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Stock market volatility and exchange rates in emerging countries: A Markov-state switching approach

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ABSTRACT

In this paper we employ a Markov-Switching EGARCH model to investigate the dynamic linkage between stock price volatility and exchange rate changes for four emerging countries over the period 1994–2009. Results distinguish between two different regimes in both the conditional mean and the conditional variance of stock returns. The first corresponds to a high mean-low variance regime and the second regime is characterized by a low mean and a high variance. Moreover, we provide strong evidence that the relationship between stock and foreign exchange markets is regime dependent and stock-price volatility responds asymmetrically to events in the foreign exchange market. Our results demonstrate that foreign exchange rate changes have a significant impact on the probability of transition across regimes.

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1. Introduction

During the last two decades, emerging countries have experienced several crises, namely the stock market crash in 1987, the Asian currency crises in July 1997, the Mexican currency crisis in 1994 and the subprime crisis of 2007–2008. These “turbulent” episodes have been characterized by large negative asset returns and high volatility and their effects have swiftly proliferated to other emerging economies. These features have greatly increased foreign exchange (FX) rates volatility and, therefore, the risk associated with international

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portfolios: foreign stock returns expressed in domestic currency are systematically affected by FX rate movements and investment in foreign stock markets thus involves exposure to FX rate risks.

The empirical literature provides conflicting findings regarding the dynamic linkage between FX and stock markets. Early studies including Jorion (1990, 1991) suggest that FX rate changes offer little or no predictive power for stock returns volatility, whilst others (see e.g. Dumas and Solnik, 1995; Roll, 1992) claim the existence of a strong linkage between FX rate changes and stock market volatility. Mixed empirical evidence is accompanied by the lack of a theoretical consensus on the relationship between stock and FX markets. Although sophisticated econometric approaches have been implemented to research this topic, the evidence is somewhat mixed as to whether FX market volatility affects (or is affected by) stock market behavior. While empirical methodologies vary widely, these studies are generally founded on first moments in the specification of the dynamic relationship between stock prices and exchange rates and have not allowed for similar switching behavior in stock market volatility. Moreover, empirical investigations of the dynamic linkage between FX rate changes and stock markets volatility have tended to focus upon the major developed markets and only a very limited body of research is devoted to emerging stock markets. Furthermore, there is very little empirical research that investigates volatility spillovers between FX and stock markets when stock market volatility may itself switch between two or more regimes. Our study examines volatility spillovers between FX markets and equity markets in selected emerging countries using a Markov-state switching approach. More precisely, our main research questions are: 1) Is there any regime switching behavior in volatility on emerging stock markets? 2) Are there any volatility spillovers between FX and stock markets? 3) Is the impact of FX markets volatility on the stock market regime dependent?

Such empirical research may have several practical implications for traders, portfolio managers and policymakers. It can be helpful for traders in explaining the flow of information between stock and FX markets. Results may also be useful for assessing the informational efficiency of emerging stock markets. More importantly, results may provide insight into the way that FX rate volatility shocks are transmitted to stock markets and assess the degree and persistence of these innovations over time. For portfolio hedgers, it is crucial to spell out how markets are linked over time to develop an effective hedging strategy. From a financial stability perspective, the volatility transmission across the two markets is also an important consideration for policymakers.

We distinguish our study from previous studies in several ways. First of all, while previous empirical investigations of the link between FX markets and stock prices are mainly devoted to developed markets, and sometimes to Pacific Basin countries, our interest is focused on four emerging countries, namely Hong Kong, Singapore, Malaysia and Mexico that were affected by several crises. Secondly, unlike most studies in the literature that only estimate the relationship between FX rate changes and stock market return volatility for a whole period, we attempt to estimate during "good" and "bad" periods. This is made possible by using a two regime MS-EGARCH model. To the best of our knowledge, ours is the first study of emerging nations stock and FX markets to employ this model. The use of the MS-EGARCH model is motivated by at least three points: 1) This model allows the variance of stock returns to switch across different regimes. 2) The model is able to detect regime dependence in the impact, persistence and asymmetric response to shocks since the conditional variance depends on past shocks and the present and past states of the economy. 3) This model is founded on the assumption that stock returns may shift across different volatility regimes, which is linked to the diverse perceptions and reactions of FX traders and stock market participants to volatility spillovers between FX and equity markets (see e.g. Aloui and Jammazi, 2008; and Wang and Theobald, 2008).

This paper is structured as follows. Section 2 presents a brief review of theory related to the volatility spillovers between exchange rates and stock markets. Section 3 discusses previous empirical studies. Section 4 presents a preliminary analysis of the data. Section 5 details the econometric methodology used. The empirical results are reported in Section 6. Section 7 summarizes the main conclusions.

2. The linkage between FX and stock markets: background theory

Economic theory states that there are various ways in which stock and FX markets can interact. This makes empirical analysis of the interdependence of these markets so interesting. In particular, theoretical approaches have failed to reach a consensus on the existence of a link between stock prices and exchange

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