Study on the Shock-transmission Mechanism of Stock Price among China, Russia and India

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Volume 4 No 1 (2014) | ISSN 2158-8708 (online) | DOI 10.5195/emaj.2014.58 | http://emaj.pitt.edu |

Abstract

Researchers pay more and more attention on the price comovement-effect among international stock markets. This paper deals with the transmission mechanism of price shocks among three stock markets of China, Russia and India, with a sample of weekly returns. The results showed that the price fluctuation of each market has an influence on other markets, although the price behavior is significantly independent. The impact of external price innovations will last 5 or 6 weeks usually and disappear after about 8 weeks. The pattern of transmission-mechanism for the price shocks is very different from each other. Besides, a further study revealed that the influence of external shocks on the domestic stock price increased significantly among the three markets after the 2008 international financial crisis.

Keywords: Stock Markets; Price Shock; Transmission Effect

Volume 4 No 1 (2014) | ISSN **2158-8708** (online) | DOI 10.5195/emaj.2014.58 | http://emaj.pitt.edu

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1 Introduction

As three important emerging economies in the world, China, Russia and India are geographical proximity and closely interconnected in terms of political, economic, social, cultural, military, scientific and technological spheres. In fact, these countries have a huge impact on global and regional development and stability. In October 2003, a global economic report of the *Goldman Sachs* predicted that over the next 50 years the world economy will change dramatically and the six largest economies will be China, US, India, Japan, Brazil and Russia in 2050[1]. At present, China is the world's second largest economy, the largest exporter and second largest importer and one of the fastest-growing economies. Russia, which is vast in territory across the Asia and the Europe, abounds with minerals and energy resources and now it is the ninth largest economy according to the IMF's latest rankings of the world economy in 2013. India, as one of the fastest-growing economies in the world, is an international powerhouse in software industry and also a major exporter of financial, research and technical services. For a long time, China, Russia and India have built up a closely bilateral relationship each other. Especially, after the 2008 international financial crisis, the three countries further strengthened the economic and political cooperation under the BRICs-country mechanism. Meanwhile, they are also key countries attracting international investment and hot money in recent twenty years.

As we all know, the price comovement-effect among international stock markets has been a focus of researchers' attention in the finance (Berger and Pozzi, 2013). Along with the increasing growth of the bilateral economic and trading linkage, the financial relationship among China, Russia and India is continuously strengthened. This study intends to explore the shock-transmission mechanism of stock price among China, Russia and India, which has an obvious practical importance. The remainder of this paper is organized as follows: section 2 is a review of the related theory and literatures, section 3 discusses the methodology, section 4 reports the empirical study and section 5 concludes the paper shortly.

2 Theory and Literature Review

Generally, the price comovement-effect in stock markets could be thought as a chain reaction, that is, the returns of different markets, different sector-stock portfolios or different stocks in one market exhibit a significant correlation, and form a long-term equilibrium or a synchronous moving trend (Chen, 2010). Under the background of economic globalization, researchers pay more and more attention on the comovement-effect of stock price across countries or areas. For example, Premaratneb and Balaa (2004) showed that the comovement-effect among stock markets of America, Britain, Japan, Hong Kong and Singapore is statistically significant at different levels, and there is a significant transmission phenomenon from the stock markets of small economies to those of America, Britain and other major economies. Contessi et al. (2004) found that the introduction of the euro and the convergence of European countries' economic structure made the comovement-effect among European stock markets significantly increased in recent years. Berger and Pozzi (2013) measured the comovement effect and time-varying integration in financial markets with the unobserved components approach.

In literatures, the existing studies on the comovement-effect of securities usually followed three levels: the equalization of asset price, the economic theory for stock price comovement and the transmission

[1] Goldman Sachs, 2003, Dreaming with BRICs: The Path to 2050. Goldman Sachs Global Economics Paper, No. 99, October.

mechanism of international stock contagion during the financial crisis (Grieb and Reyes, 2002). Asset price equalization theory explores the market comovement from the perspective of asset pricing, which studies the diversity and convergence of asset price or returns based on the risk of asset and focuses on the degree of price comovement. The study on economic theory for stock price comovement extends the research on the equalization theory of asset price from financial field to much wider fields including trade, investment, securities market characteristics, geographic and cultural perspectives, to explore the intrinsic driving force behind the comovement phenomenon of stock price. The third level deepens this line of studies on time dimension and focuses on the crisis period to explore the special mechanism and characteristics of comovement effect among different markets during the crisis period.

There are two representative views to explain the comovement-effect of stock markets: fundamental-based comovement and behavior-induced comovement (Qixia Yang, 2007; Tam and Pui, 2012). On the basis of the classic efficient market hypothesis (EMH), the fundamental-based comovement view considers that the return comovement of securities is resulted from the fluctuation of fundamental factors, which is also called the economic fundamental hypothesis. As far as stock markets are concerned, the fundamentals are the correlation emerging from cash flow or discount rate (Tam and Pui, 2012). The correlation of changes in expected cash flow is usually resulted from the following aspects: changes of economic policies or homogeneous impact of important events on expected return or profitability of some securities. The correlation of changes in discount rate usually derives from changes of interest rate or related discounting methods. The theory of fundamental-based comovement has a strong linkage to economic structure, which could explain the comovement phenomenon among the closely related economies and industries, as well as the comovement phenomenon in the same industry sector. For example, Bekaert and Harvey (1997) and Chinn and Forbes (2004) found that international trade is an important factor accounting for the linkage among emerging markets. In fact, Gerrits and Yuce (1999) has pointed out that along with the rapid development of global trade and the increase of regional cooperation among countries, the less barriers to the flows of commodity, service, financial asset and human-resource made the stock price comovement-effect stronger.

The behavior-induced comovement is also called a trading-induced comovement coming from the market contagion, which points out that specific behavior of investors will form certain transaction mode, leading to changes of demand on the securities and further resulting in the comovement-effect of return rate in stock markets (Berger and Pozzi, 2013). For example, Connolly and Wang（2002）found that investors could extract unobservable global information from the stock returns and then adjust their investment strategies, which finally led to a correlation among the return rates in different stock markets. Inconsistent with the fundamental-based comovement theory, Zhigao Yi and Ning Mao (2008) argued that the herd behavior is a most typical irrational behavior which constructed a key behavior factor resulting in the price comovement-effect. In the behavior finance, investors are usually classified into two specific kinds: category investors and scope investors. The investment strategies for the two kinds are different, however, both behavior of them maybe lead to the price comovement. The theory of category investment suggests that investors will divide assets into different categories when choosing investment portfolio, since assets always have different characteristics. Then they decide how to allocate capital while the price comovement occurs if the investors redistribute their assets among different categories (Barberis and Shleifer, 2003; Berger and Pozzi, 2013). The theory of scope investment argues that investors have to choose only a small part of assets to invest due to trading cost, space constrains or absence of information. If the investors try to adjust the direction of investment due to changes of market mood or the degree of risk aversion, the price

comovement effect will be induced (Lee, Shleifer and Thaler, 1991).

Some studies have investigated the stock price comovement-effect between China and other countries. Han Fei and Xiao Hui (2005) found that the correlation between China and US stock markets is weak during 2000-2004. Ligao Chen et al. (2006) showed that the US stock market is much more independent compared with the Japanese and Asian emerging stock markets and the Japanese stock market is highly correlated with Asian emerging markets, while the Chinese stock market exhibits strong exogeneity. Jian Hu and Pengbo Lv (2008) argued that there is no long-term stable equilibrium between Shanghai and Hong Kong stock markets and failed to find any common factor. However, according to Xicun Youzuo (2009), there is a unidirectional volatility spillover effect from the Chinese stock market to the US stock market, and the US stock market has started to affect the Chinese stock market. Bing Zhang et al. (2010) argued that there is no long-term equilibrium between the Chinese and US stock markets and both markets show relative independence, while an increasing spillover effect from the US market to the Chinese market is found. Specially, Xiaoguang Li and Yangui Zhang (2008) revealed that after the US subprime crisis, the comovement effect between the Chinese and international key stock markets strengthened gradually, especially the linkage of the Chinese stock markets with UK and Hong Kong are continually increasing. Chuilin Yi and Cuiyu Zhang (2010) investigated the relation between the Chinese stock market with six main markets of Asia, and suggested that the Chinese stock market is significantly influenced by other markets before the 2008 financial crisis while the impact of the Chinese stock market on other markets becomes stronger after the crisis. Recently, Oztek and Ocal (2012) explored the integration of China stock markets with international stock markets using the approach of smooth transition conditional correlation.

Generally speaking, the related studies about the price comovement in stock markets usually have two characteristics. The one is that most of the existing literatures focused on the comovement effect between the Chinese stock market and the stock markets of developed countries, while they paid less attention on the comovement effect between the Chinese stock market and those of other emerging economies. The other is that current studies usually tested whether there is a comovement effect in the stock markets among different countries or regions, while they paid little attention on the transmission mechanism of stock price shock.

3 Methodology

This study employs the approaches of impulse response function and variance decomposition to investigate the price shock transmission-mechanism among the stock markets of China, Russia and India with samples of weekly returns. In a VAR model, the shock on the i^{th} variable will not only directly affect the i^{th} variable, but also affect other endogenous variables through the dynamic structure of VAR model. The VAR(p) can be written as follows:

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + \varepsilon_t \qquad (1)$$

Where y_t represents a *k*-dimension endogenous vector and ε_t is a multivariate sequence of stochastic error with mean-zero and nonsingular-covariance matrix Ω. The VMA(∞) model of y_t can be represented as:

$$y_t = (\psi_0 + \psi_1 L + \psi_2 L^2 + \cdots)\varepsilon_t \qquad (2)$$

Since VAR(p) model is invertible, the coefficients of VAR model could be used to compute the coefficients of VMA model. Setting $\psi_q = (\psi_{q,ij})$, q=1,2,…, then the i^{th} variable in *y* could be written as follows

$$y_{it} = \sum_{j=1}^{k} (\psi_{0,ij}\varepsilon_{jt} + \psi_{1,ij}\varepsilon_{jt-1} + \psi_{2,ij}\varepsilon_{jt-2} + \psi_{3,ij}\varepsilon_{jt-3} + \cdots) \qquad (3)$$

According to equation (3), the impulse response function depicts the impact of a one-off shock to stochastic error on the current and future values of endogenous variables. Generally, the response function of y_i resulting from the shock to y_j can be presented as follows

$$\psi_{0,ij}, \psi_{1,ij}, \psi_{2,ij}, \psi_{3,ij}, \cdots$$

Using the approach of variance decomposition, changes in endogenous variables could be decomposed to shocks on the components of VAR system. Therefore, the variance decomposition shows the relative importance of stochastic error influencing variables in VAR and reveals the order of importance of stochastic error affecting variables in VAR. In equation (3), the items in parentheses are the sum of all impacts of ε_j on y_i. The variance of y_{it} is calculated as follows:

$$\mathrm{var}(y_{it}) = \sum_{j=1}^{k} \left\{ \sum_{q=0}^{\infty} (\psi_{q,ij})^2 \sigma_{jj} \right\} \qquad (4)$$

The variance of y_{it} could be decomposed to k unrelated effects, an index (called relative variance contribution, *RVC*) is defined to analyze the contributions of error terms to the variance of y_{it}, which is calculated as follows:

$$RVC_{j \to i}(s) = \frac{\sum_{q=0}^{s-1} (\psi_{q,ij})^2 \sigma_{jj}}{\sum_{j=1}^{k} \left\{ \sum_{q=0}^{s-1} (\psi_{q,ij})^2 \sigma_{jj} \right\}}$$

i,j=1,2,…,k (5)

Following the equation (5), the greater $RVC_{j \to i}(s)$ is, the larger the impact of j^{th} variable on i^{th} variable is; while the smaller $RVC_{j \to i}(s)$ is, the weaker the impact of j^{th} variable on i^{th} variable is.

4 Empirical Study

4.1 Data

This paper investigates the transmission effect of stock price shock with a sample of weekly closing price indices ranging from January 1998 to December 2012, including the Shanghai composite index of China, the RTS index of Russia and the SENSEX30 index of India. The data are collected from Bloomberg system and the weekly returns of stock r_t are computed as follows:

$$r_t = \ln(I_t) - \ln(I_{t-1}) \qquad (6)$$

Where I_t denotes the closing stock price index at period *t*. Totally, 746 observations are obtained after eliminating the unmatched trading data. The descriptive statistics of samples are shown in Table 1. The mean of weekly return rate of the Shanghai composite index is 0.0008 and that of the RTS index is 0.0035, while that of the SENSEX30 index is 0.0019. The skewness coefficients for Chinese and Russian stock markets are positive, while that for Indian stock market is negative. The kurtosis coefficients are all larger than 3 for the three markets. The Jareque-Bera statistics are relative high and the corresponding p-values are almost 0, which shows that the return series are not subject to normal distribution. Moreover, the results of ADF test, DF-GLS test and Phillips-Perron test all show that the return series are stationary.

Table 1 A Summary Statistics of the Return Series

Variable	SH	RU	IN
Mean	0.0008	0.0035	0.0019
Median	0.0003	0.0072	0.0052
Maximum	0.1394	0.4008	0.1317
Minimum	-0.1489	-0.2976	-0.1738
S.D.	0.0345	0.0641	0.0362
Skewness	0.1168	0.2255	-0.4017
Kurtosis	4.7521	9.8597	5.0441
Jarque-Bera	97.1153	1468.9680	149.9412
P-value	0.0000	0.0000	0.0000
Observation	746	746	746

Note: SH represents the weekly return of Shanghai composite index, RU represents the weekly return of RTS index and IN represents the weekly return of SENSEX30 index.

4.2 Empirical Study

4.2.1 Basic Analysis

The correlation analysis showed that the correlation coefficient of SH and RU is 0.0947; the correlation coefficient of SH and IN is 0.1488; the correlation coefficient of RU and IN is 0.1488. Therefore, the sample series of weekly returns exhibits weakly positive correlation during the sample period.

Granger causality test could check the direction of causality between any two variables and the results could be used to judge the mutual prediction power. The lag length is determined by the Akaike information criterion and Schwarz information criterion. As shown in Table 2, the results suggest that RU does Granger cause SH, while there is no statistically causality between SH and IN, and there is a bilateral causality between RU and IN at 5% level.

Table 2 Results for Granger causality tests

Pairwise Granger causality tests			Sample:1 746; Number of lag:12		
The Null hypothesis H_0	Direction of causality	Obs.	F-value	P-value	Decision
RU doesn't Granger cause SH	$RU \xrightarrow{G.C.} SH$	734	1.5559	0.0997***	Reject
SH doesn't Granger cause RU	$SH \xrightarrow{G.C.} RU$		1.0071	0.4402	Do not reject
IN doesn't Granger cause SH	$IN \xrightarrow{G.C.} SH$	734	1.1702	0.3005	Do not reject
SH doesn't Granger cause IN	$SH \xrightarrow{G.C.} IN$		0.5295	0.8962	Do not reject
IN doesn't Granger cause RU	$IN \xrightarrow{G.C.} RU$	734	1.9725	0.0242**	Reject
RU doesn't Granger cause IN	$RU \xrightarrow{G.C.} IN$		1.9451	0.0267**	Reject

Note: * represents statistical significance at 1% level; ** represents statistical significance at 5% level; *** represents statistical significance at 10% level.

4.2.2 Impulse Response Function Analysis

According to the impulse response function, when exerted one unit standard deviation shock to a variable in VAR at period 1, all variables in the VAR system will respond in subsequent periods. Figure 1 reports the accumulated response in the first 12 weeks, and the results have following features:

First, the accumulated response of variables in the VAR system changes obviously in the first 5 weeks, when a variable is exerted one unit standard deviation shock. This time pattern suggests that the accumulated response values usually approximate steady in the 6^{th} or 7^{th} week and almost there is no changes after the 8^{th} week, and the impact of new innovations lasts for about 5 or 6 weeks and it will die out after the 8^{th} week. Therefore, the impact of price shock among China, Russian and India usually lasts for about 5-6 weeks observing from the reaction time perspective.

Second, the reaction mode (including direction and magnitude) of sample variables in the VAR system is obviously different from each other. Generally, the accumulated response deriving from the shock of itself is the intensest and the direction is positive; the accumulated response to external markets is much more tepid. Besides, the direction and magnitude of reaction for three markets to the price shock are also different significantly.

Third, the final convergence levels for the response to price shock are obviously different from each other. The accumulated response of Shanghai stock market is positive and converges to the level of about 0.0415, 0.0066 and 0.0052, respectively for the price shock coming from China, Russia and India. Meanwhile, the accumulated response of Russian stock market converges to the level of about 0.0055, 0.0710 and -0.0054, respectively for the price shock coming from China, Russia and India. Besides, the accumulated response of Indian stock market converges to the level of around 0.0075 and 0.0354, respectively for the price shock coming from Russia and India, while the reaction of Indian market converges to the level near 0 for the shock from China. From above, the Russian and Indian

stock markets have an almost similar influence on the Shanghai stock market; the impact of the Chinese stock market on the Russian stock market is significantly different from that of the Indian stock market on the Russian stock market, along with an opposite response direction; the Chinese stock market almost has no impact on the Indian stock market, while the Russian market has a certain influence on the Indian market.

Finally, the transmission-mechanism of variables in VAR system is different from each other and is obviously irregular. 1) The Shanghai stock market makes a positive response from the 2th to 4th week to a shock from the Russian stock market, and a negative response in the 5th week and a positive response in the 6th and 7th week, while the response isn't significant after the 7th week. The Shanghai stock market makes a positive response in the 2th, 3th, 5th, 6th and 7th week to a shock from India except for a negative response in the 4th week. 2) The Russia stock market makes a positive response in the 2th, 3th, 5th and 6th week to a shock from the Shanghai stock market, and a negative response in the 4th, 7th week while the response decreases rapidly after the 7th week. Meanwhile, the Russia stock market makes a positive response in the first two weeks to a shock from the Indian stock market, and a negative response from the 4th to 7th week and the response almost could be ignored after the 7th week. 3) The Indian stock market makes a positive response to a shock from the Russian stock market during the 2th to 4th week, and a negative response from the 5th to 6th week, while the response turns to positive and converges rapidly after the 7th week. At the same time, the Indian stock market makes a negative response in the 2th, 4th, 7th, 10th week to a shock from the Shanghai stock market, and a positive response at the rest periods, while the magnitude of response is relative small at all periods.

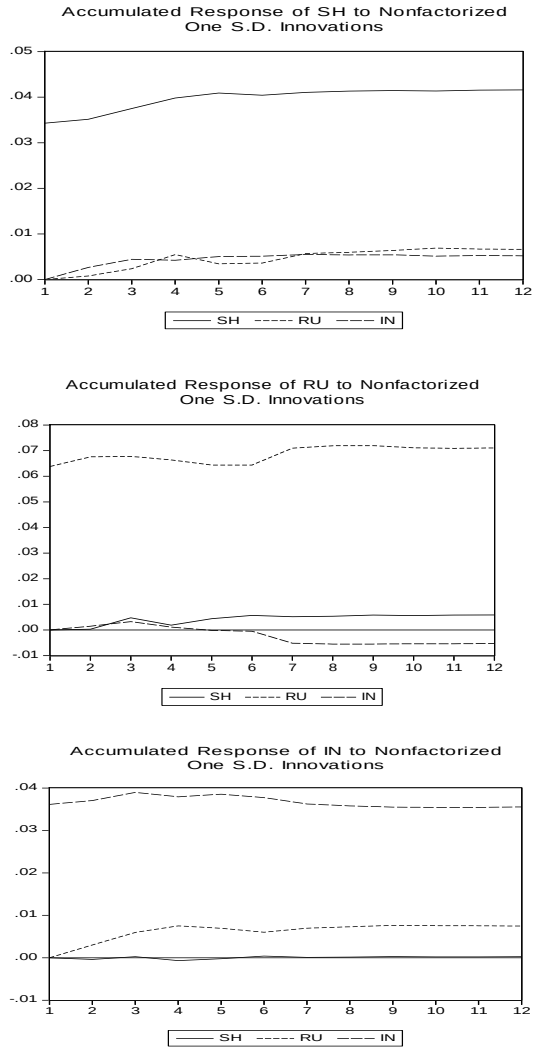

Figure 1 Accumulated Impulse Response of Sample Series

4.2.3 Variance Decomposition Analysis

The variance decomposition could obtain the relative importance of stochastic error influencing the variables in VAR system, which supports to assess the importance of different factors in the transmission mechanism of price shocks. Table 3 showed the main results of the variance decomposition in the first 12 weeks.

First, each variable accounts for the largest share of forecasting error by itself in the VAR system. According to the requirement of algorithm, the forecasting error all comes from its own innovation of the variable at the first step, that is, each variable itself accounts for all of the

variance at this step. In subsequent periods, the forecasting error will be affected by all variables in the VAR system. However, the variable itself always accounts for almost more than 97% of the variance. This suggests that there is only a very small mutual influence among the three stock markets and the price fluctuation primarily depends on the domestic factors, which means that the price behavior exhibits significant independence.

Second, according to Table 3, the results of variance decomposition are relatively stable after the 7th or 8th week and usually converge to a certain level. This is very similar to the conclusion obtained from the impulse response analysis. Undoubtedly, the impact of new shocks to stock price usually lasts for about 6 weeks and dies out after the 8th week.

Third, the contribution shares of other variables to the variance of each variable continue to increase during all forecasting periods. However, a change of the shares for non-self variables is so small and keeps relatively stable in all periods. What's more, the RVC results are not sensitive to the forecasting periods.

Finally, the RVC values for non-self variables reach peaks in the 12th week. The maximum contribution shares of RU and IN in the variance of SH account for 2.0342% and 0.7809% respectively, and the maximum contribution shares of SH and IN in the variance of RU account for 0.8608% and 0.7878% respectively. Then, the maximum contribution shares of RU and SH in the variance of IN account for 1.4603% and 0.1540% respectively. Therefore, all three variables in the VAR system reveal a different transmission mechanism to the price shock exerted by other markets and have a different importance. Relatively speaking, the Russian stock market has a significant influence on the Chinese and Indian stock markets, and the influence of the Chinese stock market on the Russian stock market is stronger than that on the Indian stock market.

Table 3 Variance Decomposition of Sample Series

Variable	Time	Standard Error（S.E.）	SH	RU	IN
SH	1	0.0342	100.0000	0.0000	0.0000
	2	0.0344	99.2566	0.2365	0.5068
	3	0.0346	98.6295	0.6414	0.7291
	4	0.0348	97.9082	1.3687	0.7231
	5	0.0349	97.6234	1.6096	0.7669
	6	0.0349	97.6200	1.6127	0.7672
	7	0.0350	97.2279	1.9989	0.7732
	8	0.0350	97.2232	2.0033	0.7736
	9	0.0350	97.2094	2.0171	0.7735
	10	0.0350	97.1892	2.0311	0.7797
	11	0.0350	97.1856	2.0337	0.7808
	12	0.0350	97.1849	2.0342	0.7809
Cholesky Ordering:		SE	SH	RU	IN
RU	1	0.0342	0.0000	100.0000	0.0000
	2	0.0344	0.0018	99.9522	0.0461
	3	0.0346	0.4773	99.3570	0.1657
	4	0.0348	0.6692	99.0327	0.2981
	5	0.0349	0.8163	98.8668	0.3169
	6	0.0349	0.8559	98.8267	0.3174
	7	0.0350	0.8530	98.3611	0.7859
	8	0.0350	0.8534	98.3590	0.7876
	9	0.0350	0.8584	98.3540	0.7875
	10	0.0350	0.8596	98.3528	0.7877
	11	0.0350	0.8607	98.3516	0.7877
	12	0.0350	0.8608	98.3514	0.7878
Cholesky Ordering:		SE	RU	IN	SH
IN	1	0.0342	0.0000	0.0000	100.0000
	2	0.0344	0.0114	0.5976	99.3911
	3	0.0346	0.0425	1.1719	98.7856
	4	0.0348	0.1041	1.3172	98.5786
	5	0.0349	0.1188	1.3377	98.5435
	6	0.0349	0.1460	1.3884	98.4657
	7	0.0350	0.1525	1.4450	98.4025
	8	0.0350	0.1527	1.4516	98.3957
	9	0.0350	0.1537	1.4595	98.3868
	10	0.0350	0.1540	1.4598	98.3862
	11	0.0350	0.1540	1.4599	98.3862
	12	0.0350	0.1540	1.4603	98.3857
Cholesky Ordering:		SE	IN	RU	SH

4.2.4 Robustness Test

The 2008 international financial crisis brought a huge and deep influence on the global financial markets. Considering the robustness, this study divided the full sample into two sub-samples by the crisis and analyzed the two periods respectively. The sub-sample 1 (January

1998-December 2007) includes 494 observations and sub-sample 2 (January 2008- December 2012) includes 252 observations. The results suggested during the period of sub-sample 2, the external price shock has a more obvious impact on the domestic stock price. Moreover, the sensitivity and response magnitude increase significantly too. Specifically, the main conclusions of the robust test are as follows:

First, the correlation among three stock markets increased significantly at the later stage. The correlation coefficients between China and Russia, China and India, Russia and India are 0.0598, 0.0965 and 0.2439 for the sub-sample 1 respectively, while those are 0.1495, 0.2196 and 0.6150 for the sub-sample 2 respectively.

Second, the Granger causality tests showed that IN granger causes RU and there is no any other causality for the sample series at the previous stage. Meanwhile, at the second stage, SH does exist the Granger causality to RU and IN, and a bilateral causality between RU and IN is found.

Third, the results of impulse response analysis are obtained the following findings: 1) For the sub-sample 1, the response of the three markets to new shock usually lasted for about 5 or 6 weeks, followed by a rapid convergence and stable trend. However, for the sub-sample 2, there is no evidence for a convergence and the impact of external stock markets on the domestic market shows a significant instability. This may prove that the 2008 international financial crisis has a huge effect on international financial markets to some extent. 2) For the sub-sample 2, the magnitude of response is much larger than that for the sub-sample 1. 3) The Shanghai stock market made a positive response to the price shocks coming from the Russian and Indian stock markets for both sub-samples. The accumulated effect of the Russian stock market to the price shock from China and India began positively, and turn negative gradually before coming to stability for the sub-sample 1. However, for the sub-sample 2, the accumulated response of the Russian stock market to the price shock from China is still positive, but that effect of the shock from India is positive at first and then turns negative. Finally, the accumulated response of the Indian stock market to the shock from China always kept negative for the sub-sample 1 while it kept positive for the sub-sample 2. The accumulated response of the Indian market to the price shock from Russia kept positive at both stages, while the scale of this effect is much larger at the second stage.

Forth, the results of variance decomposition for the subsamples are very similar to those of the full sample, that is, the own RVC of each market in variance deposition is the largest, and the share of external markets to the variance reach peaks in the 12th week, too. For the sub-sample 1, the maximum share of RU and IN in the variance of SH are 2.3299% and 0.7335% respectively, those of SH and IN in the variance of RU are 1.0526% and 1.2389% respectively and those of SH and RU in the variance of IN are 0.4846% and 2.6953% respectively. For the sub-sample 2, the maximum shares of RU and IN in the variance of SH are 4.7059% and 3.4877% respectively, those of SH and IN in the variance of RU are 5.1878% and 3.0448% respectively and those of SH and RU in the variance of IN are 1.1675% and 2.8793% respectively. From above, the shares of external markets in the variance of each market at the second stage are much larger than those at the first stage, and the shares of Chinese factor in the variance of Russian and Indian stock returns increased largely at the second stage. This proved that the power of external markets in forecasting the price of domestic stock market rose after the 2008 international financial crisis, especially the influence of Chinese stock market on the Russian and Indian stock markets increased significantly which is the same with the conclusions of Guangxiao Li and Yangui Zhang (2008), Chuilin Yi and Cuiyu Zhang (2010).

5 Conclusion

Nowadays, financial researchers pay more and more attention to the price comovement-effect among international stock markets. This paper investigated the

shock-transmission mechanism among three emerging stock markets of China, Russia and India, with a sample of weekly closing price including Shanghai composite index, Russia RTS index and India SENSEX30 index ranging from January 1998 to December 2012.

The results showed that the price fluctuation has an important influence on external markets, although the price behavior of each market primarily depends on the domestic factors. Obviously, the independence of price is significantly stronger than its comovement-effect. Usually, the impact of external price innovations will last for about 5 or 6 weeks and then die out after the 8th week in these three markets. The transmission mechanism of price shocks is very different from each other. Relatively, the Russian stock market has a significant influence on other two stock markets, and the impact of the Chinese stock market on the Russian stock market is stronger than that on the Indian stock market. A further study suggested that the impact of external price shock to the domestic stock price significantly increased after the 2008 international financial crisis, as well as the sensitivity and response amplitude increased too. Especially, the price shock from the Chinese stock market has shown a fast growing impact on foreign stock markets.

ACKNOWLEDGEMENT

This study is supported by Project of National Social Science Fund of China (14ZDA047, 13AZD086), Program for New Century Excellent Talents in University (NECT-11-0029), Research Project of National Statistical Science (2012LZ042), Humanities and Social Science Project of the Ministry of Education (13YJA630005) and the Fundamental Research Funds for the Central Universities (2012WZD02).

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