



# The impact of the Asian financial crisis on foreign exchange market efficiency: The case of East Asian countries

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## Abstract

This paper investigates whether the Asian financial crisis in the second half of 1997 affected the foreign exchange market efficiency in four Asian countries hit hard by the crisis: Thailand, Indonesia, Malaysia and Korea. We find that empirical evidence based on the bivariate and multivariate cointegration estimations using the high-frequency data from January 1996 to February 2001 is mostly consistent with the across-country efficient market hypothesis in the Asian foreign exchange markets during the whole sample period except the short period immediately after the July 1997 crisis. Within-country market efficiency also appears to have become weaker immediately after the crisis than before the crisis, but market efficiency was recovered quickly, evidenced by the regained cointegrating relationship for the pairs of the spot-forward exchange rates in the Asian countries. The findings of the threshold effects in the forward market equation and asymmetrical responses of the spot rate to the forward spread imply that there has been a strong force of recovering new equilibrium exchange rate levels in the Asian foreign exchange markets once the rates have been disturbed, especially when their currencies are significantly undervalued compared to the rationally expected level of exchange rates. © 2003 Elsevier B.V. All rights reserved.

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## 1. Introduction

This paper examines market efficiency of the Asian foreign exchange markets during the recent years of 1996 through early 2001 by applying the bivariate and multivariate

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cointegration estimations to the high-frequency (daily) data. The data covers forward and spot exchange rates of the Asian currencies during the period from January 1, 1996 to February 28, 2001: the Thai bhat, the Malaysian ringgit, the Indonesian rupiah, and the Korean won. In particular, we investigate whether the Asian financial crisis in the second half of 1997 affected the long-run relations of the pairs of spot-forward rates in each country and those of cross-country exchange rates in the Asia Pacific region.

The foreign exchange market efficiency across countries in the global market context has been tested by many researchers applying the concept of cointegration to a number of foreign exchange rates. The presence of cointegration among different exchange rates implies that it is possible to predict one market from another, which violates one of the main tenets of the efficient market hypothesis (Granger, 1986; MacDonald and Taylor, 1989; Dwyer and Wallace, 1992; Engle, 1996). Many studies that conducted foreign exchange market efficiency tests using various forms of cointegration techniques have reported mixed results. Hakkio and Rush (1989) and Baillie and Bollerslev (1989, 1994), for example, found that exchange rates across countries were cointegrated and suggested that foreign exchange markets might not be characterized by the efficient market hypothesis.

Other studies, however, have reported different results. Rapp and Sharma (1999), for example, reported that there was no cointegrating vector on a bilateral basis between any of the two exchange rates in G-7 nations, providing evidence in support of the efficient market hypothesis. These mixed results have also conflicted with the empirical finding of a robust cointegration relation between the forward rate and the corresponding future spot rate in the same country, providing further evidence of market efficiency (Crowe, 1994; Diebold et al., 1994; Luintel and Paudyal, 1998).

The mixed and conflicting results on the existence of cointegrating relationships in the literature have been ascribed to alternative testing strategies, the choice of the lag length in the vector autoregression estimation, different data sets, and different frequencies of the data (for example, Sephton and Larsen, 1991; Caporale and Pittis, 1998; Luintel and Paudyal, 1998). The major foreign exchange market policy coordinations, such as the Plaza Agreement (1985) and the Louvre Accord (1987), were also found to have affected the cointegration relationships, and thereby market efficiency of the major foreign exchange markets in the G-7 nations (Jeon and Lee, 2002). This paper extends the literature by presenting empirical evidence of the influence of the 1997 Asian financial crisis on foreign exchange market efficiency in the selected Asian countries hardest hit by the crisis.

We examine whether or not the 1997 Asian currency/financial crisis has influenced the bilateral (within country) and multilateral (across country) cointegration relationships among forward and spot exchange rates, and thereby market efficiency of the Asian foreign exchange markets. Due to the possibility of the system shift around July 1997, when the Asian financial crisis erupted starting in the Thai foreign exchange market, we also conducted estimations for various sub-sample periods and compared the results between the pre-crisis period and the post-crisis period. The sub-sample period estimations will assist us in investigating the persistence of the impact of the 1997 crisis on the long-run relations among exchange rates and market efficiency in the Asian foreign exchange markets.

We also explore the possibility that a threshold cointegration model provides a better description of long-run equilibrium relationships between spot and forward exchange rates in the 1997 crisis-stricken Asian countries than traditional cointegration models. The

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