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Measuring stock market contagion: Local or common currency returns?☆

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ABSTRACT

Empirical research on contagion between international stock markets generally focuses on index returns converted into US dollars. This paper argues that it would be more appropriate to use returns denominated in countries' local currencies, as only these returns accurately reflect price fluctuations in national stock markets. Returns converted into a common currency also reflect fluctuations in the exchange rate, which is shown to bias the outcomes of a contagion test.

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1. Introduction

The global financial crisis of 2007 and beyond has intensified the debate amongst academics and policy makers on financial markets' vulnerability to contagion. One part of this debate is about how to define contagion, with influential definitions being 'a significant increase in cross-market linkages after a shock to one country' (Forbes and Rigobon, 2002) and cross-market 'correlation over and above what one would expect from economic fundamentals' (Bekaert et al., 2005). Another part of the debate is on how to measure contagion, which Corsetti et al. (2005) show is complicated by the fact that no single measure of contagion can be derived independently of a model of financial asset returns.

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With so much work being done on the topic, it is perhaps surprising that little attention has been paid to an important empirical issue: the choice of a currency unit in which to express the market returns before implementing a contagion test. When measuring co-movement between the Hang Seng and the Nikkei stock market, say, should the index returns be expressed in local currencies, i.e. the Hong Kong dollar and the Japanese Yen, or should they be converted into a common currency such as the US dollar? Many analyses focus on US dollar returns, referring to common practice or the international investor's perspective. The related literature on international stock market diversification, however, has advocated already some time ago to use local currency returns so as to 'focus on the correlation across markets rather than across currencies' (Longin and Solnik, 1995, p. 21). This paper explains that this reasoning carries over to the contagion literature as well, and uses an example from the Lehman Brothers collapse to illustrate the bias that may otherwise be the result.

The paper's findings may also have implications for other studies on international stock market phenomena. In the literature on international stock market integration, for instance, a high contemporaneous correlation between countries' US dollar returns may signal a high level of integration, but could also indicate that such returns are importantly driven by otherwise unrelated fluctuations in the dollar exchange rate. And in the literature on international stock market inefficiencies, serial correlation or momentum effects in US dollar returns may signal inefficiencies in stock price formation, but may also reflect inefficiencies in the market for foreign exchange. While these fields of study are outside the scope of the present paper, the discussion below may thus be of relevance to a broader literature as well.

2. How is contagion typically measured?

The empirical literature, as reviewed by Rigobon (2002), Pericoli and Sbracia (2003), and Forbes (2012), has put forward a large variety of financial contagion measures. Still, the most popular measures are inspired by a relatively small number of influential papers, and are methodologically related (see Dungey et al., 2005). A key difference between the main approaches relates to the timing of contagion effects, with contagion being either assumed to take place during a prolonged time period following a critical event, or during trading days with extreme market returns.[2]

The seminal work by Forbes and Rigobon (2002) adopts the first perspective, and measures contagion as a significant increase in cross-market linkages after a shock to one market. If there is no such significant increase but only strong linkages between markets that exist in all states of the world, the authors refer to this as interdependence. Potential contagion effects are thus assumed to occur during an adjacent time period following an exogenously identified critical event. In their empirical analysis of the Asia crisis, Forbes and Rigobon (2002) focus on the month following the collapse of the Hang Seng stock market on 17 October 1997.

Bae et al. (2003) analyse contagion during trading days with extreme stock market returns. If such extreme returns occur simultaneously across stock markets, Bae et al. (2003) refer to this as a co-exceedance event. They define contagion as the fraction of the co-exceedance events unexplained by economic fundamentals. Rather than focusing on a specific time period, potential contagion effects are thus assumed to occur during the set of trading days on which returns exceeded a certain threshold value. Amongst other values, Bae et al. (2003) focus on the 5% most negative returns in the distribution.

The overview in Table 1 illustrates that several contributions to the empirical literature focus on US dollar returns, including the seminal studies by Forbes and Rigobon (2002) and by Bae et al. (2003). All but one of these contributions report results for emerging markets, which are commonly believed to be especially vulnerable to contagion effects. The overview confirms that most studies find evidence for emerging market contagion during the 1994 Mexico crisis and, especially, during the 1997 Asian crisis. Even though the group of emerging markets does not include the United States, the examined stock market returns are generally converted into US dollars. This focus on dollar returns generally remains unmotivated, or is explained by the aim to 'adopt the perspective of the international investor' or to 'follow common practice'. The next section discusses how this common practice originated.

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[2] Mierau and Mink (2013) examine for both crisis dating approaches how the test results depend on the adopted crisis definition.

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