

Market efficiency and cointegration of spot exchange rates during periods of economic turmoil: Another look at European and Asian currency crises

Chanwit Phengpis *

*Department of Finance, College of Business Administration, California State University,
Long Beach, 1250 Bellflower Boulevard, Long Beach, CA 90840, United States*

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Abstract

This study extends the study of foreign exchange market efficiency. It employs several verification testing procedures, rather than using only standard Johansen tests, to re-examine if cointegration among different spot exchange rates is actually present during the 1992–1993 European currency crisis and during the 1997–1998 Asian currency crisis. In contrast to the findings in prior studies, the test results collectively cast strong doubts on the presence of cointegration. Therefore, a cointegration test may not be an appropriate technique to detect and reveal market inefficiency if it in fact transpires during these two crises. Further, this study strongly corroborates empirical evidence that the reliance on Johansen tests can result in spurious findings of cointegration and thus incorrect inferences about efficiency.

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1. Introduction

Whether or not foreign exchange markets are efficient is of considerable interest to researchers and market participants. Among other econometric techniques, a cointegration analysis has been employed by several recent studies to examine foreign exchange market efficiency. The majority of prior empirical work (e.g., Coleman, 1990; Copeland, 1991; Lajaunie, McManis, & Naka,

* Tel.: +1 562 985 4569; fax: +1 562 985 1754.

E-mail address: pchanwit@yahoo.com.

1996; Lajaunie & Naka, 1992; MacDonald & Taylor, 1989; Rapp & Sharma, 1999) has found that spot exchange rates for various major currencies generally are not cointegrated during the modern float. The absence of cointegration and thus a cointegrating vector and the error correction model (ECM) (e.g., Engle & Granger, 1987) implies that the current value of one currency cannot be predicted by past values of other currencies. This unpredictability is commonly interpreted by prior studies as evidence of weak-form efficiency in foreign exchange markets.

Interpretational ambiguity mainly arises when cointegration among spot exchange rates is detected. Baillie and Bollerslev (1989) interpret the predictability implied by cointegration as a violation of weak-form efficiency or as indirect evidence of a time-varying risk premium. Crowder (1994) finds that a cointegrating vector which is stationary or $I(0)$ by definition does not appear to be a proxy for a time-varying risk premium. This is because the forward premium used to represent the risk premium has a different time series property in that it appears non-stationary or $I(1)$. Baillie and Bollerslev (1994) contend that the forward premium is not a pure $I(1)$ process but fractionally integrated and mean reverting with finite cumulative impulse response weights. On the other hand, Wu and Chen (1998) employ a more powerful unit root test, find that the forward premium is in fact stationary and conclude that foreign exchange markets are efficient even though the presence (or lack thereof) of cointegration is not examined.

Jeon and Lee (2002) find that the G-7 countries' exchange rates are cointegrated during the period between the Plaza Agreement in 1985 and the Louvre Accord in 1987. They conclude that market inefficiency transpires during this period of international policy cooperation to stabilize exchange rates. Further, Haug, Mackinnon, and Michelis (2000) and Rangvid and Sorensen (2002) detect cointegrating relations among exchange rates of the European Union (EU) countries over extended time periods prior to the inception of the European Monetary Union (EMU) in 1999. They however interpret this result as an indication of stability and credibility of the EU exchange rate policy coordination through the Exchange Rate Mechanism (ERM) rather than as evidence of market inefficiency. The Maastricht Treaty (1992) which requires convergence of key economic variables, including exchange rates, among EU nations prior to becoming EMU members can further explain such finding.

In relation to voluminous studies using long spans of data, a few studies have performed cointegration tests of spot exchange rates during periods of economic turmoil. Aroskar, Sarkar, and Swanson (2004) find a cointegrating relation among daily spot exchange rates of EU currencies during the European currency crisis of 1992 and 1993. They suggest that weak-form inefficiency exists during the crisis partially because the ECM provides better predictive power for some included currencies than does the random walk model. Further, Aroskar and Swanson (2002) and Jeon and Seo (2003) evidence a cointegrating relation among daily spot exchange rates of Asian currencies during the Asian currency crisis of 1997 and 1998. These two studies conclude that weak-form inefficiency occurs during the crisis as well.

Similar to the analyses using long time spans, whether or not cointegration really indicates market inefficiency during these two crises is open to debate. On the one hand, cointegration and its embedded predictability can emerge and entail arbitrage opportunities if foreign exchange markets are truly inefficient during turbulent times. On the other hand, Dwyer and Wallace (1992), Baffes (1994), Engel (1996), Masih and Masih (2001) and Ferre and Hall (2002) indicate that cointegration does not necessarily imply market inefficiency, implying further that cointegration tests may not be appropriate tests of market efficiency for any period. This is because whether or not the predictability derived from cointegration can truly lead to arbitrage opportunities and/or the ability of market participants to earn risk-adjusted excess returns has not been confirmed nor verified. Further, Lence and Falk (2005) indicate that cointegration test results

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