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# The linkage between the US and Korean stock markets: the case of NASDAQ, KOSDAQ, and the semiconductor stocks

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## Abstract

This paper examines the interrelationship between stock prices in the US and Korea by applying the vector autoregression (VAR) model to the daily stock prices at three different level of aggregation – the national aggregate index level, the high-tech industry level and the semiconductor firm level – for the period of July 1996 through February 2001. The major findings of this study are as follows. First, the US stock market plays a leading role over the Korean market at every level of aggregation. The reverse direction of influence, from Korea to the US, was found to be minimal. Second, the evidence also suggests that the speed of transmission of innovation from the US to Korea is swift and finished for the most part within a 24-h period, although it takes three or four days to complete the whole process. Third, the influence of the US stock prices on Korean stock prices, which is measured by the innovation transmission using the impulse–response function (IRF) analysis, seems to be somewhat stronger in the composite national stock price indices and the tech-laden indices than high-tech firms. Fourth, at the firm level, the influence of Micron Technology on the leading semiconductor manufacturers in Korea is shown to be strong and persistent by passing about 34 percent of its innovations to the Korean firms within the three-day period. The impact of IBM and Intel on the Korean chip makers seems to be relatively smaller. Finally, stock prices in Korea, national stock price indices and individual high-tech

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stocks alike, have become much more responsive to innovations in the US stock prices after the 1997 financial crisis. The implications of the main findings in this paper are also discussed.

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## 1. Introduction

As world financial markets have become more closely linked in recent years, national stock markets increasingly react to each other. Nearly simultaneous collapses of world stock markets in October 1987 and of Asian stock markets in late 1997 provide just a few conspicuous examples of the increasing interdependence and contagion in the global stock markets. Many researchers have examined the interrelationships and the information transmission patterns among stock prices across selected stock markets, and explored to search for their underlying reasons and driving forces.

Earlier research has explored dynamic interdependence, return and volatility transmission, and market integration among major world stock exchanges, applying vector autoregression (VAR) and autoregressive conditional heteroskedastic (ARCH) types of empirical models using high frequency data. Frontier studies include von Furstenberg and Jeon (1989), Eun and Shim (1989), Jeon and von Furstenberg (1990), Hamao et al. (1990), Campbell and Hamao (1992), and Karolyi and Stulz (1996), among others.<sup>1</sup> Several researchers have also attempted to find out the main reasons behind the increasing interdependence among major stock markets: deregulation (Taylor and Tonks, 1989; Jeon and Chiang, 1991), international business cycle (Kasa, 1992), regional affiliations and trade linkages (Bachman et al., 1996), and regional economic integration (Booth et al., 1997). von Furstenberg and Jeon (1989) investigated whether differences in industry composition can help account for unequal changes in national stock indices. Roll (1992) indeed found that a significant part of national stock market correlations can be explained by the industry structure.

Several studies have provided evidence of the impact of the world's leading markets on emerging markets or intra-regional contagion effects (see, e.g., Jeon et al., 1996; Knif and Pynnonen, 1999; Tay and Zhu, 2000; Maysami and Koh, 2000; Sheng and Tu, 2000; Masih and Masih, 1999, 2001). Relatively few studies have examined industry-based stock market interdependence in developing countries. However, fund managers and market analysts have been looking at company stocks in emerging economies through a sector lens, rather than assessing stocks country by country. This new trend in the global investment strategy was accelerated by increasing importance and high volatility of technology stocks in emerging markets recently. The increasing reliance on sector-based research has recently

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<sup>1</sup> Recent works which apply more advanced econometric techniques to the major world stock markets include Lee and Jeon (1995), Francis and Leachman (1998), Hamori and Imamura (2000), and Masih and Masih (2001).

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