

Spillover Effect of Chinese Cross-Listed Companies across Shanghai, Hong Kong and US Markets

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Abstract

This paper assesses the spillover effect of returns of ten Chinese cross-listed equities which are traded in Shanghai, Hong Kong and US markets simultaneously. We find a strong unidirectional spillover effect from US market to Shanghai market, however, a significant two-way influence exists between Hong Kong and US markets. When we use VAR modeling to exam the same-day effect, we find evidence that the effect of same-day return occurs from the Shanghai to Hong Kong market and from the Hong Kong to US market; however, there is no such effect from the Shanghai to US market.

Keywords: Spillover effect, Return, Cross-listed, Chinese equities, A shares, H shares, ADRs

JEL classification: F3; G11; G15

1. Introduction

Morana and Beltratti(2008) point out that financial markets integration could have eroded much of the gains from international diversification by making markets co-move more closely and enhancing spillovers. However, the spillover effects in international markets pose a challenge to investors who expect to reduce unsystematic risk from international diversified portfolios. The increasing number of cross-listed companies (one company is listed on two or more markets) may speed international integration; the number of cross-listed companies has grown significantly since the early 1990s. Bennett and Keller (1988) believe that the listing of stocks at multiple stock exchanges globally had added to integration of markets, with more and more studies now focussing on the spillover effects of cross-listed equities.

The purpose of this paper is to examine the return spillover effect of cross-listed Chinese equities which are cross-listed in the Shanghai, Hong Kong and US markets. When the Chinese economy grows rapidly, some Chinese companies need more capital to support their fast growth from domestic and foreign markets. When those Chinese firms are listed on different markets, some speculative investors wish to get arbitrage benefits from asynchronous price movements.

This research analyses all ten Chinese firms which are cross-listed on the Shanghai (A share), Hong Kong (H share) and the American Depository Receipts (ADRs) simultaneously. These days, the news and information transmits from one country to another within a short time horizon. It has become necessary to study the same-day effect on spillover effects among markets. The early opened market may have a strong influence for forthcoming opening markets. We examine the same-day price spillover of Chinese cross-listed equities with Vector Autoregressive (VAR) models developed by Singh, Kumar and Pandey (2009).

This paper is organized as follows: section 2 presents a literature review and a brief review of the Chinese

cross-listed equities. Section 4 provides details of the employed methodology; and section 5 explains the empirical results and the final section concludes the whole research.

2. Literature review

The dramatically increasing numbers of cross-listed companies on international markets have made it necessary to consider where information is impounded into prices (Eun and Sabherwal, 2003). When Alaganar and Bhar (2002) studied Australian-American dual-listed stocks, they found unidirectional information flow from the US to Australian market. Eun and Sabherwal (2003) find that the prices are co-integrated and mutually adjusting between home and host markets for 62 cross-listed Canadian firms on the U.S. exchanges. Jaiswal-Dale and Jithendranathan (2009) analyzed daily price and volume data of 264 stocks from 26 countries that are traded in their home country and cross-listed outside their home market as depository receipts (DR), they found DR returns and volatilities are affected by the shocks in the markets where they are cross-listed controlling for domestic shocks. Contemporaneous and/or lagged shocks to the cross-listed markets are transmitted to domestic stock returns.

Hansda and Ray (2003) investigated ten Indian companies with floated ADRs, and found a strong correlation between the prices of the dually listed stocks, with the same bidirectional relation between domestic market and NASDAQ /New York Stock Exchange.

Some Chinese firms have been aggressive in seeking capital via foreign listings due to its rapid economic growth as well. Xu and Fung (2002) examine patterns of information flows for China-background stocks cross-listed on exchanges in Hong Kong and New York, and indicate significant mutual feedback of information between the two markets in terms of pricing and volatility. Stocks listed on the Hong Kong market appear to play a more significant role of information transmission in the pricing process, whereas stocks listed on the NYSE play a considerable role in volatility spillover. Kutun and Zhou (2006) believe that the Hong Kong market has the most significant impact on mean returns of the ADRs. After studying the stocks cross-listed on the New York Stock Exchange (NYSE) and the Stock Exchange of Hong Kong (SEHK), Su and Chong (2007) point out that the stock prices in these two exchanges are co-integrated and mutually adjusting.

3. Research data

Chinese equity markets have grown rapidly since the early 1990s when the Shanghai Stock Exchange and the Shenzhen Exchange were established. By the end of 2009, there were 1718 firms are listed on domestic A-share listing market. (Note 1) Due to significant demand of capital, some Chinese companies are also directly or cross listed on international markets. The major cross-listed international markets are the Hong Kong, Singapore and US markets. Today, a total of ten Chinese companies are simultaneously listed on the Shanghai, Hong Kong and U.S. markets in the form of A shares, H shares and ADRs respectively. Table 1 provides a list of these companies with additional information such as the code of the company on each of the exchanges, conversion ratio (number of H shares per ADRs) and the listing dates of A shares.

To investigate the same-day spillover effect of these ten cross-listed companies, we need to know opening and closing times in the three markets. Both local and GMT timings of Shanghai, Hong Kong and US market are provided in Table 2. China and Hong Kong are in the same time zone, while the US are not; during the daily opening to closing time in US market, it is night time in Asia. The Chinese market opens and closes 30 minutes earlier than the Hong Kong market; the US market opening time is 12.5 hours behind Hong Kong. We obtained daily opening and closing prices of A share, H share and ADR of these ten cross-listed firms from Yahoo Finance. Because H shares are quoted in Hong Kong dollars, ADRs in US dollars and A shares in RMB, we converted all into RMB basing on the daily spot exchange rate. (Note 2) Daily close-to-close and open-to-open returns of three classes of shares are computed by taking the log difference of close and open prices over the entire sample period respectively. We excluded weekends and holidays in three markets in calculating daily returns. In this sense, the returns are over a trading day and may cover more than one calendar day.

In the next section, we focus on the methodology incorporating the same day effect presented by Singh, Kumar and Pandey (2009) to test the spillover effect of returns of Chinese cross-listed firms.

4. Methodology

To examine the same-day spillover effect of returns of ten Chinese cross-listed stocks, we employ the vector autoregressive (VAR) which was used by Singh, Kumar and Pandey (2009). The VAR model thus estimates a dynamic simultaneous equation system; free of a priori restrictions on the structure of relationships; and the VAR is a good model to examine the spillover effect (Eun and Shim, 1989; Alaganar and Bhar, 2002; Hansda and Ray, 2003). The VAR model will be used to examine A shares, H shares and the ADRs respectively. The VAR model employed in our study is as follows:

$$R_{i,t} = \delta_i + \sum_{i=1}^p \phi_{i,t} R_{i,t-i} + \sum_{j=1}^l \chi_{j,t} R_{j,t} + \sum_{j=1}^k \beta_{j,t} R_{j,t-i} + \varepsilon_{i,t} \quad (1)$$

Where,

$R_{i,t} = (R_{A,t}, R_{H,t}, R_{ADRs,t})'$, $R_{A,t}, R_{H,t}, R_{ADRs,t}$ represents the return of A shares, H shares and the ADRs at time t ,

δ_i and ϕ_i are 3×1 and 3×3 coefficient matrix respectively,

p is the lag length, and

$\varepsilon_{i,t}$ is the 3×1 column vector of forecast errors.

' l ' is the number of shares that open/close before the i th share, and

k is the number of shares that open/close after the i th share.

The three markets operate with different opening and closing times, thereby making return observations asynchronous. However, this VAR model can be used to examine the spillover effect of several markets with different opening/closing times Singh, Kumar and Pandey (2009). Here we perform the VAR model with exogenous variables for market returns and incorporated the same day effect of market returns which open/close before the market under consideration. For the markets which open/close before the market under examination, the same day returns of these markets are used as explanatory variables and those markets which open/close after, the one day lagged returns are used as explanatory variables. For example, while modeling H shares return, the same day returns of A shares and one day lagged return of ADRs are considered as explanatory variables.

5. Empirical results

To examine the spillover effect of returns of ten cross-listed Chinese companies' A shares, H shares and the ADRs, we use the daily return of open-to-open and close-to-close prices. We firstly employ the VAR model to exam the partial cross-correlation of three classes of shares with closing and opening prices respectively (see Table 3a and 3b). In Table 3a, the results show that the one day lag of the ADRs returns has a positive and statistically significant impact on the same period returns of A shares. It ranges between 0.0232 and 0.2360. The influence return from the one day lag of H shares to A shares is smaller than from H shares to ADRs. We also find that there is a strong interaction between H shares and the ADRs in addition to their return persistence. In contrast, the influence return from one day lag of A shares is little. Two results are similar from both close-to-close and open-to-open series; these results indicate strong unidirectional spillover effect from US market to Shanghai market. However, we find a significant two-way influence between Hong Kong and New York markets (Xu and Fung, 2002; Su and Chong, 2007; Kutan and Zhou, 2006).

The three markets operate with different opening and closing times, thereby making return observations asynchronous; in order to show a clear picture, we also exam the same-day spillover effect of these Chinese cross-listed companies. Table 4a shows the return spillover of closing prices and Table 4b shows the return spillover of opening prices.

From Table 4a and 4b, we find that the ADRs return is mainly influenced by H shares which trade before it, with no such effect from the same day return of A shares to the ADRs; which is similar to Hong Kong market (Kutan and Zhou, 2006). Both Table 4a and Table 4b have similar results. As such, we believe there is a more significant same-day effect between Hong Kong- US than Shanghai-US markets.

6. Conclusions

This study examines the spillover effect of return of ten Chinese cross-listed stocks across Shanghai, Hong Kong and US markets. Different to previous literatures which mainly focus on the information flow of China-background stocks which are cross-listed in Hong Kong and US markets, we analyze the spillover effect across three markets, Shanghai, Hong Kong and US by using the daily prices on stock by stock basis. We find a strong unidirectional spillover effect from US market to Shanghai market while a significant two-way influence exists between the Hong Kong and New York markets. Furthermore, we find that the same day return effect occurs from Shanghai to Hong Kong market and from Hong Kong to US market, with no such effect from Shanghai to US market.

Cross-listed stocks are the important bridges connecting several stock markets and contribute to the interdependency of the markets (Wei, Lui, Yang, and Cheung, 1995). We believe that our study has value for both policymakers and

investors in making financial decisions. And, this paper can also help investors and other academic people to better understand spillover effect between China and other markets. When any future academic research focuses on spillover effect of cross-listed equities, this paper may be considered in their literature reviews.

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Notes

Note 1. The data are collected from www.csrc.gov.cn.

Note 2. The exchange rates are from <http://www.federalreserve.gov/releases>.

Table 1. Cross-listed Chinese Companies in Shanghai, Hong Kong and US

Company name	A code	H code	ADRs code	Ratio (share/ADRs)	Listing date of A share
Sinopec Shanghai Petrochemical Co. Ltd	600688	0338	SHI	1:100	1993-11-8
China Eastern Airlines Corp.Ltd	600115	0670	CEA	1:100	1997-11-5
Yanzhou Coal Mining Co. Ltd	600188	1171	YZC	1:10*	1998-7-1
China Petroleum & Chemical Corp	600028	0386	SNP	1:100	2001-8-8
Huaneng Power International Inc	600011	0902	HNP	1:50	2001-12-6
China Southern Airlines Co.Ltd	600029	1055	ZNH	1:50	2003-7-25
Guangshen Railway Co. Ltd	601333	0525	GSH	1:50	2006-12-22
China Life Insurance	601628	2628	LFC	1:15	2007-1-9
Aluminum Corp. of China Ltd	601600	2600	ACH	1:25	2007-4-30
Petrochina Co. Ltd	601857	0857	PTR	1:100	2007-11-5

Asterisk (*) indicates the convert ratio of Yanzhou Coal Mining Co. Ltd changed from 50 to 10 shares per ADRs since June 6, 2008.

Table 2. A share, H Share and ADRs opening and closing time

Class of listing	Venue of listing	Local time		GMT	
		Open	Close	Open	Close
A shares	Shanghai	09:30	15:00	01:30	07:00
H shares	Hong Kong	10:00	16:00	02:00	08:00
ADRs	U.S.	09:30	16:00	14:30	21:00

Table 3a. The results of partial cross-correlation of A share, H share and ADR with close-to-close prices.

	Code	SHI	CEA	YZC	SNP	HNP	ZNH	GSH	LFC	ACH	PTR
A Shares	A shares	0.0107**	0.0859	-0.0229	-0.0457	-0.0043**	0.0411	-0.1124	-0.0393**	0.0037**	-0.0212**
	H shares	0.0048**	-0.0514	-0.0057	0.0193*	0.0045	-0.0098**	-0.0933	-0.1467	-0.0488**	-0.0932
	ADRs	0.0232	0.1147	0.0732	0.0723	0.0900	0.1666	0.1125	0.2360	0.1774	0.1823
H Shares	A shares	-0.0003**	0.0623	0.0310	0.0523*	-0.0190**	0.0509	-0.0355**	0.0476**	-0.0322**	0.0159**
	H shares	-0.2521	-0.1831	-0.1460	0.2196	-0.1059	-0.2021	-0.2044	-0.3709	-0.2437	-0.3124
	ADRs	0.3321	0.2586	0.2730	0.2520	0.2462**	0.3213	0.3561	0.3550	0.4853	0.4234
ADRs	A shares	0.0501**	0.02674**	0.0201	-0.0480*	-0.0293**	0.0353**	-0.0496**	0.0707*	0.0122**	-0.0108**
	H shares	0.0956	0.1492	0.1550	0.2869*	-0.0038	0.1021	0.1037	-0.0132**	0.0380**	0.0666**
	ADRs	-0.0881	-0.0927	-0.0870	-0.2124**	-0.0372*	-0.1034	-0.1526	-0.1827	-0.0499**	-0.1143

*(**) denotes rejection significance at the 5% (10%) level.

Table 3b. The results of partial cross-correlation of A share, H share and ADR with open-to-open prices.

	Code	SHI	CEA	YZC	SNP	HNP	ZNH	GSH	LFC	ACH	PTR
A Shares	A shares	-0.0367	-0.0545	-0.1038	-0.0806*	-0.0197**	-0.0344**	-0.1476	-0.0759	-0.0013**	0.0401**
	H shares	-0.0577	-0.0545	-0.0422	0.0250**	0.0221**	-0.0379*	-0.0884	-0.2584	-0.1336	-0.1193
	ADRs	0.1658	0.2292	0.1770	0.3133*	0.1146	0.3341	0.2384	0.6108	0.3557	0.3130
H Shares	A shares	0.0181**	0.0563	0.0399	0.0285*	-0.0196**	0.0198**	0.0406**	0.1003	0.0700*	0.1294
	H shares	-0.3360	-0.4081	-0.3054	0.3673	-0.1544	-0.3699	-0.3104	-0.4925	-0.4565	-0.3982
	ADRs	0.6875	0.7679	0.7177	0.6996	0.3767	0.7054	0.5756	0.6099	0.7033	0.6096
ADRs	A shares	0.0237*	0.0144**	-0.0016**	0.0370*	-0.0050**	-0.0029**	0.0132**	0.0361**	-0.0440**	0.0934**
	H shares	0.0270*	-0.0471	-0.0197**	-0.0417	-0.0514	-0.0795	0.0494**	-0.0751*	-0.1055	-0.0801**
	ADRs	0.0019**	0.1156	0.1226	-0.0262	-0.0240**	0.0853	-0.1000	-0.0950	0.0941	-0.0454**

*(**) denotes rejection significance at the 5% (10%) level.

Table 4a. The results of same-day spillover effect by VAR model with close-to-close price returns

	Code	SHI	CEA	YZC	SNP	HNP	ZNH	GSH	LFC	ACH	PTR
H shares	AR1	-0.328	-0.188	-0.175	-0.178	-0.106	-0.23	-0.36	-0.385	-0.291	-0.368
	AR2	-0.138	-0.094	-0.086	-0.062	-0.048	-0.161	-0.172	-0.111	-0.149	-0.073 **
	AR3	-0.084	-0.005**	-0.096	-0.079	0.002 **	-0.059	-0.227	-0.052 **	-0.068	-0.077**
	AR4	-0.037	-0.029**	-0.057	-0.084	0.010 **	-0.065	-0.119	-0.077	-0.023**	-0.091
	A shares(t)	0.164	0.407	0.263	0.425	0.114	0.377	0.265	0.495	0.412	0.478
	ADRs(t-1)	0.397	0.233	0.281	0.142	0.234	0.285	0.437	0.263	0.427	0.382
ADRs	AR1	-0.563	0.019	-0.419	-0.745	-0.165	-0.502	-0.708	-0.756	-0.746	-0.777
	AR2	-0.458	0.862	-0.286	-0.539	-0.15	-0.342	-0.569	-0.597	-0.627	-0.636
	AR3	-0.24	-0.498	-0.108	-0.353	0.003 **	-0.168	-0.272	-0.368	-0.374	-0.411
	AR4	-0.151	-0.418	-0.035 *	-0.166	-0.011 **	-0.032**	-0.084	-0.179	-0.177	-0.129
	A shares(t)	0.021	-0.243 **	0.043	0.003 **	0.098	0.026 **	0.015 **	-0.018 **	-0.019 **	-0.013 **
	H shares(t)	0.846	-0.131	0.822	0.957	0.407	0.815	0.853	0.878	0.902	0.87

Table 4b. The results of same-day spillover effect by VAR model with open-to-open price returns

	Code	SHI	CEA	YZC	SNP	HNP	ZNH	GSH	LFC	ACH	PTR
H shares	AR1	-0.552	-0.569	-0.446	-0.744	-0.189	-0.521	-0.726	-0.644	-0.768	-0.765
	AR2	-0.356	-0.379	-0.283	-0.531	-0.061	-0.27	-0.492	-0.245	-0.506	-0.393
	AR3	-0.248	-0.209	-0.14	-0.349	-0.033**	-0.185	-0.312	-0.104	-0.357	-0.291
	AR4	-0.119	-0.092	-0.115	-0.169	0.010**	-0.125	-0.124	-0.085	-0.207	-0.172
	A shares(t)	0.076	0.195	0.14	0.096	0.068	0.228	0.149	0.284	0.124	0.181
	ADRs(t-1)	0.784	0.75	0.715	0.795	0.38	0.648	0.761	0.544	0.787	0.762
ADRs	AR1	-0.651	-0.551	-0.446	-0.664	-0.159	-0.358	-0.681	-0.818	-0.728	-0.754
	AR2	-0.401	-0.351	-0.269	-0.439	-0.09	-0.152	-0.383	-0.585	-0.582	-0.577
	AR3	-0.251	-0.178	-0.113	-0.302	-0.005**	-0.051	-0.304	-0.374	-0.358	-0.321
	AR4	-0.082	-0.085	-0.052	-0.154	-0.021**	-0.006**	-0.137	-0.214	-0.198	-0.181
	A shares(t)	0.004**	0.031*	0.046	-0.009**	0.049	0.035**	0.007**	-0.004**	-0.017**	-0.015**
	H shares(t)	0.74	0.709	0.674	0.8	0.315	0.567	0.782	0.844	0.9	0.852

*(**) denotes rejection significance at the 5% (10%) level