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Global regional sources of risk in equity markets: Evidence from factor models with time-varying conditional skewness

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Abstract

We examine the influence of global and regional factors on the conditional distribution of stock returns from six Asian markets, using factor models in which unexpected returns comprise global, regional and local shocks. The models allow for conditional heteroskedasticity and time-varying conditional skewness, and are used to measure mean, variance, and skewness spillovers. We find that incorporating time-varying conditional skewness improves the fit of our spillover models, and can alter measurements of variance spillovers. However, time-varying conditional skewness is mostly a local phenomenon; with exceptions, there is little spillover in skewness from global and regional factors.

JEL classification: G15; C53

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1. Introduction

A thorough understanding of the sources of risk in equity markets is useful for important financial market activities such as risk management, asset allocation, and the development

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and implementation of regulatory frameworks. We contribute to this understanding by presenting new measurements of the relative importance of global, regional and local components of risk in equity markets. Our measurements are new in two ways: first, we re-estimate volatility spillover using a factor model that, unlike previous models used for this purpose, allows for time-varying conditional skewness. Second, we present additional evidence that distinguishes between downside and upside risks; specifically, we present measurements of spillover in skewness. The evidence we present is from six Asian equity markets, namely Hong Kong, Korea, Malaysia, Singapore, Taiwan and Thailand, using weekly data from the 1990s.

Research into interlinkages between stock markets has focused on co-movements in the mean and volatility of returns across stock markets, and has uncovered evidence of spillovers. Eun and Shim (1989), using a VAR model, find interdependence among the daily returns of leading stock markets of the world, with the US stock market being the most influential market. Kasa (1992) finds a common trend driving weekly and monthly returns from the US, Japanese, UK, German and Canadian markets. Hamao et al. (1990) study the interdependence of returns volatility across the US, UK and Japanese stock markets and find that volatility spills over mainly from the US market to the Japanese market, but not the other way around. Lin et al. (1994) find bi-directional dependency between the US and Japanese markets; daytime returns in one market are correlated with overnight returns in the next market to open. Koutmos and Booth (1995) study the US, UK and Japanese markets but differentiate between good and bad news and find, as did Booth et al. (1997) in a study of Scandinavian markets, that volatility spillovers are greater when news is bad, i.e., when the price movement in the latest market to trade prior to opening is a decline.

Evidence of co-movements in the mean and volatility of equity returns suggests that factor models, such as those developed in Bekaert and Harvey (1997) and Ng (2000), are useful ways of modeling the behavior of stock returns. Specifying unexpected return to depend on a world factor as well as an idiosyncratic shock, Bekaert and Harvey (1997) find evidence that emerging market volatility is affected by a world factor, and that the influence of the world factor varies considerably over time. Extending this approach to include both a world factor and a regional factor, Ng (2000) finds evidence of spillovers in volatility from the US and Japanese markets to the same six stock markets that we study, with the US market exerting a stronger influence, although the external shocks appear to explain only a small fraction of volatility in these markets. Both Bekaert and Harvey (1997) and Ng (2000) find that liberalization of equity markets changes the proportion of variance caused by external factors.

Past studies of mean and/or volatility spillovers have assumed the conditional distribution of stock returns to be symmetric about its conditional mean. Recent work, however, suggests that dynamics in the conditional third moment is an empirically relevant feature of stock returns. Using a model that allows for autoregressive third moments, Harvey and Siddique (1999) present evidence of skewness in the conditional distributions of daily stock index returns in the US, German, Japanese, Chilean, Mexican, Taiwanese and Thai markets, and that this asymmetry in the shape of the distribution depends on the degree of skewness in previous periods. Harvey and Siddique (2000) and Chen et al. (2001) are detailed studies into the determinants and economic significance of skewness in stock returns; stocks that are experiencing relatively high turnover and/or unusually high returns over previous periods tend to be more negatively skewed. Stock capitalization also appears to be important in explaining the degree of skewness in stock returns. Perez-Quiros and Timmermann (2001) relate time-varying skewness to business cycle variation. The skewness in stock returns is economically significant; Chen et al. (2001) demonstrate this by showing that the asymmetry they find in stock returns changes option prices