Risk spillovers and portfolio management between developed and BRICS stock markets

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Abstract

This paper investigates spillover effects and portfolio diversification between the four major developed stock markets (USA, Europe, Japan and Asia) and five of the most important emerging stock markets known as the BRICS (Brazil, Russia, India, China and South Africa). To this end, we apply the multivariate DECO-FIEGARCH model to daily spot indices during the period 1998–2016. The results reveal a significant and asymmetric long memory process for both the developed and the BRICS markets. Moreover, we find a significant variability in the time-varying conditional correlations between the considered markets during both bull and bear markets, particularly from early 2007 to summer 2008. Additionally, we analyze the optimal portfolio weights, time-varying hedge ratios and hedging effectiveness based on the estimates of the model. The results underline the importance of overweighting the optimal portfolios with stocks from the developed countries over those from the BRICS. Finally, we assess the practical implications for mixed developed-BRICS stock portfolios, based on finding strong evidence of diversification benefits and downside risk reductions that confirm the usefulness of using developed market stocks in the BRICS stock portfolio risk management.

1. Introduction

In early 1980s, the majority of emerging countries has experienced gradual financial liberalization, followed by a wave of financial and economic reforms (e.g., the introduction of electronic trading, the enforcement of insider trading laws, safety net mechanisms, connection between domestic stock exchanges, more regulatory transparencies, pension system reforms, etc.). Among these emerging economies, five countries stand out in terms of economic performance and promise. These include Brazil, Russia, India, China and South Africa (thereafter BRICS), which have been considered as the fastest growing markets in the world of emerging economies. Given their promising economic perspective relative to other emerging market economies and developed countries, the BRICS have attracted a great deal of attention from national and international investors, portfolio managers and policymakers (Hammoudeh, Sari, Uzunkaya, & Liu, 2013; Mensi, Hammoudeh, Kang, & Nguyen, 2016). According to Kearney (2012), the BRICS include four of the ten most important countries in the world as...
measured by their purchasing power parity (PPP)-adjusted nominal gross domestic products (GDP). China ranks No. (2), India (4), Russia (6) and Brazil (8). In the next forty years, the economies of the BRICS (without South Africa) could be larger than the combined economies of the U.S., Japan, and the four largest European economies of Germany, France, Italy, and the United Kingdom (G6) in US dollar terms (Cheng, Gutierrez, Mahajan, Shachmurove, & Shahrokhi, 2007).

On the other hand, the BRICS stock markets have consistently produced high average returns and evolving correlations with those of developed markets, a characteristic that is important for risk reduction which gives room for the creation of more internationally diversified portfolios. Additionally, their stock returns are relatively more predictable and volatile than those of the developed markets. Barry, Peavy, and Rodriguez (1998) indicate that some of emerging markets would become some of tomorrow’s developed markets, which applies to the BRICS markets now. Thus, these features show that the emerging markets have become an important asset class, and that their holdings in international and dedicated portfolios are of increasing importance since they present ample diversification opportunities for investors in the developed markets. Furthermore, financial liberalization and globalization have also made emerging markets more liquid, improved their market size and depth, and strengthened investor protection particularly the minority shareholders. Buchanan, English, and Gordon (2011) underscore the importance of including the emerging market asset class in developed markets’ portfolios because it enables investors to achieve a higher risk-adjusted performance.

Financial markets have been characterized by high volatility particularly during periods of structural breaks like the recent global financial crisis and the Eurozone debt crisis. These markets also exhibit asymmetric behavior in response to positive and negative shocks during bull and bearish markets, which leads to portfolio re-balances as a result of changing correlations (Mensi, Hammoudeh, Reboredo, & Nguyen, 2014; Zhang, Li, & Yu, 2013). Thus, understanding the volatility behavior of stock markets during major events and crises, particularly the time-varying conditional correlations between the most important emerging markets such as the BRICS and major developed stock markets, is a key challenge for international investors and policy makers in order to be able to make sound decisions.

This study considers the issue of spillover effects between the BRICS and four major developed stock markets (represented by the S&P500 index, Nikkei225 index, DJASIA index and Europe Stoxx600 index), while accommodating the effects of the properties of long memory, volatility power and volatility asymmetry, which have not been given proper considerations in previous studies. Thus, the main aim of this study is to examine the dynamic spillover effects between those five fast growing economies and the four major developed stock markets. We then provide the financial implications of the dynamic linkages for portfolio risk management through an analysis of time-varying hedging strategies for the portfolios and design financial strategies for reduction.

The paper makes at least four major contributions to the existing literature. First, it examines the dynamic linkages between the BRICS stock markets and the United States’ market, which is the largest developed stock market, and the DJASIA, Japanese and mature European markets, which is of great significance for having portfolio risk assessment and benefiting from portfolio diversification. Second, the study explicitly takes into account long memory and asymmetry simultaneously. It would be interesting to investigate the dynamic spillover effects, while accounting for long memory and asymmetry in the volatilities of these equity markets. Third, the study uses the empirical results to calculate the optimal weights and the dynamic hedge ratios of the developed-BRICS stock portfolios. Finally, we measure and analyze the downside risk/risk reductions.

As far as the empirical methodological framework is concerned, we use the dynamic equicorrelation-fractionally integrated exponential GARCH (DECO-FIEGARCH) model to investigate the time-varying conditional correlations between the daily spot indices of the developed and BRICS stock markets over the turbulent period from June 4, 1998 to April 28, 2016. One of the main advantages of this model is that it allows one to consider several of the most important stylized facts of stock return series including volatility persistence, long memory and asymmetry of the conditional variance processes indicated earlier. Our emphasis is on the repercussions of changes in those properties on the volatility links, which has implications for portfolio allocation and risk management. The DECO-FIEGARCH model also analyzes in depth the changes in the correlations during the stability/crisis periods. Interestingly, the FIEGARCH model of Bollerslev and Mikkelsen (1996) offers the flexibility to model the conditional volatility taking into account the long memory property, the predictability structure of return volatility and the volatility asymmetry. The choice of the fractionally integrated GARCH model is based on the descriptive and empirical research carried out in this paper. The descriptive statistics (particularly the presence of asymmetry in the return series and the ARCH effects), the long memory in volatility analysis and other diagnostic tests (i.e., information criteria) have directed us toward using the DECO-FIEGARCH model. We have also chosen the best GARCH (p, q) that fits the data series based on the AIC criterion. In carrying out those steps, we have followed the same procedures in the literature such as those followed for example by Boubaker and Raza (2016) and Sensoy and Tabak (2014) among others. It is worth noting that we estimate different GARCH models including the FIAPARCH and FIEGARCH models to capture more stylized facts in the time series. We also use the DECO-FIEGARCH approach to model volatility clustering (as in the ARCH and GARCH models), to capture the asymmetric response of volatility (as in the EGARCH model) and to take into account the characteristic of long memory in

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1 This characteristic also prevails during our 20 year-sample period.

2 Cappiello, Engle, and Sheppard (2006) developed the asymmetric generalized dynamic conditional correlation (AG-DCC) model to examine correlation dynamics between stock and bond returns with volatility asymmetry. In spite of this advantage, the AG-DCC model is unable to simultaneously incorporate long memory and asymmetry in conditional variances. This study considers the DECO-FIEGARCH model in capturing long memory and asymmetry in transmission of volatility between the equity markets.
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