Pacific-Basin Finance Journal 20 (2012) 247–270

Contents lists available at SciVerse ScienceDirect

Pacific-Basin Finance Journal

journal homepage: www.elsevier.com/locate/pacfin

Volatility spillovers between the Chinese and world equity markets

Xiangyi Zhou [a,*], Weijin Zhang [a], Jie Zhang [b]

[a] Jinhe Center for Economic Research, Xi'an Jiaotong University, PR China
[b] Department of Economics, Texas A&M University, United States

ARTICLE INFO

Article history:
Received 23 February 2011
Accepted 2 August 2011
Available online 16 September 2011

Keywords:
China
World equity markets
Vector autoregression
Variance decomposition
Spillover index
Financial crisis

JEL classification:
G15
F36

ABSTRACT

We propose measures of the directional volatility spillovers between the Chinese and world equity markets based on Diebold and Yilmaz's (2011b) forecast-error variance decompositions in a generalized vector autoregressive framework. It was found that the US market had dominant volatility impacts on other markets during the subprime mortgage crisis. The other markets were also very volatile, and driven by bad news, their massive volatilities were transmitted back to the US market. The volatility of the Chinese market has had a significantly positive impact on other markets since 2005. The volatility interactions among the markets of China, Hong Kong, and Taiwan were more prominent than those among the Chinese, Western, and other Asian markets were. The major correction of the Chinese stock market between February and July 2007 significantly contributed to the volatility surges of other markets. Owing to the restrictions on foreign investment, the Chinese stock market was not considerably affected in terms of market volatility during the subprime mortgage crisis.

1. Introduction

As globalization and financial liberalization are enabling international financial markets to become more correlated and connected than ever before, an understanding of the correlations and interactions among various financial markets is crucial for investors, financial institutions, and governments.

Early literature focused on the correlations among the financial markets of developed countries (see for example, Eun and Shim (1989), Hamao et al. (1990), King et al. (1994)). The cited papers show that

* Corresponding author at: Xi'an Jiaotong University, Jinhe Center for Economic Research, No. 28 Xian Ning West Road, Xi'an, Shaanxi Province, PR China.
E-mail addresses: martonzhou2003@yahoo.com.cn (X. Zhou), softmagic211@gmail.com (W. Zhang), seraphj15@econmail.tamu.edu (J. Zhang).

0927-538X/$ – see front matter
doi:10.1016/j.pacfin.2011.08.002

developed financial markets are interconnected and that the volatility of the US stock market is transmitted to other developed markets. In the last 20 years, with the development of emerging financial markets, financial economists have become increasingly interested in the relationship between emerging and developed markets and its meaning to financial liberalization and global integration. For example, Bekaert and Harvey (1995) estimated the degree of integration between major emerging markets and world equity markets from 1969 to 1992. Bekaert and Harvey (1997) found that capital market liberalization often leads to a higher correlation between local and international markets. Janakiramanan and Lamba (1998) and Ng (2000) found that before 1996, volatility in the US and Japanese equity markets spilled over significantly to the stock markets of the Pacific Basin, including Hong Kong, Korea, Malaysia, Singapore, Taiwan, and Thailand.

As a young startup, the Chinese stock market has developed at a fast pace. According to statistics from the Chinese Securities Regulatory Commission (CSRC), as of the end of May 2010, the total market value of the Shanghai and Shenzhen stock markets had reached 3.07 trillion USD, ranking third in the world behind the NYSE and the NASDAQ. With this type of growth, many scholars are paying more attention to the correlations between the Chinese and international markets. As one of the first papers on the Chinese stock market, Bailey (1994) found that although some world market indicators could enable the explanation of the characteristics of the Shanghai and Shenzhen markets, these two markets were not integrated with world equity markets in the early 1990s. Furthermore, Wang and Firth (2004) proposed that from 1994 to 2001, the direction of the return spillover was from developed markets such as the US, the UK, and Japan to markets in Greater China, such as mainland China, Hong Kong, and Taiwan. After the 1997 Asian financial crisis, the volatility spillover has been bidirectional between the Greater China markets and the developed markets. Wang and Di Iorio (2007) found little evidence that the Chinese A stock index was better correlated with the MSCI world index, indicating that the Chinese A stock market was isolated from world markets between 1994 and 2004. Lin et al. (2009) argued that from 1992 to 2006, the Chinese A stock market had no significant correlation with world equity markets, whereas the B stock market had some connection with Western markets and more correlation with Asian markets.

In the volatility spillover literature, the common econometric methodologies are the multivariate Generalized AutoRegressive Conditional Heteroskedasticity (GARCH), Regime Switching (RS) and Stochastic Volatility (SV) models. The multivariate GARCH model is most commonly used by researchers. Departing from the methods above, Diebold and Yilmaz (2009) provided new measures of return and volatility spillovers of international stock markets based on forecast-error variance decompositions in a vector autoregressive framework (DY 2009). Diebold and Yilmaz (2011a) discussed the return and volatility spillover among five American countries using this method. Yilmaz (2010) used the same method to evaluate the return and volatility spillover among major Asian countries. More importantly, Diebold and Yilmaz (2011b) further improved the DY 2009 method and used the upgraded model (DY 2011) to explore the spillover among major American financial assets including stocks, bonds, foreign exchanges, and commodities from 1999 to 2009, with particular attention to the volatility interaction during the subprime mortgage crisis.

Our paper differs from the previous literature in that we are the first to use the DY 2011 framework to shed light on the volatility spillover between the Chinese and world equity markets. The DY 2011 method that we used has several advantages over other models. First, this method does not depend on the Cholesky factor identification of VAR; therefore, the results of variance decomposition do not hinge on the sequence of the variables. Hence, the DY 2011 is superior to the DY 2009. Second, not only can the DY 2011 be used to gauge the magnitude of the volatility spillover, it can indicate the direction of the spillover as well. In other words, it may provide the value of the directional spillover between any two markets, between one market and any set of (regional) markets, or between one market and global (all) markets. Third, as Diebold and Yilmaz pointed out, the DY 2011 avoids the controversial issues associated with the definition and existence of episodes of contagion (see the debate in Forbes and Rigobon (2002)).

In addition to exploring the volatility correlation between the Chinese and any other market, as in the previous literature, our paper investigates both the magnitude and direction of the volatility spillover between China and the Greater China markets, between Chinese and the Asian markets, and between China and the global (all) market. This could provide a more vivid picture of the position and power of the Chinese stock market in the world arena. In addition, because we can easily define and measure the direction of the spillover by variance decomposition, we can measure the impact of the Chinese market on any