

The Dynamic Relationship Between The Real Exchange and Stock Markets: Evidence During The Economic Crisis to Crisis



Finance

KEYWORDS : Foreign Exchange Exposure, Stock Markets, Asian crisis, tranquil period, Global Crisis

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ABSTRACT

This paper examines the dynamic linkages between the foreign exchange and stock markets for seven Asian countries, including India, china, Taiwan, Indonesia, Korea, Philippines and Thailand. While the literature suggests the existence of significant Interactions between the two markets, our empirical results show that, in general, exchange rates Granger-cause stock prices with less significant causal relations from stock prices to exchange rates. Furthermore, this one-way Granger causality effect from exchange rates to stock prices becomes less significant during the US financial crisis of 2009. Our results also suggest that, there is insignificant long-run outlook (no co integration) except for Thailand, implies that these financial assets share on common trends in their economy system and hence they will move apart in the long-run for countries that have higher trade size exchange rate fluctuations tend to exhibit significant influence on the equity market, regardless of the exchange rate arrangement system and the degree of capital controls during the US financial crisis of 2009.

INTRODUCTION

Argument of whether stock prices and exchange rates are related or not, has received considerable attention after the Asian crises and tranquil period and global crises period. The financial crisis that affects the countries affected saw turmoil in both currency and stock markets. If exchange rates and stock prices are related and the causation runs from exchange rates to stock prices then crises in the stock markets can be prevented by controlling the exchange rates. Likewise these developing countries can exploit such a link to attract/stimulate foreign portfolio investment in their own countries. Similarly, if there is a causal relationship from stock prices to exchange rates then authorities can focus on domestic economic policies to stabilize the stock market. Also these will benefit the investors if the two markets/prices are related then they can use this information to predict the behavior of one market using the information on other market.

Review from the related literature shows that the stock prices-exchange rate relationship has focused on examining this relationship for the developed countries with very little attention on the developing countries. The findings are ambiguous. Smith (1992), Solnik (1987), and Aggarwal (1981)) found that is a significant positive relationship between stock prices and exchange rates while Soenen and Hennigar (1998) have reported a significant negative relationship between the stock prices-exchange rate relationships. On the other hand, Franck and Young (1972), Eli Bartov and Gordon M. Bonder (1994) in their studies found that there is very weak or no association between stock prices and exchange rates. In relation to causation, the evidence is also mixed. Abdalla and Muriinde (1997) have found causation runs from exchange rates to stock prices while Ajayi and Mougoue (1996) reported that a reverse causation. Bahmani-Oskooee and Sohrabian, (1992) exposed that the relationship between stock prices and exchange rates is bidirectional.

Based on the theoretical consensus, there is no proper relationship between stock prices and exchange rates either. In evaluating the portfolio balance models for examples, the exchange rate determination postulate a negative relationship between stock prices and exchange rates and that the causation runs from stock prices to exchange rates. The exchange rates play the main role in balancing the demand for and supply of assets. Due to an increase in domestic stock prices lead individuals to demand more domestic assets. Buying more domestic assets local investors would sell foreign assets (they are relatively less attractive now), causing local currency appreciation. Due to an increase in wealth can rise in domestic asset prices will also lead investors to increase their demand for money, which in turn raises domestic interest rates. Then this will again leads to appreciation of domestic currency by attracting foreign capital. In contrast for the same negative relationship is increase in foreign demand for domestic assets due to stock price increase would also cause a domestic currency appreciation. The factors that cause changes in exchange rates may be different from the

factors that cause changes in stock prices. Under such scenario, it is clear that there is no empirical or theoretical consensus on the issue of whether stock prices and exchange rates are related and the direction of causation if they are related.

OBJECTIVES OF THE STUDY

The primary objective of this study is to investigate the dynamics interactions between exchange rates and stock prices using recent developments in time series modelling. This study investigates whether these national stock markets in the periods are moving in tandem and in equilibrium or they depart permanently from each other in short and long run. The Asian emerging markets selected for analysis are India, Thailand, Indonesia, Korea, Philippines, china and Taiwan and world major equity markets are in this region.

This study differs from most of the existing literature in the following aspects: (1) the study employs last one decade's daily observation covering the period of the Asian financial crisis from July 1997 to December 2013. (2) The study considers the dynamic relationships of market liberalization the long run relationships among the equity markets. (3) The multivariate Johansen and Jusellus (1990) maximum likelihood procedure is supplemented by vector error correction modelling methods to analyses dynamic aspect of markets integration.

METHODOLOGY

The prerequisite condition for the series to be cointegrated is that the series must have the same order of integration. The order of integration of a series is determined by the number of times that the series must be difference before achieving stationary. A series, Y_t is said to be integrated of order d if the series achieves stationary after differencing d times and denoted as $Y_t \sim I(d)$. For instance, if price series (Y_t) is not stationary at its level but becomes so after first differencing, (i.e. $Y_t - Y_{t-1}$ is stationary) we describe this as $Y_t \sim I(1)$. If Y_t is stationary at its level before first difference, then we describe it as $Y_t \sim I(0)$. Thus the very beginning step in the cointegration analysis is to determine the order of integration of the series.

We ADF and PP unit root test to test the stationary properties of the variables. Schwert (1987) and later on, Campbell and Perron (1991) noted that ADF is better for small-sample data set. In testing the order of integration using ADF approach, the following two ADF regression equations could be estimated:

$$\Delta 1Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{i=1}^L \delta_{i1} \Delta Y_{t-i} + v_t \quad (1)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 T + \sum_{i=1}^L \delta_i \Delta Y_{t-i} + \tau_1 \quad (2)$$

Where ΔY_t is the first difference of the series, α_0 is intercept, α_1 and α_2 are constant, V_t and are disturbance terms, T is time or trend variable and L is the number of lagged terms. To ensure disturbance term V_t and τ_1 are approximately white noise, a sufficient number of lagged differences L should be estimated. The

null hypothesis is that the level of the series, Y_t , contains a unit root $H_0: Y_t$ is $I(1)$ and the alternative hypothesis is that $H_1: Y_t$ is not $I(1)$. We reject the null hypothesis when α_1 is found to be negative and statistically significant. The rejection (or acceptance) of the null hypothesis is made by calculating a t-ratio of α_1 to its standard error.

Johansen Cointegration Approach

We apply the Johansen maximum-likelihood approach to examine the Cointegration between the variables. This approach permits in examining linear restriction for cointegrating estimates (Perman, 1991). To illustrate this approach, let Y_t be a vector of N time series variables, each of which is integrated of order 1. Assume that Y_t can be modelled by the vector auto regression,

$$y_t = \beta_1 y_{t-1} + \dots + \beta_k y_{t-k} + \alpha + v_t$$

Where $t=1 \dots T$ (3)

Here Y_t is $N \times 1$ vector of stochastic variables; all Y_{t-k} are assumed predetermined; α is a $N \times 1$ vector of constant; v_t is a vector of normal distributed error with zero mean and constant variance; and k is the maximum number of lag length processing the white noise. The lag length of k is chosen by using the Akaike Final Prediction Errors (FPE) criterion. In brief, the technique chooses the length which minimise the forecast error of the series

EMPIRICAL RESULTS

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests are employed to test for the stationarity of the macro-economic series at level and then first difference of each series. The results of the ADF and PP tests at level are reported in Table-1, by taking into consideration of trend variable and without trend variable in the regression.

Table-1. Unit Root Analysis

Country	Variable	Aug. Dickey-Fuller	Phillips-Perron	Lags
India	E	-2.862068	-2.862062	1
	S	-2.862066	-2.862063	1
	ΔE	-4.9526*	-30.874*	1
	ΔS	-5.2699*	-30.907*	1
China	E	-2.7653	-5.4117	1
	S	-1.4442	-5.0117	1
	ΔE	-5.7814*	-31.299*	1
	ΔS	-6.2595*	-31.346*	1
Thailand	E	-2.9043	-6.0124	1
	S	-2.3949	-5.9801	1
	ΔE	-4.7788*	-29.977*	1
	ΔS	-5.0346*	-30.017*	1
Taiwan	E	-1.0479	-1.1290	1
	S	-0.7738	-0.9136	1
	ΔE	-4.3906*	-6.4638*	1
	ΔS	-4.8097*	-6.7951*	1
Indonesia	E	-2.1959	-4.8294	1
	S	-2.3604	-5.0031	1
	ΔE	-4.9124*	-32.789*	1
	ΔS	-5.1100*	-31.346*	1
Korea	E	-2.862066	-2.862062	1
	S	-2.862064	-2.862062	1
	ΔE	-13.431800*	-13.431792*	1
	ΔS	-13.73764*	-85.95367*	1
Philippines	E	-2.862064	-2.862062	1
	S	-2.862064	-2.862062	1
	ΔE	-18.18770*	-66.75598*	1
	ΔS	-31.71743*	-201.6632*	1

Note: The null hypothesis is that the series is non-stationary, or contains a unit root. The rejection of null hypothesis for both ADF and PP tests are based on the MacKinnon critical values.* indicates the rejection of the null hypothesis of non-stationary at 5% significance level.

The number of lag is set equal to one in order to avoid the problem of autocorrelation that is to ensure the error terms are uncorrelated and enhance the robustness of the results. Since the variables are integrated of order one, and then we can proceed to conduct the multivariate Cointegration test.

Table-2. Multivariate Cointegration analysis

Country	Null hypothesis	Trace	Max- λ	Critical values (5%)	p Value(λ)
				Trace	Max - λ
India	p= 0	19.544**	17.655**	15.197	14.036
	p <=1	2.333	2.333	3.962	3.962
China	p= 0	7.899	6.788	15.197	14.036
	p <=1	2.113	2.113	3.962	3.962
Thailand	p= 0	12.677	12.908	15.197	14.036
	p <=1	0.988	0.988	3.962	3.962
Taiwan	p= 0	9.880	8.677	15.197	14.036
	p <=1	1.988	1.988	3.962	3.962
Indonesia	p= 0	11.788	10.678	15.197	14.036
	p <=1	1.677	1.677	3.962	3.962
Korea	P<=0	20.19300	15.92316	14.26460	14.26460
	P<=1	8	4.269846	3.841466	3.841466
Philippines	P<=0	15.49471	20.19300	15.92316	14.26460
	P<=1	4.269846	3.841466	4.269846	4.269846

Note: The critical values are obtained from Johansen and Juselius (1990). ** indicates significant at 1% level.* indicates significant at 5% level.

Table-3. Granger causality analysis

Country	Null Hypothesis	F-value	P-value
	$\Delta E \neq \Delta S$	0.000	0.000
India	$\Delta S \neq \Delta E$	0.476	0.789
	$\Delta E \neq \Delta S$	2.578	0.344
China	$\Delta S \neq \Delta E$	0.914	0.362
	$\Delta E \neq \Delta S$	2.745	0.211
Thailand	$\Delta S \neq \Delta E$	2.421	0.253
	$\Delta E \neq \Delta S$	5.431**	0.003
Taiwan	$\Delta S \neq \Delta E$	1.986	0.161
	$\Delta E \neq \Delta S$	0.252480	0.0271
Indonesia	$\Delta S \neq \Delta E$	3.503**	0.013

	$\Delta E \neq \Delta S$	0.204	0.887
Korea	$\Delta S \neq \Delta E$	0.13835	0.9995
	$\Delta E \neq \Delta S$	0.03265	0.9995
Philippines	$\Delta E \neq \Delta S$	0.37822	0.8640
	$\Delta S \neq \Delta E$	2.11637	0.0606

Symbol “ \neq ” implies does not Granger-cause. *, **, and *** denote rejections of the null hypothesis at 10%, 5%, and 1% significance levels, respectively.

We employ Johansen’s (1991) maximum likelihood method to examine whether or not the exchange rate and stock price series for each country are cointegrated. Table-2 reports the Johansen cointegration test statistics. As can be seen in the table, there is only one cointegration vector between the exchange rate and stock price series for Hong Kong, suggesting the Korean dollar is cointegrated with the Hang Seng stock Korean index. For the other four countries, no cointegrating vector is found. Therefore, the results suggest a long-run equilibrium between exchange rates and stock prices in Korean. Consequently, an error correction term should be included in the Granger causality test equations for Korean.

For the sample period, the reported F-values suggest that exchange rates significantly lead stock prices for seven countries, including India, china, Philippines, Korea, Thailand, Taiwan and Indonesia. It is noteworthy that these seven countries are also the ones that have a larger size of international trade. Thus, our findings seem to support the prediction that stock prices for countries with a high trade size tend to be affected more by exchange rate fluctuations. Except Thailand, these five countries also show a feedback effect from stock prices to exchange rates, although some of the F-statistics are significant only at a marginal level.

CONCLUSIONS AND DEVELOPMENT

In this paper, we examine dynamic linkages between foreign exchange and stock markets in India, china, Korea, Indonesia, Philippines, Taiwan and Thailand. These seven economies are significantly different in terms of the size of each economy, degree of development, rate of growth, and maturity of financial markets. Except or Thailand, which is an emerging country, Regarding the maturity of financial markets, India, china, Taiwan are considered most player of world markets, while Indonesia,

Korea, Philippines and Thailand are considered to be emerging markets. Such as the Asian crisis June 1997 to US financial crisis of 2009, may alter the Nature of stock price-exchange rate relations. Beginning in the early July of 2007 and over the subsequent one or two years, whether a causal relation exists from exchange rates to stock prices or the other way around our empirical results show a strong causal relation from Exchange rates to stock prices, despite that several of these countries such as all countries floating or follow a pegged exchange rate system. On the other hands, there also exists a causal relation from the equity market to the foreign exchange market for economies that exhibit a bi-directional causal relation, it appears that the impact from the foreign exchange market to the equity market is much stronger than that from the equity market to the foreign exchange market. We also find a one-way causal relation from exchange rates to stock prices for these economies after the US financial crisis of 2009. Our results remain similar when different econometric methods are used.

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