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# Intraday return and volatility spillover mechanism from Chinese to Japanese stock market



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### ABSTRACT

**Nishimura, Yusaku, Tsutsui, Yoshiro, and Hirayama, Kenjiro**—Intraday return and volatility spillover mechanism from Chinese to Japanese stock market

We analyze the mechanism of return and volatility spillover effects from the Chinese to the Japanese stock market. We construct a stock price index comprised of those companies that have substantial operations in China. This China-related index responds to changes in the Shanghai Composite Index more strongly than does the TOPIX (the market index of the Tokyo Stock Exchange). This result suggests that China has a large impact on Japanese stocks via China-related firms in Japan. Furthermore, we find evidence that this response has become stronger as the Chinese economy has gained importance in recent years. *J. Japanese Int. Economies* **35** (2015) 23–42. Institute of International Economy, University of International Business and Economics, 10 East Huixin Street, Chaoyang District, Beijing 100029, China; Faculty of Economics, Konan University, 8-9-1 Okamoto, Higashinadaku, Kobe 658-8501, Japan; School of Economics, Kwansei Gakuin University, Uegahara, Nishinomiya-shi 662-8501, Japan.

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## 1. Introduction

In this paper we empirically investigate the intraday stock price spillover effects between Japanese and Chinese<sup>2</sup> stock markets, with a special focus on overlapping trading hours. We analyze both return and volatility of stock prices in this paper. There exist studies that examine interactions between the two markets using daily (Liu and Chen, 2008; Nishimura and Men, 2010) or high-frequency data (Nishimura et al., 2012; Tsutsui and Hirayama, 2013). Almost all of those studies conclude that there is a one-way influence running from China to Japan. The main purpose of this paper is to investigate the mechanism producing this one-way causality.

Most past studies of return and/or volatility spillover effects utilize intraday (opening and closing price data), daily (closing price data) or lower-frequency data (Hamao et al., 1990; Theodossiou and Lee, 1993; Bae and Karolyi, 1994; Longin and Solink, 1995; Karolyi, 1995; Christofi and Pericli, 1999; Ng, 2000; Caporale et al., 2006). However, dramatic advances in communications and computer technology now make it possible to obtain information from other markets extremely rapidly. If the stock market is informationally efficient, this should result in speedy responses in overseas markets. Since Chinese and Japanese markets are simultaneously open for certain hours each day, it is extremely interesting to use these hours to analyze high-frequency spillover effects that cannot be accurately captured using daily or lower-frequency data. In addition, if daily closing prices are used to represent daily observations, the fact that the Chinese market closes just one hour after Tokyo implies that causality from Japan to China will be over-emphasized relative to the opposite causality. Tokyo's closing price on the following day will be influenced by all other intervening major stock markets, weakening or blurring the effects of Shanghai on Tokyo. Any positive finding of spillover effects from Shanghai to Tokyo thus gains credibility. For this reason, recent analyses of spillover effects between the two neighboring markets with overlapping trading hours have begun to utilize high-frequency data (Jeong, 1999; Baur and Jung, 2006; Égert and Kočenda, 2007; Harju and Hussain, 2008; Nishimura et al., 2012; Tsutsui and Hirayama, 2013).

These recent studies make use of market indices to estimate the extent of stock price spillover effects between different stock markets, but they have not focused on the factors that lead to international transmission of stock price changes. This paper, however, endeavors to analyze why and how such transmission arises across national borders. Such an analysis has heretofore not been undertaken by researchers in our field.

Tsutsui and Hirayama (2005) propose three possible causes of international stock price spillover effects. In the first place, common global shocks may be buffeting firms across borders. When this is the case, use of daily observations tends to reveal causation from Japan to Asia, to Europe, and to the Americas, because that is the order in which these markets open and close on a given day. If one utilizes high-frequency intra-day data during overlapping trading hours, the effects of common global shocks are likely to be observed almost simultaneously. In this case, the observed one-way influence from the Chinese to the Japanese stock market (Nishimura et al., 2012; Tsutsui and Hirayama, 2013) cannot be explained by the existence of common global shocks.

The second cause of inter-market correlation is that a large change in the stock price index of one country usually receives a great deal of attention from investors of other countries like a “sun-spot”. This phenomenon seems to occur particularly at the time of market opening when the news about other markets is processed, but is probably not likely during normal trading hours.

The third cause is portfolio adjustment by international investors. Portfolios of institutional investors are significantly diversified across national boundaries, and international capital movements caused by portfolio adjustments of these investors thus affect stock prices worldwide. In the case of China, however, international capital flows are strictly regulated, and individual and institutional investors in China are not allowed to invest in overseas stock markets in principle (except for some

<sup>2</sup> “China” in this paper is defined to be mainland China, excluding Hong Kong, Macau, and Taiwan.

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