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How close a relationship does a capital market have with other markets? A reexamination based on the equal variance test ☆

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ABSTRACT

The cointegration test cannot discriminate closer relationships from cointegrating relationships. In most applications, we must assess the degrees of cointegrating relationships, for example, to examine the comovement between international stock markets using the cointegration methodology. Lee et al. (2012) introduced a variance test of cointegration equilibrium errors to measure the similarity of these relationships. However, the key assumption of cross-sectional independence between a panel of two country-pair squared cointegrating equilibrium errors in their model is not desirable. The appearance of cross-sectional dependence of individual (stock) markets in a panel is a common existence. The current paper shows that the consideration of cross-sectional dependence and the method of estimating long-run variance are important. Our results, which extend the cross-sectional dependence of some Asian stock markets during the Asian financial crisis (1997–1998) documented by Lee et al. (2012), indicate that the similarity of background and business cooperation (or trading activities) are all crucial factors for determining the price patterns by the "equal variance test" proposed in this paper. The analysis of the 2007–2009 global financial crisis is included to confirm the robustness of the results.

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1. Introduction

Over the past two decades, researchers have paid increased attention to the comovement patterns among international stock markets. Early empirical studies investigated the comovement patterns among international stock markets based on a simple correlation analysis of returns or dynamic conditional correlation in the multivariate generalized autoregressive conditional heteroscedasticity (GARCH) framework.[1] However, focusing on stock returns and returns volatility rather than equity prices may yield unstable and often conflicting short-term empirical results (Kasa, 1992; Manning, 2002; Yang et al., 2006). Thus, the numerous studies that examine the comovement patterns among asset prices using either a bivariate or multivariate cointegration methodology can be used to complement the investigation of international stock markets (e.g., Kasa, 1992; Richards, 1995; Rangvid, 2001; Ghosh et al., 2005; Yang et al., 2006; Valadkhani and Chancharat, 2008; Lee et al., 2012).

Cointegration among stock markets can naturally result from the existence of a common feature among stock markets (Engle and Susmel, 1993). Based on this realization, a large number of authors have attempted to explain the factors underlying the comovement among stock markets. Most of the recent studies on this topic are devoted to determining the relative importance of both economic and geographical ties, but the cause of comovement remains enigmatic. Some studies tend to support the dominant importance of economic ties. For example, Johnson and Soenen (2002) showed that an increased export share by Asian economies to Japan and greater foreign direct investment from Japan to other Asian economies contributed to greater comovement. More recently, Didier et al. (2012) indicated that comovement in the stock market is driven largely by financial linkages. Fernández-Avilés et al. (2012) showed that stock market linkages are unrelated to geographical proximity. However, other authors have showed that both economic and geographical ties are important, or that geographical ties influence the pattern of stock prices. For example, Madaleno and Pinho (2012)reported results suggesting that geographically and economically closer markets exhibit a higher correlation and more short-run comovements. Lee et al. (2012) confirmed that geographic ties, not trading activities/business cooperation, would be reflected by most of the comovement patterns among stock markets.

An assessment of the relationships among international stock markets is crucial to exploring the comovement patterns or the factors underlying the comovement of capital markets in the cointegration framework. Lee et al. (2012) proposed a residual-based variance test to discriminate closer relationships from cointegrating relationships by comparing the variances of the cointegrating equilibrium errors from the statistics calculated from the ordinary least squares (OLS)-estimated squared cointegrating residuals. This test can be treated as an extension of the concept of cointegration.

Unlike analysis based on returns, such as correlation analysis, the degree of cointegration provides information on the long-term common trend. Alexander (1999) indicated that cointegration and correlation are related but are different concepts. A high correlation of returns does not necessarily imply a high cointegration in prices. Fig. 1 in Appendix B shows that the degree of cointegration can be measured by comparing the variances of cointegrating errors. Because the scale of the variables is a determining factor of the magnitude of the variances of cointegrating equilibrium errors, the variance tests should be used to compare the degrees of cointegrating relationships that contain a common dependent or independent variable. Nevertheless, in most applications, we must assess the degrees of cointegrating relationships between a panel of two pairs of countries which contains a common country, satisfying the requirement of including a common dependent or independent variable in the relationship. Therefore measuring the degree of cointegration by conducting the variance test can be a useful complement to the analysis of comovement patterns among international stock markets based on correlations of returns.

However, the variance test proposed by Lee et al. (2012) has some limitations. The appearance of cross-sectional dependence of individual time series in a panel is a common existence. According to Lee et al. (2012), the key assumption of cross-sectional independence between a panel of two country-pair squared cointegrating equilibrium errors is not desirable. Some common unobservable factors or omitted variables can lead to cross-sectionally dependent cointegrating equilibrium errors, especially for country-pair regressions, hence lead to cross-section dependence between squared cointegrating equilibrium

[1] Arshanapalli et al. (1995) summarized the limitations of the methodologies based on the stock returns. Furthermore, Li et al. (2012a) reviewed a wide range of related terms and methodologies used in the literature of interdependence in financial markets.