitivity of stock returns to exchange rate changes, conclusive evidence is far and between. For example, studies that focus on the U.S. firms (see Jorion, 1990, 1991; Amihud, 1993; Bodnar and Gentry, 1993; Bartov and Bodnar, 1994; and Griffin and Stulz, 2001) report few firms or industries exhibit significant exchange rate exposures. In another front, Allayannis (1996) and Chow et al. (1997) find that exchange rate exposure becomes more significant at the longer return intervals, whereas Chamberlain et al. (1997) and Di Iorio and Faff (2000) document greater foreign exchange sensitivity using daily rather than monthly data.

The overall mixed findings in the literature could in part due to two specification problems as suggested by Koutmos and Martin (2003). First, in light of the several known theories mentioned earlier that argue for the asymmetric currency exposure, failure to incorporate such effect may result in model misspecification and could cast doubt on the outcome of an empirical finding. Second, in the presence of conditional heteroskedasticity, the violation of independent and identically distributed assumption could lead to inefficient estimates and bias the test statistics. In fact, both Baillie and Bollerslev (1989) and Hsieh (1989) report nonnormal and time-dependent second moment in the foreign exchange market data. By using autoregressive conditional heteroscedasticity (ARCH) and generalised autoregressive conditional heteroscedasticity (GARCH) models, they are able to remove all heteroskedasticity in price changes in the currencies examined.

In this paper, we investigate the foreign exchange effect on returns by explicitly incorporating these two features into our model and test specification. While Koutmos and Martin (2003) focus their study on 4 major industrialized countries, namely, Germany, Japan, the U.K. and the U.S., our motivation lies with the analysis of

U.S. dollar exposure on returns in the Asia Pacific. Firms in this region tend to be very export oriented and often with the U.S. as their largest export market. Coupled with the backdrop of the Asian financial crisis that result in dramatic devaluation on several Asian currencies, changes in the exchange rate between the U.S. dollar and the domestic currency are highly sensitive and may carry significant impact on their subsequent cash flows. Such issue therefore is also of practical important to investors and finance managers interested in the area.

There has been no study conducted comprehensively across Asia Pacific and only a handful of studies have limited their investigation on firms or sectors in a single country. For instance, Marston (1990) and He and Ng (1998) examine the sensitivity of Japanese firms to exchange rate risk, while Khoo (1994) and Di Iorio and Faff (2000) estimate the foreign exchange exposure on sector returns in Australia. Similarly, Chang (2002) focus his investigation on the currency risk at industrial level in Taiwan around the Asian financial crisis.

The rest of the paper is organized as follows. Section 2 describes the data and the methodology. Section 3 reports the empirical findings of the exchange rate effect on sector returns in the sampled countries. The last section concludes the paper.

2 DATA AND METHODOLOGY

The weekly total market return, sector indices and exchange rates for Australia, Japan, Korea, Malaysia, Singapore and Thailand stock markets in this study are obtained from DATASTREAM over the period from January 1989 to March 2004. These indices have been adjusted for dividends and provide the longest sampling data available for the 6 countries from the same source of database.[1] For the exchange rate, it is expressed in the U.S. dollar per domestic currency. The weekly market returns, sector returns and exchange rate changes are calculated from the first difference of the logarithm of the indices. Parallel with the S&P classification on economic sectors, the 8 sector indices common to all the sampled countries in this study are Discretionary Consumption, Consumer Staples, Financials, Industrials, Resources, Retails, Telecommunication Services and Utilities. The full sample of 794 observations are available for market returns and exchange rates in each country. As for the sector returns, the samples range from 794 for most sectors to the lowest 408 for Telecommunication Services in Australia. Given that the Malaysian government has fixed its exchange rate against the US dollar in October 1998, the sample period after October 1998 will not be considered. This reduces the sample size for all Malaysian data to 512 observations except for the utilities sector which only has 355 observations.

We first present the summary statistics of the weekly exchange rate changes, market returns and sector returns in Table 1. The return distribution in each market of the sampled countries shows high non-normality, highlighted by its skewness and kurtosis. Based on the Jarque-Bera (1980) test (see Table 1), the non-normality for each market and sector return series is significant at the 1% level. The preliminary result is therefore consistent with Bollerslev et al. (1992) that the return series are conditional heteroskedasticity. Specifically, the evidence suggests that stock returns have time-varying volatility, and error terms from ordinary least square regressions involving stock returns are also not normally distributed. To incorporate heteroscedasticity and to distinguish between nonnormal conditional and unconditional errors, the GARCH model developed by Bollerslev (1986) is also used to examine the exchange rate risk exposure.

For the GARCH(1,1) model where the variance term depends only upon last period's variance and squared residual, the conditional variance of the unconditional shock ε_t is given by

$$\varepsilon_t = \eta_t \sqrt{h_t}\,, \tag{1}$$

$$h_t = \omega + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1}\,, \tag{2}$$

where η_t is a sequence of normally, independently and identically distributed random variables with zero mean and unit variance, $\omega > 0$, $\alpha > 0$, and $\beta \geq 0$. The estimates of the parameters of GARCH model are derived using the Gauss-Newton/BHHH (Berndt, Hall, Hall and Hausman) algorithm (Berndt el at., 1974).

To test the asymmetric foreign exchange exposure, we use the augmented market model proposed by Koutmos and Martin (2003). In its testable form at the market and sector level,

$$R_{m,t} = \beta_0 + (\beta_x + \beta_{D,x} D_t)x_t + \varepsilon_t\,, \tag{3}$$

$$R_{s,t} = \beta_0 + \beta_1 R_{m,t} + (\beta_x + \beta_{D,x} D_t)x_t + \varepsilon_t\,, \tag{4}$$

where $R_{m,t}$ is the market return at time t, $R_{s,t}$ is the sector index return, x_t is the unanticipated exchange rate change, D_t is a dummy variable which takes the value of one if $x_t < 0$ and zero otherwise, and ε_t is the error term with zero mean and constant variance. For both Equations (3) and (4), $\theta = (\beta_x + \beta_{Dx} D_t)$ measures exposure to exchange rate movements and is decomposed into its positive and

[1] We exclude Hong Kong due to its pegging policy towards U.S. dollars, and China and New Zealand for the lack of sector return data.

Table 1: Summary Statistics for Weekly Market Returns, Exchange Rate Changes and Sector Returns for Australia, Japan, Korea, Malaysia, Singapore and Thailand (%)

Country	Obs	Mean	Std Dev	Skewness	Kurtosis	Jarque-Bera
AUSTRALIA						
Market return	794	0.2110	1.7517	0.0479	3.4998	8.57*
US dollar	794	-0.0182	1.3566	-0.5259	5.6904	276.06*
Sector returns:						
Consumption disc.	794	0.2371	3.1659	0.1555	4.5938	87.24*
Consumer staples	794	0.1454	2.2282	-0.1595	4.5058	78.38*
Financials	794	0.2592	1.9394	-0.2442	3.5630	18.38*
Health	794	0.2296	2.7254	-0.1990	3.6550	19.43*
Industrials general	794	0.1028	2.3265	-0.1904	4.4895	78.20*
Resources	794	0.2081	2.5626	0.1965	3.9375	34.19*
Retail general	794	0.1829	2.5260	0.0041	4.1572	44.31*
Telecom Services	408	0.3318	4.0386	1.7105	16.9487	3506.56*
Utilities	794	0.2926	3.0091	0.1056	3.9603	31.98*
JAPAN						
Market return	794	-0.0587	2.7083	-0.0513	4.1372	43.13*
US dollar	794	0.0223	1.6198	1.1903	11.5334	2596.59*
Sector returns:						
Consumption disc.	794	0.0124	2.7192	-0.2462	4.4090	73.70*
Consumer staples	794	-0.0159	2.4103	-0.1895	6.0902	320.68*
Financials	794	-0.1234	3.6011	0.0933	4.3344	60.06*
Health	794	0.0033	3.4605	0.0401	5.0029	132.92*
Industrials general	794	-0.0103	3.0538	-0.1232	4.2734	55.65*
Resources	794	-0.0859	3.6012	-0.4793	6.4369	421.19*
Retail general	794	-0.0388	3.0943	0.0275	4.2480	51.63*
Telecom Services	794	-0.1001	4.5299	0.5004	5.4208	227.01*
Utilities	794	-0.0780	2.7113	1.1966	17.4130	7062.03*
KOREA						
Market return	794	0.0793	4.4747	-0.0108	5.0148	134.32*
US dollar	794	-0.0663	1.8871	-6.6652	133.0061	565039.50*
Sector returns:						
Consumption disc.	794	0.1079	5.6485	0.0732	5.9907	296.62*
Consumer staples	794	0.2035	4.3467	-0.4075	7.3911	659.88*
Financials	794	-0.1232	6.0940	0.1802	6.9270	514.49*
Industrials general	794	0.2236	5.6266	0.0705	5.9379	286.21*
Resources	794	0.1999	5.3213	0.1382	5.7448	251.77*
Retail general	794	0.2842	6.7796	0.4688	6.9960	557.35*
Telecom Services	750	0.5225	6.2543	0.2541	5.8618	264.01*
Utilities	763	0.0318	5.3120	0.1978	5.8117	256.31*

Country	Obs	Mean	Std Dev	Skewness	Kurtosis	Jarque-Bera
MALAYSIA[a]						
Market return	512	0.1188	3.5918	-0.2306	10.1300	1089.05*
US dollar	512	-0.0654	1.6690	-0.7326	29.6359	15181.14*
Sector returns:						
Consumption disc.	512	0.2442	4.2170	-0.3927	8.1783	585.20*
Consumer staples	512	0.1305	3.0433	-0.3525	5.5190	145.97*
Financials	512	0.1876	4.7241	1.3603	23.0150	8704.04*
Industrials general	512	0.0518	4.3249	0.0185	7.7091	473.11*
Resources	512	0.0227	3.7680	0.0133	12.4351	1899.11*
Telecom Services	512	0.2538	5.3263	-0.3008	7.6947	477.92*
Utilities	335	-0.1128	4.8465	0.1893	6.6943	192.50*
SINGAPORE						
Market return	794	0.1089	2.7545	-0.5048	7.3264	652.88*
US dollar	794	0.0173	0.7717	1.0696	23.9915	14729.27*
Sector returns:						
Consumption disc.	794	0.1487	2.9632	-0.4034	10.3689	1818.00*
Consumer staples	794	0.1473	3.1685	0.1700	7.6514	719.59*
Financials	794	0.1641	3.6661	-0.5070	15.1792	4941.34*
Health	794	0.0828	5.5162	-0.8800	14.7906	4701.64*
Industrials general	794	0.1318	3.3336	-0.4152	6.7518	488.48*
Resources	697	0.1708	5.4360	-2.0890	53.4960	74558.57*
Retail general	794	0.1762	3.7946	0.4619	7.5399	710.10*
Telecom Services	542	-0.0564	4.2370	-0.0713	10.1500	1154.98*
THAILAND						
Market return	794	0.1897	4.6983	0.0842	6.7723	471.72*
US dollar	794	-0.0570	1.4622	-3.1239	53.5579	85855.73*
Sector returns:						
Consumption disc.	638	0.0740	6.1679	0.7115	6.6018	398.70*
Consumer staples	794	0.2490	5.5506	0.2947	7.2261	602.37*
Financials	794	0.1148	5.9841	0.2519	6.8380	495.73*
Industrials general	581	0.3133	6.1410	0.4112	5.7060	193.63*
Resources	771	0.5515	5.6209	0.3018	6.1002	320.47*
Retail general	638	0.0753	6.6909	0.8157	10.2484	1467.40*
Telecom Services	646	0.1884	6.5993	0.3031	5.4047	165.55*
Utilities	479	0.1240	5.3231	0.7715	5.8779	212.82*

Notes: [a] The sample period covers from January 1989 to October 1998.

- denotes significant at the 1% level.

negative components, where $\beta_x = \theta^+$ and $\beta_{Dx} = (\theta^+ - \theta^-)$ to test for asymmetry exposure. A statistically significant $\beta_{D,x}$ implies the exchange rate exposure is asymmetric.

To estimate the unanticipated exchange rate change, x_t, the exchange rate changes are assumed to follow a discrete lognormal diffusion process,

$$\ln S_t = \mu + \ln S_{t-1} + x_t, \quad (5)$$

where S_t is the spot exchange rate and x_t is the unanticipated exchange rate change or innovation. The lognormal diffusion process in Equation 5 therefore is also a representation that the level of exchange rate follows a random walk. Since the drift term, μ, is found to be approximately zero in daily and weekly frequencies (Meese and Rogoff, 1983), the unanticipated exchange rate change, x_t, is simply the log-different of the exchange rate.

We investigate whether the exchange rate follow a random walk by conducting unit root tests. As shown in Table 2, both the Augmented Dicky-Fuller (Dickey and Fuller, 1981) and the Phillips-Perron (Phillips and Perron, 1988) tests fail to reject nonstationarity of exchange rates in level. However, both test statistics for all six exchange rates in first-difference are significant at the 1% level, which indicate the transformed series are stationary. Evidence of a unit root at the level of the exchange rates therefore supports the expected exchange rate formation process in Equation (5).

Table 2: Tests for Unit Root on Exchange Rates (January 1989 – March 2004)

	Augmented Dickey-Fuller		Phillips-Perron	
Country	Level	1st Diff.	Level	1st Diff.
Australia	-1.7754	-30.2828*	-1.8003	-30.2209*
Japan	-1.7329	-30.4817*	-1.8918	-30.3940*
Korea	-1.6102	-37.2275*	-1.6564	-37.4721*
Malaysia[a]	0.3031	-28.6718*	-0.2871	-27.8896*
Singapore	-1.7423	-8.1310*	-1.7830	-31.7032*
Thailand	-1.0713	-5.7600*	-1.0168	-29.7745*

Notes: [a] The sample period covers from January 1989 to October 1998.
* denotes significant at the 1% level.

3 EMPIRICAL FINDINGS

For the foreign exchange exposure analysis with respect to the US dollar, we begins at the market level using the GARCH(1,1) model. Table 3 presents the estimation results of exchange rate exposure for each country using the EViews 4.0 software. Four of the six markets we examine, namely, Japan, Korea, Malaysia and Thailand exhibit statistically significant symmetric exchange rate effect at the 5% level. Significant positive coefficients indicate that the market returns benefit from an appreciation of domestic currency against the US dollar. Exchange rates have been quite volatile in the last two decades, however,

Table 3: Exchange Rate Exposure at the Market Level (January 1989 – March 2004)

Market			Adj. R^2
Mean equation: $R_{m,t} = \beta_0 + (\beta_x + \beta_{Dx} D_t) x_t + \varepsilon_t$			
	β_x	$\beta_{D,x}$	
Australia	0.0165	0.1965	0.0062
	(0.1742)	(0.1329)	
Japan	0.1968	-0.1962	0.0015
	(2.7022)*	(-1.3802)	
Korea	0.9719	-0.2655	0.1048
	(4.7741)*	(-1.0700)	
Malaysia[a]	0.7292	-0.0045	0.1384
	(4.2510)*	(-0.0204)	
Singapore	0.1862	0.7502	0.0383
	(0.8911)	(2.6159)*	
Thailand	0.6080	-0.4217	0.0170
	(2.5908)*	(-1.4694)	
Variance equation: $h_t = \omega + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1}$			
	α	β	
Australia	0.0379	0.9422	
	(2.7762)*	(38.9343)*	
Japan	0.1289	0.7490	
	(3.7518)*	(9.0835)*	
Korea	0.0441	0.9488	
	(4.4888)*	(90.8835)*	
Malaysia[a]	0.1356	0.8450	
	(5.1394)*	(25.6187)*	
Singapore	0.0972	0.8689	
	(6.3542)*	(42.9347)*	
Thailand	0.1219	0.8455	
	(6.2815)*	(30.9306)*	

Notes: t-statistics are given in parentheses.
[a] The sample period covers from January 1989 to October 1998.
* denotes significant at the 5% level.

none of these markets experience any asymmetric exposure except for Singapore. It is evident from the variance equation estimates that the error terms are conditionally heteroskedasticity. The sum of $\alpha + \beta$ for each country is close to unity which indicate the variance process or the impact of a shock is highly persistence.

Estimation results of GARCH(1,1) model of exchange rate exposure for sector indices by country are given in Table 4. The coefficient estimates of associated variance equation are not reported to conserve space. As shown in Table 4, domestic market returns of all six countries have a dominant influence on all their respective sector returns. On the other hand, we obtained rather mixed results across countries for the effect of exchange rate on individual sector return. For individual country, there are evidence of significant exchange rate influence on returns of two (Korea) to five (Malaysia) sectors except for Singapore. These results imply that all eight sector returns under study are subject to exchange rate exposure. Of all the sectors, the 3 sectors that are supported by most countries are the Financials, Industrials and Resources sectors.

Table 4: Exchange Rate Exposure Estimates for Sector Indices by Country (January 1989 – March 2004)

Sector	β_1	β_x	$\beta_{D,x}$
Consumption disc.			
Australia	1.1864	-0.1072	-0.0512
	(33.2991)*	(-1.4077)	(-0.3991)
Japan	0.8832	-0.2394	0.0919
	(77.7935)*	(-12.7212)*	(1.6450)
Korea	1.0063	0.1674	-0.0558
	(46.3591)*	(0.9048)	(-0.2788)
Malaysia[a]	1.0700	-0.1625	0.2256
	(53.2598)*	(-2.2303)*	(2.8466)*
Singapore	0.9105	-0.0818	0.1165
	(65.3336)*	(-0.7812)	(0.8927)
Thailand	0.8215	0.1137	-0.3131
	(25.0088)*	(0.7067)	(-1.5338)
Consumer staples			
Australia	0.7411	-0.0931	-0.0437
	(21.9302)*	(-1.2755)	(-0.4002)
Japan	0.6846	0.0592	0.0063
	(46.3734)*	(1.4917)	(0.0752)
Korea	0.5604	0.1514	0.1246
	(23.8527)*	(1.0370)	(0.6543)
Malaysia[a]	0.7643	-0.3005	0.0973
	(43.8954)*	(-5.5765)*	(1.1722)
Singapore	0.7963	0.0495	0.0113
	(35.3411)*	(0.2715)	(0.0423)
Thailand	0.5701	-0.5038	0.3365
	(18.2589)	(-3.1882)*	(1.4803)
Financials			
Australia	0.8874	-0.0420	0.0629
	(47.7371)*	(-0.6144)	(0.6317)
Japan	1.2047	0.1784	-0.1507
	(69.8459)*	(3.7618)*	(-1.6197)
Korea	1.1292	-0.1382	0.1883
	(54.4109)*	(-0.7041)	(0.8087)
Malaysia[a]	1.1210	0.4717	-0.4313
	(68.2657)*	(8.1169)*	(-4.3234)*
Singapore	1.0493	-0.1083	0.2837
	(92.9472)*	(-1.0191)	(1.8979)
Thailand	1.1437	0.1759	0.2504
	(101.2511)*	(2.1263)*	(2.2547)*
Industrials			
Australia	0.8459	0.0876	0.1342
	(26.8034)*	(1.2639)	(-1.2150)
Japan	1.0250	-0.2104	0.1304
	(81.3116)*	(-5.6742)*	(1.9653)*
Korea	1.0507	0.3675	-0.3797
	(55.1340)*	(5.6213)*	(-4.9970)*
Malaysia[a]	1.0589	0.1139	-0.1257
	(48.9609)*	(2.0433)*	(-1.3356)
Singapore	1.0444	-0.1442	-0.2972
	(46.3570)*	(1.2455)	(-1.5753)
Thailand	0.8192	-0.0203	-0.4979
	(22.2611)*	(-0.0756)	(-1.5363)
Resources			
Australia	1.1334	0.2147	-0.1768
	(45.2294)*	(2.7815)*	(-1.5835)
Japan	0.8865	0.1045	0.0421
	(32.3470)*	(1.4865)	(0.2984)
Korea	0.7781	0.3939	-0.3398
	(32.6806)*	(2.2689)*	(-1.8344)
Malaysia[a]	0.7963	-0.0461	-0.4293
	(34.8864)*	(-0.3658)	(-3.1143)*
Singapore	0.6978	0.0929	0.6855
	(16.5865)*	(0.3100)	(1.5064)
Thailand	0.7391	-0.4495	0.1985
	(27.4737)*	(-2.3330)*	(0.8315)
Retails			
Australia	0.7740	0.0676	-0.0693
	(21.1544)*	(0.6360)	(-0.4359)
Japan	0.9151	0.1403	-0.1584
	(43.3898)*	(2.5973)*	(-1.4071)
Korea	0.8205	0.3774	-0.2390
	(26.6734)*	(1.3169)	(-0.7328)
Singapore	0.7365	-0.0608	0.0481
	(20.4718)*	(-0.3521)	(0.1450)

Sector	β_1	β_x	$\beta_{D,x}$
Thailand	0.4353	0.0665	-0.3087
	(10.8485)*	(0.2461)	(-0.9125)
Telecom services			
Australia	1.0863	0.5047	-0.9979
	(12.2735)*	(2.4870)*	(-3.0744)*
Japan	1.2295	0.1661	-0.0985
	(37.8058)*	(1.6207)	(-0.4728)
Korea	0.8370	-0.0196	-0.1487
	(28.1492)*	(-0.1287)	(-0.6569)
Malaysia[a]	1.0732	-0.1869	-0.0006
	(28.7757)*	(-1.1437)	(-0.0031)
Singapore	0.8105	-0.1546	-0.0313
	(17.2018)*	(-0.5104)	(-0.0760)
Thailand	1.1169	0.1956	-0.2872
	(39.7015)*	(1.1933)	(-1.2976)
Utilities			
Australia	0.3791	-0.2042	0.3727
	(7.5320)*	(1.7334)	(2.1599)*
Japan	0.4746	0.1302	0.0289
	(17.1635)*	(1.3737)	(0.1654)
Korea	0.8189	-0.0863	0.1845
	(31.3260)*	(-0.4782)	(0.7535)
Malaysia[a]	0.9242	0.2335	-0.0501
	(21.7674)*	(2.0141)*	(-0.3324)
Thailand	0.6785	0.0973	-0.1754
	(21.2426)*	(0.7081)	(-0.8552)

Notes: t-statistics are given in parentheses.
[a] The sample period covers from January 1989 to October 1998.
* denotes significant at the 5% level.

We also found significant asymmetric exchange rate exposure for six sectors, excluding the Consumer Staples and Retails. At the country level, Malaysia has the most sectors with asymmetric exposure, namely Discretionary Consumption, Financials and Resources, followed by Australia which has two (Telecommunication Services and Utilities). Of the 8 sectors, the Financials and Industrials are the two sectors with evidence of asymmetric exchange risks in two countries.

The Asian financial crisis in 1997 resulted in dramatic devaluation of several Asian currencies and high volatility in the exchange rate changes between the U.S. dollar and domestic currency during that period. To examine possible impact of the currency crisis, we estimate the same model for each sector by country over two sub-periods, excluding the crisis period from July 1997 to June 1998. Estimation results of the two sub-periods do not differ substantially from Table 4, and hence are not reported here. The only notable difference is the Industrials sector whereby in addition to Japan, Korea and Malaysia, we found significant exchange rate exposure for Singapore and Thailand prior to the currency crisis and for Australia after the crisis.

4 CONCLUSION

This study examine the US dollar exposure on market and eight sector returns for six countries in the Asia Pacific, as firms in this region tend to be more export oriented and often with the US as their largest export market. It provides important implications for investors and finance managers interested in the analysis of foreign exchange exposure, especially with the dramatic devaluation of several Asian currencies following the 1997 financial crisis.

The evidence reported here is consistent with the findings in the international finance literature that support the significance of exchange rate risk on stock return. At the market level, we found significant exchange rate effects on market returns for four of the six countries, namely Japan, Korea, Malaysia and Thailand, and asymmetric exposure for Singapore. At the sector level, however, domestic market returns were found to have more significant influence than exchange rate risk on all sector returns. Overall, there are evidence from different countries to support significant exchange rate exposure on all sector returns. The three notable sectors with most countries having similar results were Financials, Industrials and Resources. As for the asymmetric exposure, only six sectors, excluding the Consumer Staples and Retails, are found to be significant, and again the two notable sectors were Financials and Industrials.

It is important to note that the evidence provided above are subject to the estimation method used, particularly the assumption that returns and exchange risk are constant through time. Finally, future research should consider additional factors at both the firm and industry levels for a better understanding of the role and magnitude of the exchange rate influence on the firm value.

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