

Measuring equity market integration using uncorrelated information flows: Tokyo, London and New York

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Abstract

Equity markets do not pass all overnight information into prices instantly at the opening of trade. We adjust open-to-close return series for non-instantaneous information absorption and then use adjusted series to measure integration among three major equity markets. Because the adjusted daytime return series are uncorrelated, we can accurately measure the size, and identify the sources, of transmissions. Overnight news, as represented by foreign open-to-close returns, explains 13% of opening price variation (close-to-open returns) in New York, 14% in Tokyo and 30% in London. For New York and Tokyo, the largest influences come from the market that trades immediately prior (London and New York respectively) whereas opening price variation in London is linked closer with New York than Tokyo. Foreign volatility spillovers are also significant, and subject to asymmetric effects.

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1. Introduction

Variations in opening prices in the Tokyo, London and New York equity markets are significantly predicted by the returns and volatility patterns of overnight foreign trade. This predictability

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does not contradict market efficiency (since there is no opportunity to trade between the close and opening of a market), but it does identify the common information flows between the three markets, and offers a yardstick for measuring integration.

Using intra-daily data on the S&P 500 (New York), the Nikkei 225 (Japan) and the FTSE 100 (London) indices, we search the early hours of trade in each market for the point of zero correlation with lagged foreign and domestic open-to-close returns. We make this the reference point for measuring the arrival of truly new information, and the starting point for adjusting returns calculations. We can then use the resulting zero-correlation open-to-close returns as explanators for opening price variation (close-to-open returns).

By isolating the early-trade ‘opening’ price, which fully reflects preceding information, up to a one-half-hour interval accuracy, our new method improves the quality of integration measures for these markets. Other studies recognize that estimates based on raw opening prices are likely to mis-measure the size of transmissions between markets by omitting relevant information (see, for example, Baur and Jung, 2006; Lin et al., 1994 and Susmel and Engle, 1994). Since our adjusted daytime returns are orthogonal explanatory variables in a model of opening price variation, we can identify both the size and the source of foreign market effects on price change and volatility with more ease and precision than when more arbitrary adjustments are made.¹

Results show stronger and more significant mutual spillovers occurring between all three markets than have been reported previously. About 13% of the log change in close-to-opening price in New York, 14% in Tokyo and 30% in London is explained by foreign daytime returns. The strongest impact on New York and Tokyo is from the markets that trade immediately prior to them, that is, London and New York respectively. London, however, appears to be much more dependent on New York’s daytime return than on Tokyo’s, despite the fact that New York’s news is older. Spillovers from foreign daytime volatility explain 9% of opening price conditional variance in New York, 3% in Tokyo and 2% in London. We also find evidence of asymmetric effects in returns and volatility spillovers associated with negative foreign returns.

2. Literature

The degree of integration between international stock markets has long been recognized to have implications for portfolio allocation, risk management and asset pricing. Highly integrated markets offer reduced opportunities for diversification and may make the global financial system more susceptible to crisis.² Studies of equity market integration aim to map the transmission of common information from one market to another through time. However, really precise mapping of information transmission is made difficult by the fact that continuously and randomly arriving news must be tracked using the non-synchronous and/or overlapping returns processes which we actually observe.

Past research into the transmission of shocks from one market to another has highlighted the importance of a careful treatment of returns timing, since results can be contaminated by non-synchronous or overlapping measurement of returns (Martens and Poon, 2001).

Hamao et al. (1990, 1991) and Becker et al. (1990) approach the problem by dividing close-to-close returns (which confuse predictive and contemporaneous effects) into close-to-open and

¹ Baur and Jung (2006) use similar search methods to compare the German and U.S. markets.

² The extensive literature linking news and covariance includes, for example, King et al. (1994), Bekaert and Harvey (1995), and Bekaert et al. (2005).

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