# The transmission of market shocks and bilateral linkages: Evidence from emerging economies

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## ARTICLE INFO

## ABSTRACT

The linkage between emerging and developed economies spans beyond the usual trade in goods and services. Underlying trade is the flow of capital for foreign direct investment and for speculation in markets, which renders emerging economies vulnerable to shocks from the developed world. As such, equity return volatility in emerging markets is partly attributable to this dependence. To gauge the importance of bilateral economic and cultural factors in driving economic integration, we adopt a two-step process. First, we use Diebold and Yilmaz's spillover index methodology to extract spillover indices representative of the return volatility spillover effects of the United States, the developed portion of the Euro area, and Japan on financial markets in Asia, the Gulf Cooperation Council countries, Eastern and Central Europe, Africa, and Latin America. Second, we test whether these indices are governed by economic and cultural factors. Our results show that the spillover effects vary across markets and that a strong correlation exists with the volume of trade, security investment, common language, distance, and market capitalization.

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## 1. Introduction

Advances in technology of information, mainly the internet and, more recently, by-products such as YouTube, Facebook, and Twitter, have contributed a great deal to a more connected world. The Information Age has without a doubt complemented policy initiatives towards market liberalization over the last four decades, giving rise to the wave of the globalization of national capital markets. In general, the markets started to play an active role in this movement in the early 1980s with the advent of policies towards interest and exchange rate deregulation, as well as efforts towards reducing or removing barriers to foreign investments (Bekaert & Harvey, 1995, 2000). These efforts subsequently led to a spectacular development of international exchanges across countries, particularly in the developed world (Bekaert, Harvey, & Lumsdaine, 2002). As reported by the International

Finance Corporation in their 2008 annual report, net flows of private capital towards emerging markets reached USD$616 billion in 2007. In recent years emerging markets have accounted for about 50% of the world's economic growth. Along with the movement towards the globalization of domestic markets, worldwide economic areas have continued to develop their institutional aspects, as shown by the introductions of a number of regional economic agreements (European Union, ASEAN, (GCC), etc.). These regional trade agreements carry the seeds of greater openness, which could translate into more competitiveness at the world level when member countries jointly exert effort and synergy. Several emerging regions such as Central and Eastern Europe, Asia, and South America are also in keeping with these dynamics, both at the regional and the global scales. However, the relationship between global and regional integration is not consistent across different areas, nor is the speed of the financial integration process and procedures consistent over time. In some regions such as the GCC and Asia, international integration is ahead of the regional integration, whereas in areas such as Eastern and Central Europe and Latin America, it is the opposite that is observed. The benefits of globalization and financial integration, in particular, are well documented in the

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literature: higher potential for risk sharing, a more efficient allocation of capital, and brighter economic growth prospects for emerging markets. However, a number of unwanted side effects come along, including higher financial vulnerability in the event of an economic crisis, and trade disparities with developed countries (Levine & Zervos, 1998; Stiglitz, 2002). As the emerging markets mature and co-move with the world markets, they become more responsive to the volatility of equity markets elsewhere. This integration with world markets has the potential to constrain international portfolio diversification (Balli, Basher, & Rana, 2014b; Neaime, 2002). To what extent these may occur depends entirely on the level of financial integration. This is a void that a detailed assessment can fill for these markets. Such studies can shed light on fundamental perspectives such as the determinants and effects of current trends in financial integration on risk premia and cost of capital.

Research into cross-border linkages in emerging equity markets has been motivated by growth and increasing openness, as well as by the speed and severity with which past financial crises in these markets have spread to other countries. Over the last two decades or so, a variety of papers have provided a general understanding on the integration of emerging markets. Bekaert and Harvey (1995, 1997, 2000), Bekaert, Harvey, and Lundblad (2005) and Carrieri, Errunza, and Hogan (2007) studied the implication of increasing integration with global markets on local returns, volatility, and cross-country correlations, covering a wide range of emerging markets comprising Asia, Eastern and Central Europe, Latin America, and the Mediterranean area. Other studies of emerging stock markets, however, specifically looked at specific regions. Scheicher (2001), and Yang, Hsiao, Li, and Wang (2006), Balli and Balli (2011) and Balli, Balli, and Louis (2013b) studied the extent and effects of stock market integration in the Europe, both regionally and globally. Chen, Firth, and Meng Rui (2002), Abugri (2008), Susmel (2001), and Diamandis (2009) examined the evidence of regional linkages among Latin American equity markets. Neaime (2002, 2006, 2012) and Floros (2008), Balli, Basher, and Louis (2013a) extensively concentrated on the booming stock markets in the Middle East, while Ng (2000), Tay and Zhu (2000), Worthington and Higgs (2004), Caporale, Cipollini, and Spagnolo (2005); Caporale, Pittis, and Spagnolo (2006), Engle, Gallo, and Velucchi (2008), Yilmaz (2010) and Balli, Balli, and Luu (2014a) focussed on the dynamics of stock markets in emerging Asia.

However, little attention has been paid to the cross-regional dynamics of emerging markets' integration with the world economy, which, according to Bracker, Docking, and Koch (1999) can open a whole new strand of studies on how macroeconomic, social, and cultural factors affect these markets, particularly their bond and stock markets. Few studies thus far have attempted to gauge the extent of these countries' stock market integration that is attributable to macroeconomic factors. Chen and Zhang (1997) explained the links between stock market volatility and the intensity of bilateral trade. They correlated the emerging stock markets of South Korea, Taiwan, Thailand, Malaysia, Philippines, and Mexico with the developed markets of the United States (US), Canada, Japan, Hong Kong, Singapore, Australia, New Zealand, Austria, the United Kingdom, and some developed European countries. They showed that stock market interdependence is positively correlated with the magnitude of trade. In fact, trade explains 5–40% of the variation in the correlation, depending on the measure of correlation used. In a similar study, Bracker et al. (1999) used daily returns to construct a time series of the correlation matrix and found that the matrix had changed substantially over time. In fact, the degree of interdependence was positively correlated with market volatility and trend, but negatively correlated with exchange rate volatility, real interest rate differentials, the return on the world index, and the term structure differentials.

Although the literature has pointed to stock markets being interdependent and driven by economic factors (Bekaert & Harvey, 1997) one issue that remains unresolved is whether the factors that drive co-movement in more mature markets are also common to emerging markets. Contributions by Pretorius (2002) and, more recently, those of Lucey and Zhang (2010) attempt in this direction. In this vein, our paper complements the existing literature in conducting a two-step analysis. First, we quantify the spillovers from major countries/regions (US, the Euro area, and Japan) on emerging markets using the methodology proposed by Diebold and Yilmaz (2009) and extract a variety of shocks affecting emerging markets. Second, to capture the links between emerging and developed markets, we use a cross-sectional regression technique to test the relevance of macroeconomic factors, cultural affinities, and geographic distance in explaining the shocks. The results show that bilateral trade, security investments, a common language, and market capitalization are important determinants of shock spillovers to emerging markets. We also find evidence that geographical distance and, to a lesser extent, colonial ties matter. This, to our knowledge from our reading of the existing literature, is quite a novel finding.

## 2. Data and descriptive statistics

The data for this study come from a number of sources. The list of emerging markets (39 in total) is based on the 2012 International Monetary Fund (IMF) listing and the Financial Times Stock Exchange classification of markets. Of these markets, seven are classed as the largest emerging and developing economies by either nominal or inflation-adjusted gross domestic product. The sample of 39 markets was subsequently classified into five groups based on their geographic regions. This grouping enables us to distinguish among differential volatility effects that may emerge due to differences in locations and economic areas. Accordingly, our study focuses on Asia, the GCC, Eastern and Central Europe, Africa, and Latin America.

The dataset includes bilateral trade volumes between emerging markets and the developed economies of the US, Europe (the Euro area), and Japan, as well as weekly equity return data. In addition, we have gathered data on geographic distances as well as data on the equity investments and debt securities issued by emerging markets being held by investors in developed economies.

Quarterly bilateral trade data came from the IMF's Direction of Trade Statistics database and equity data in US dollars was taken from the Morgan Stanley Capital International database. Annual aggregate values of equity and debt security investments were also extracted from the IMF's Coordinated Portfolio Investment Survey database, and the geographic distance data were collected from the French Research Center in International Economics (CEPII). The data stretch over the period 1990–2013, which encompasses the recent financial crisis. Table 1 presents the descriptive statistics for the weekly equity returns. It shows that the mean values vary between −0.70% (Ukraine) and 0.24% (Mexico and Oman). The variation in returns as measured by the standard deviation ranges from 2.42% (Tunisia) to 7.54% (Venezuela). Higher degrees of volatility are observed for countries with less stable economic conditions in most cases. For these countries, stock prices are more vulnerable to unusual economic disturbances. The statistical distributions show that most of the returns are skewed to the left and all suffer from excess kurtosis, which is quite high in some cases. The last four columns of Tables 1 and 2 report the Ljung and Box (1978) Portmanteau Q and Q† (for the squared data) test statistics for first- and second-moment dependencies in the distribution of the emerging market returns. In many cases, the Q and Q† statistics are significant, suggesting that the equity returns are serially correlated and subject to strong second-moment dependencies. Table 2 also contains the summary statistics of bilateral trade, investments, and geographic distance between the markets on a cross-section basis.

For each of the 39 selected emerging markets, we compute their total trade (exports plus imports) with each developed market as a share of their overall trade with the rest of the world on a yearly basis. We follow a similar procedure for the equity and debt investment measures by looking at the relative importance of each emerging market in the investment portfolio of developed markets. We find that, on