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Cointegration and causality in the Asian and emerging foreign exchange markets: Evidence from the 1990s financial crises

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Abstract

This article examines the cointegration level, changes in the existence and directions of causality of the foreign exchange (FX) rates in the Asian and emerging markets during the 1990s financial crises. Engle and Granger's simple bivariate and Johansen's multivariate cointegrations are applied to the FX rates for the 1994 Mexican, 1997 Asian, 1998 Russian, and 1999 Brazilian crises. In addition, the article conducts the Granger causality test and impulse response analysis to examine the causality pattern in all the FX rates. The analysis shows most of the pre-Mexican causality disappears and significant numbers of new causality emerge in the 1994 Mexican crisis while the 1997 Asian crisis generates significant spillover effects into the later part of the 1998 Russian and 1999 Brazilian crises.

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1. Introduction

Contagion has been argued as a channel for currency crises spilling across countries in today's turbulence financial markets (see Sander & Kleimeier, 2003; Reside & Gochoco-Bautista, 1999). Tests on the presence of contagion effects in currency crises include the cross-market correlation coefficient method (see Baig & Goldfajn, 1999; Park & Song, 2000), cointegration method (Reside & Gochoco-Bautista, 1999), Granger causality method (Khalid & Kawai, 2003; Sander & Kleimeier, 2003), and conditional probability of crisis method (see De Gregario & Valdes, 2001; Eichengreen, Rose, & Wyplosz, 1996).

The cointegration test has been used to analyze long-run relationships among nonstationary time series (see Baillie & Bollerslev, 1989; Caporale, Cipollini, & Demetriades, 2000; Nieh & Lee, 2001). Prior to the 1997 Asian crisis, cointegration tests were primarily conducted to assess the relative impact of the Japanese yen (JPY) and/or the U.S. dollar (USD) on Asian currencies. For example, Aggarwal and Mougoue (1996) in their analyses found that the JPY is cointegrated with the East Asian and ASEAN (Association of South East Asian Nations) currencies. The authors' findings demonstrate a significant preliminary discussion of yen blocs in Asia. Tse and Ng (1997) reached similar cointegration conclusions among the Japan, Malaysia, the Philippines, Singapore, and Thailand currencies.

The cointegration method has been utilized to examine the effect of contagion post-1997 Asian crisis. For example, Reside and Gochoco-Bautista (1999) use an error correction model to examine the cointegration relationships among exchange rates in the Asian market to isolate country specific effects of contagion. The authors' results show stable long-run relationships between exchange rates in the region with contagion effects from other countries to Singapore, China, and Japan. This article extends the cointegration findings of Reside and Gochoco-Bautista to include exchange rates from the Asian and emerging economies accounting for the major currency crises of the 1990s.

The Granger causality method has also been widely used to draw inferences on contagion effects of currency crises. Unlike the cross-market correlation coefficient method, cointegration, and conditional probability of crisis methods, which can only be used to identify the existence of contagion, the Granger causality method allows further exploration of changes in the existence and directions of causality among crisis-ridden countries.

Previous literature shows that the Granger causality test has been used to analyze the equity, exchange rate, and bond market to establish the interrelationship of these markets among countries (see Khalid & Kawai, 2003). For example, Nagayasu (2001) use Granger causality test to examine the relationship between exchange rate and stock indices during the 1997 Asian crisis. The author found that developments in some sectoral stock indices, including those of banking and financial sectors, have caused upward pressure on exchange rates. The existence of the strong relationships between the exchange rate market and stock indices confirms the importance of financial market linkages as a transmission channel of the 1997 Asian crisis from Thailand to neighboring countries, such as Indonesia, Malaysia, and the Philippines.

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