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**A Test of Effect of Cross-listing on the Valuation of  
Chinese Firms**

by  
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requirements for the degree of Master of Finance

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**Abstract**

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The purpose of this study is to test the effect of cross-listing on the valuation of Chinese firms. The research performed event study with the event window of 20 days, 60 days and 120 days to examine the existence of accumulated abnormal return when cross-listing on Shanghai Stock Exchange (SSE). The results of this study proved negative accumulated abnormal return on Hong Kong Stock Exchange (HKEx) when listed on SSE. Furthermore, this study discussed effect of cross-listing on the valuation of firms in different industries. These results of our study could be a potential source for decision making and for managers who are attempting to cross-listing on Chinese stock markets.

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## Chapter 1

### Introduction

#### 1.1 Background

Cross-listing is where a firm lists its equity shares on two or more exchange markets in different regions. In 1993, Tsingtao Brewery Co. Ltd. listed its shares on the Hong Kong Exchange, which became the precedent of cross-listing in China. Since then, Chinese companies have shares listed on New York, Singapore and Hong Kong. This form of internationalization promotes market integration, and the rapid development of emerging market in China.

Cross-listing of firm's shares begins with its additional benefits such as increasing opportunities for innovation, reputation enhancement and liquidity. Moreover, crossing-listing gives the companies a board way to financial market.

However, Chinese companies must pay higher fees when cross-listing, there include registration, issuing and underwriting expenses which make cross-listing listing. After cross-listing, the regulations and requirements for disclosure are complicated, so the costs of accounting, legislation, reporting and exchange annual fee are high for companies. In addition, the barriers in culture, politic, and language increase the risk of operation and development of companies.

## **1.2 Objective of the study**

Cross-listings are associated with significantly positive stock market reactions (Foerster and Karolyi, 1999; Miller, 1999; Doukas and Switzer, 2000). This study uses event study to test whether abnormal returns exist after cross-listing, and if so whether the abnormal returns derive from cross-listing. The event window is 20 days (i.e., 10 days before cross-listing and 10 days after it), 60 days, and 120 days.

## **1.3 Purpose of study**

Our study tests the effect of cross-listing on the valuation of Chinese companies over the 10-year period (from 1<sup>st</sup> Jan.2003 to 31<sup>st</sup> Dec.2012). There are four stock exchange markets in Greater China: the Shanghai Stock Exchange (SSE), Shenzhen Stock Exchange (SZSE), Hong Kong Exchanges (HKEx), and Taiwan Stock Exchange (TWSE). Therefore, the cross-listing in our study refers to those companies list both on Shanghai Stock Exchange and Hong Kong Exchanges and Clearing Limited. From the data from China Securities Regulatory Commission, 149 companies were listed on overseas main board market and 30 companies were listed on overseas growth enterprise market as at February, 2013. Our study also focuses on main board market, which mainly consists of large capital and mature entrepreneurs.

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In recent years, there are many papers on cross-listing. Some of these papers focused on the international capital market but not the particular Chinese market (Domowitz, G. J., 1998). Some studied the spillover effects from diversion effect and risk dispersion of cross-listing (Karolyi, 2004), and others discussed the impact of cross-listing on information environment, capital cost and firm value (Wang, Y. X., Ye, L., Yang, L., 2012), etc. Although many researches considered the firm valuation, they did not use the event study to test the abnormal return and cumulative abnormal return. Therefore, by conducting this study, one can expect whether there is an improvement in firm valuation or not when cross-listing. In addition, this paper could also be a potential source for decision making, especially for those companies who expect to cross-listing on Shanghai and Hong Kong.

#### **1.4 Outline of paper**

This study conducts a test of effect of cross-listing on the valuation of Chinese companies. The paper consists of five chapters. Chapter one gives the brief introduction of Chinese cross-listing and our paper. Chapter two is the literature review which discusses the previous studies related to cross-listing according to the motivations and the cost. Chapter three introduces the data, model and the test steps under efficient market hypothesis. Chapter four provides the results of test and analyses the average abnormal return and cumulative average abnormal return. Chapter five concludes our study and



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gives some recommendations and suggestions on further study.

## **Chapter 2**

### **Literature Review**

This chapter is the literature review for our study. The literature review consists of two parts. The first part declares the motivations of cross-listing: market segmentation, liquidity, information asymmetry and price discovery function. The second part discusses the cost of cross-listing.

#### **2.1.1 Market segmentation**

Thadavillil J, T.R. Nirmalanandan, and Tandon K. (2000) contended that cross-listing was a solution to market segmentation. Segmentation of international markets might be due to foreign ownership restrictions and premium/discount in cross-listing stocks. Cross-listing reduced the barriers to international investing; thence firms were available for foreign equity capital, especially in an emerging market.

Van Dijk and Roosenboom (2009) conducted several studies in the past few years and found a company's valuation usually increased when cross-listing. This phenomenon could be attributed to the displacement of market segmentation. Consequently, the cost of capital decreased. In addition, market integration reduced the risk for cross-listing and in turn gave more benefits to it. Therefore, indicators believe an upswing in the valuation of companies after cross-listing.

However, Doidge, et al (2004) pointed out that market segmentation was not the major reason for companies to cross-listing, because the barriers for the flow of international capital had already reduced or disappeared. Moreover, they proposed that the reduction of capital cost could not be the only reason for cross-listing. If this were the case, there should have been far less interest listing in U.S. market than oversea market in 1990s, because it was prevailing to list in U.S. for oversea investors at that time. Nevertheless, the opposite happened that there was actually a rocket of interest in U.S. market.

Therefore, these researches into cross-listing suggest that market segmentation is one of the motivations to cross-listing because it reduces the cost of capital. This segmentation derives from barriers in international capital, and with the acceleration of market integration, many barriers have already disappeared.

### **2.1.2 Liquidity**

Cross-listing promotes the liquidity of shares. As the evidence showed by Abdallah et al. in 2011, there was an immediate rise in the volume of stock trade after cross-listing, which was also emphasized by Beneish and Gardner in 1995, that cross-listing in oversea market had a positive impact on the liquidity of stock.

Morro do Lena and Alto Vieiro made a research in 2007 to examine the effects of international cross-listing on liquidity. Their results pointed out that cross-listing improved the volume of stock trade significantly. They tested the factors which affecting returns. The conclusion showed that firm size, market capitalization, correlation between the returns of the cross-listing stock and the international market, trading volume, et al. had a positive relationship with return of cross-listing, while the standard deviation of the returns of the cross listed firm and the long term debt to market capitalization ratio, et al. had a negative effect on the return.

The distribution of trading volume across different venues after listing abroad is different. According to the paper from Halling M. et al. (2004), most companies faced an initial blip in the wake of the cross-listing but then foreign trade volume fell rapidly to the low level. After that, the domestic market revived bloom up with an increase in domestic trading volume. In addition, they found that smaller, more high-tech oriented companies, and lower trading costs better insider trading protection companies had higher foreign to domestic trading volume ratio.

In summary, it is reasonable that cross-listing improve the liquidity of firms and has a positive impact on stock return, but this phenomenon is only a blip and will not last for a long time.

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### 2.1.3 Information asymmetry

Cross-listing is a solution to information asymmetry because it improves the information environment of companies. Chakravarty S. et al. (1998) compared A and B shares in Chinese stock market. A shares are domestic issued and B shares are for foreign investors which trade in \$USD. He found foreign investors paid nearly the same price as domestic investors. This discovery confirms that with cross-listing, there is no significant difference in stock price because the problem of information asymmetry is diluted. Cross-listing breaks the barriers and brings exchange of information, which makes no diversification of foreign investors and domestic investors.

Nevertheless, the study from Fernandes N. et al. (2008) gave the opposite evidence. They certified cross-listing improved price informativeness for developed market firms. However, for firms in emerging markets, such as Chinese market, cross-listing decreased price informativeness, because in developed markets, cross-listing was associated with higher firm-specific return variation; in emerging markets, it was associated with lower firm-specific return variation. Their study also suggested that informed market participant could change behavior when there were significant changes in firm-level or country-level environment. As a result, to improve the overall information environment and decrease information asymmetry, regulators must complement disclosure standards and policies to encourage investment.

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#### **2.1.4 Price discovery function**

The research of Hasbrouk (1995) showed New York Stock Exchange (NYSE) and some other exchange markets had price discovery function: the stock prices of oversea companies who cross-listing on NYSE changed in accordance with U.S. stocks, and the stock prices are adjusted by the cross-border information.

The price discovery function in Chinese stock market was proved by Patricia L. and James M. in 2012. They indicated that A shares in Chinese stock markets were almost exclusively determined by domestic factors. In contrast, H shares in Hong Kong stock market were influenced by both the Chinese domestic stock market and the foreign stock markets elsewhere. With the impulse response functions and the variance decompositions, they found innovations in Chinese stock markets and Hong Kong stock market are partly transmitted to each other, and to stock markets outside China.

#### **2.2 Cost of cross-listing**

Although cross-listing benefits companies in various ways, the cost of it is a non-negligible issue. Cross-listing companies must qualify for the standard of both domestic and worldwide exchanges. The cost of distribution and the financial criteria deprive the companies of the benefits, which even make the companies loss after cross-listing.

Details of standard for listing on Hong Kong can be found on the Listing Requirements and Procedures on HKEX official website. The requirements contain pre listing requirements and post listing requirements. Listing principle, requirements, sponsors and continuing obligation&fees are all the considerable factors. Initial listing fees of pre listing can be viewed on the following table:

#### Main Board

Monetary Value of Equity Securities to be Listed (HK\$ million)		Initial Listing Fee (HK\$)
Not exceeding:	100	150,000
	200	175,000
	300	200,000
	400	225,000
	500	250,000
	750	300,000
	1,000	350,000
	1,500	400,000
	2,000	450,000
	2,500	500,000
	3,000	550,000
	4,000	600,000
	5,000	600,000
Over	5,000	650,000

The chart below shows the annual listing fees of post listing:

#### Main Board

Nominal Value of Listed Equity Securities (HK\$ million)		Annual Listing Fee (HK\$)
Not exceeding :	200	145,000
	300	172,000
	400	198,000
	500	224,000
	750	290,000
	1,000	356,000
	1,500	449,000
	2,000	541,000
	2,500	634,000
	3,000	726,000
	4,000	898,000
	5,000	1,069,000
Over	5,000	1,188,000

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From these two table, initial listing fee is 0.65 million HK\$ and annual listing fee is 1.188 million HK\$ if nominal value of listed equity securities is more than 5000 million HK\$.

In addition to the high fees, disclosure principals are rigorous when cross-listing. The promulgating of the Sarbanes-Oxley in 2000s “is to protect investors by improving the accuracy and reliability of company disclosures” (Sarbanes-Oxley forum). Under this act, the reporting and monitoring environment has undergone substantial changes. Bianconi M. et al. (2012) made a research about firm value, the Sarbanes-Oxley Act and cross-listing in the U.S., Germany and Hong Kong. They found the implementation of the Sarbanes-Oxley Act had added on additional costs for business because the evidence illustrated that the cross-listing premium was consistently negative in Hong Kong in 2000–2005, in Germany after 2001 and in the U.S. after 2002. The firms cross-listing in Hong Kong suffered a significant discount on the value, relative to those did not cross-listing there. This demonstration was also the same as Kate Litvak’s paper in 2007, which declared a decline in the cross-listing premium enjoyed by foreign companies.

In conclusion, the cost of cross-listing is a significant amount for the companies and the disclosure is complicated which may offset the listing premium, so the valuation of firms when cross-listing is unpredictable.



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## Chapter 3

### Methodology and Data Sources

This study tests the cross-listing effect on valuation of firms with standard event study, which was first applied by Fama, Fisher, Jensen, and Roll for stock splits in 1969. Our methodology is calculating the abnormal return from the difference of actual return, and the expected return without cross-listing, then sum of abnormal return to get the accumulated abnormal return. Finally, we test the significant of accumulated abnormal return with hypothesis test. The first part of this chapter introduces the efficient market hypothesis, which our study is based on. Next parts are the data source and test steps.

#### 3.1 Efficient market conditions

Efficient Markets Hypothesis (EMH) declares that large numbers of investors in the capital market are rational and they can trade-off between risk and return. The important current information is almost freely available to all participants. Therefore, the actual price of a stock in any time is a good estimator of its intrinsic value, and it reflects the balance of demands and supplies (Eugene F. Fama, 1965). Event study is a reasonable method to test the semi-form market efficiency, which asserts that the current stock price reflects all publicly available information. The event could be stock splits, dividends and allotment. Our study presumes the announcement of the event, which is cross-listing, will mirror on the share price, so monitoring the share

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price before and after cross-listing can measure the valuation of firms. Although EMH is not completely consistent with the real market because some investors are not rational and many other effects may make EHM invalid, this paper presumes EMH remains in effect.

### **3.2 Data sources**

As the data sources from Shanghai Stock Exchange and Hong Kong Exchanges, there are 67 companies listed on both stock markets. 26 of these companies had already listed on Hong Kong and then cross-listing on Shanghai over recent ten years (from 1<sup>st</sup> Jan.2003 to 31<sup>st</sup> Dec.2012). Finally, only 17 companies are qualified because 9 of 26 are initial public offering (IPO) on both stock markets and it is impossible to investigate the stock price before IPO. The list of 17 companies and the corresponding cross-listing date can be viewed in this paper in Appendix A.

Our study collected daily stock price of these 17 companies on Hong Kong Exchanges from BLOOMBERG Historical Price of 120 days (i.e., 60 days before cross-listing and 60 days after it). These shares are H shares in Hong Kong stock market, so they are settled in HKD. Our study exchanged these data to USD with BLOOMBERG. The Hong Kong Hang Seng Index (HSI) is considered as the benchmark for performance and an indicator of market index. Our study also collected the corresponding HSI of 120 days when the

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17 companies cross-listing.

### 3.3 Test steps

#### Step 1 Data

Data of 17 companies and the HSI were organized and inputted in Excel work sheet.

#### Step 2 The actual return

The actual returns on securities and the market were computed using the stock price, HSI and the following formula.

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

$$R_{m,t} = \frac{P_{hsi,t} - P_{hsi,t-1}}{P_{hsi,t-1}}$$

Where

$R_{i,t}$  is the actual daily return of security  $i$  in time period  $t$

$P_{i,t}$  and  $P_{i,t-1}$  are the price of security  $i$  in time period  $t$  and  $t-1$  respectively

$R_{m,t}$  is the return on the market index in time period  $t$

$P_{hsi,t}$  and  $P_{hsi,t-1}$  are the market index price in time period  $t$  and  $t-1$  respectively

#### Step 3 CAPM model

The most popular model to estimate expected return of securities is the Capital Asset Pricing Model (CAPM), which gives out the expected return presuming no announcement of cross-listing.

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$$E(R_{i,t}) = R_f + \beta_i [E(R_{m,t}) - R_f]$$

Where

$E(R_{i,t})$  is the expected return of security  $i$  in time period  $t$ .

$E(R_{m,t})$  is the expected return on the market index in time period  $t$ , it is originate from  $R_{m,t}$  in step 2.

$R_f$  is the risk-free rate in Hong Kong, which usually is Hang Seng Interbank Offered Rates (HIBOR). This data was available in BLOOMBERG of different periods

$\beta_i$  is the systematic risk of security  $i$ , BLOOMBERG showed adjusted  $\beta$  of each company in different periods.

After inputting the data to excel, we got the expected return  $E(R_{i,t})$  for each company.

#### **Step 4** Abnormal Return

Compute the abnormal returns of 120 days for each firm, which is the difference between actual return and expected return.

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

#### **Step 5** Cumulated Abnormal Return

Compute the cumulated abnormal return separately of 20 days (i.e., 60 days before cross-listing and 60 days after it), 60 days, and 120 days for each firm.

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$$CAAR_i = \sum AR_{i,t}$$

**Step 6 Hypothesis test**

Carry out the t-test for abnormal return and accumulated abnormal return.

The significant level is 95%. The hypotheses are as follows:

$$H_0: \overline{AR}_{i,t} = 0$$

$$H_a: \overline{AR}_{i,t} \neq 0$$

$$H_0: \overline{CAAR} = 0$$

$$H_a: \overline{CAAR} \neq 0$$

The t-test for abnormal return is computed as  $t = \frac{\overline{AR}}{SD\ AR/\sqrt{df}}$ , and the t-test

for the accumulated abnormal return is  $t = \frac{\overline{CAAR}}{SDCAAR/\sqrt{df}}$ . Reject H0 if t

number is larger than tabulated t, which is 1.96, and do not reject H0 if t

number is smaller than 1.96.

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## Chapter 4

### Analysis of results

The objective of this study is to test the effect of cross-listing of Chinese firms. This chapter will show the results of our test, and answer the question “whether cross-listing brought positive return to the firms and improved the valuation of them.”

Our study focused on the Chinese firms that had already listed on Hong Kong stock market and then listed in Shanghai between 1<sup>st</sup> Jan.2003 to 31<sup>st</sup> Dec.2012. Only 17 firms are qualified for this study. Appendix B displays the accumulated abnormal return of these 17 firms. From this table, 7 out of 17 show the positive CAAR and 10 of them show the negative CAAR during 60 days and 120 days of cross-listing. Only 4 out of 17 revive the positive CAAR during 20 days. This phenomenon can be explained by diversion effect of cross-listing. Diversion effect refers to that cross-listing distracts the domestic market investment and trading, which leads to domestic market trading volume shrinking, and investors reducing. Therefore, diversion effect has a negative impact on the stock price and return. (Karolyi, 2004). Moreover, most firms' valuation decline according to our study, although 7 firms are slightly more than 10 firms. This result is in consistence with the paper of Bianconi M. et al. (2012), which demonstrated the cross-listing premium was negative in Hong Kong stock exchange.

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There are 6 firms whose CAAR increase with the expansion of days and 6 firms whose CAAR decrease. The other 5 firms show a fluctuating CAAR. All the decreasing CAAR firms are those firms with negative CAAR. Chen Guojing and Wang Jing made a research on A and H shares in 2007. They pointed out that diversion effect deteriorated domestic market and most investors transferred to oversea markets, which was a vicious cycle for company. For those increasing CAAR firms, risk dispersion offset the diversion effect and had a positive effect on stock return. Even if the stock prices decrease on SSE, investors could make profit on HKEx. The fluctuating CAAR results from the sizes of risk dispersion and diversion effect. Consequently, the valuation of firms after cross-listing is influenced by these two effects.

Another interesting result is that of 17 companies (4 are in banking and insurance industry; 5 are in energy industry; 4 are in transportation industry; 4 are in manufacturing industry), all firms in banking and insurance industry show the negative CAAR and 3 firms have decreasing CAAR with expansion of days, which is the similar situation for the firms in transportation industry. However, 3 firms in manufacturing industry enjoy the increasing CAAR and have the positive CAAR over 120 days. The result for firms in energy industry has no rules as others. The explanation for this phenomenon may be that the bloom of manufacturing industry in Chinese market gives investors a

profitable prospect, especially during the ten years of our study.

In addition, our study conducts hypothesis test to examine the significant of the CAAR. Although some firms' CAAR are not significant for 20 days with 95% confidence level, after our study expands the days and data, all the results for 17 firms of 120 days are significant.

Overall, the valuation of Chinese firms during cross-listing declines according to our study. However, this situation will be improved when days expansion. Furthermore, the only winner of cross-listing could be the firms in manufacturing industry, who enjoy the positive CAAR finally.



## **Chapter 5**

### **Conclusions and Recommendations**

#### **5.1 Conclusions**

This study tested the effect of cross-listing on the valuation of Chinese firms. Cross-listing is where a firm lists its equity shares on two or more exchange markets in different regions. The literature review introduced four motivations to cross-listing and the cost of it. The objective of our paper was to measure whether accumulated abnormal return could be observed due to the cross-listing event.

According to the results, majority of our detected firms showed negative accumulated abnormal returns. This finding provided substantial proof for Chinese firms, who had already listed on HKEx, that they suffered a listing discount when cross-listing on SSE. This phenomenon could be explained by that the diversion effect was greater than the risk dispersion. Another finding of our paper was that firms in manufacturing industry were better off with cross-listing on SSE, but the firms in banking and insurance industry, and transportation industry got worse with it.

#### **5.2 Recommendations**

Our paper focused on the cross-listing of Chinese firms between 1<sup>st</sup> Jan.2003 to 31<sup>st</sup> Dec.2012. 26 companies had already listed on Hong Kong and then

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cross-listing on Shanghai over the ten years. 9 of them were IPO, so the prelisting stock prices were not available. The qualified 17 firms was a small sample for statistics and event study. Although the results were statistically significant, it was unconvincing to say that our conclusions could be the representatives for all the Chinese companies. For the further study, we suggest it would be a good idea to carry out the test with a longer time period, for example 20 years, or 50 years. Increasing time period will give a larger sample size, so the conclusion can be more accurate.

Moreover, our sample for event study is the firms cross-listing on SSE. Thence, another recommendation for in-depth investigations is that taking the firms cross-listing on SZSE into consideration, because SZSE is also the major stock exchange market in China. This could represent an area of concern, as the findings may have different results due to the different nature between the two stock markets. Even though SZSE and SSE are both the Chinese mainland stock exchange markets, they have different disclosure requirements, listing procedures and standards of fees. Furthermore, additional research into this study could be applied to other international listings, such as NASDAQ and NYSE, inviting a larger size and providing more convincing results.

To make our study more accurate, it is better to measure the market reaction

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by using the listing date rather than the announcement date. If the stock market is efficient, by the announcement date, the effect of cross-listing must be already reflected in the stock price. Further study could also examine the effects of motivations and cost separately, to get more detailed conclusion of cross-listing.

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**Appendix A**

## List of cross-listing Chinese companies

Name	Listing date on SSE
1.Ping An Insurance (Group) Co. of China Ltd.	01 Mar 2007
2.Great Wall Motor Co. Ltd.	28 Sep 2011
3.China Shenhua Energy Co. Ltd.	09 Oct 2007
4.China Life Insurance Co. Ltd.	09 Oct 2007
5.China Communications Construction Co. Ltd.	09 Mar 2012
6.China Construction Bank Corporation	25 Sep 2007
7.Air China Ltd.	18 Aug 2006
8.Bank of Communications Co., Ltd.	15 May 2007
9.BBMG Corporation	01 Mar 2011
10.China Coal Energy Co. Ltd.	01 Feb 2008
11.China COSCO Holdings Co. Ltd.	26 Jun 2007
12.China Molybdenum Co., Ltd.	09 Oct 2012
13.Shanghai Electric Group Co. Ltd.	05 Dec 2008
14.China Shipping Container Lines Co. Ltd.	12 Dec 2007
15.Zijin Mining Group Co., Ltd.	25 Apr 2008
16.Dalian Port (PDA) Co. Ltd.	06 Dec 2010
17.Guangzhou Automobile Group Co., Ltd.	29 Mar 2012

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**Appendix B**

CAAR for 17 companies

	CAAR (120days)	CAAR (60days)	CAAR (20days)
1.	-0.74309	-0.31745	-0.21462
2.	0.197697	-0.0378	-0.08036
3.	0.153433	0.116917	0.086626
4.	-1.02088	-0.39036	-0.32945
5.	0.003701	-0.0368	-0.07747
6.	-0.32856	0.031563	0.05922
7.	-2.0205	-0.96662	-0.4308
8.	-1.90712	-1.15749	-0.3836
9.	0.193944	0.165109	0.047589
10.	-0.45348	-0.24749	-0.12292
11.	-0.50321	-0.31447	-0.00355
12.	0.047012	0.109866	0.048348
13.	0.702672	0.626299	0.246802
14.	0.212586	-0.07729	-0.1832
15.	-0.58294	0.107321	-0.07438
16.	-0.05162	-0.09563	-0.0089
17.	-0.09286	0.061131	-0.0332

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