



**Modeling Price Differentials between
A Shares and H Shares on the Chinese Stock Market**

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Abstract

In this paper, we model the price differentials between A shares and H shares in the Chinese stock markets with both macroeconomic factors and firm specific factors, which successfully explain the A share price premium. Discounts of H-share prices relative to A-share prices are related to the contemporaneous movements of the H-share local market index relative to the A-share local market index, the spread of interest rates and inflation rates between Hong Kong and mainland China as well as firm size, liquidity and volatility of the stock. A share price premium has decreased after the launch of QFII which aims at integration of Chinese stock markets. However, we cannot conclude that these markets are integrated.

Key Words: A-share price premium, Panel data analysis, QFII

We would like to thank Hossein Asgharian for eminent supervision.

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1. Introduction and Previous research

The Financial literature has, in recent years, explored the distinct price behaviours on stocks that are simultaneously traded in China's segmented markets¹. Among these studies, the price differentials among different classes of shares have been of concern.

Bailey (1994) first documented that prices of B shares, which are traded by foreign investors, are selling at a discount relative to their A share counterparts which could only be traded by domestic investors. Several explanations have been provided for this "strange" phenomenon.

Bailey (1994) argues that the cost of capital for Chinese investors may be lower due to their limited access to investment opportunities. In addition, Chinese political and economic risks which are undiversifiable to the primarily foreign investors may add risk premium and discount the price of B shares.

Li et al (2004) demonstrates that the discount of H share prices relative to A share prices are related to the contemporaneous movements of the local markets performance, which is dominated by the local risk-free rate, the local interest rate, and the currency effect.

Based on the "investment sentiment" notions, Bailey (1994) proposes that unseasoned or unduly optimistic Chinese investors may be the source of high A share prices. Ma (1996) further suggests that the A share premium is positively related to domestic beta, which means when A share beta is high, the A share price is also high. This implies the Chinese investors to be irrational and risk seeking.

Based on the model of Stulz and Wasserfallen (1995), which presents the demand and supply of shares in segmented markets, Sun and Tong (2000) argues that since the co-exist red chips and H shares are alternatives of B shares to foreign investors, the demand of B shares is price elastic, leading to low price of B shares.

Errunza and Losq (1985) show that securities with information inaccessible to a subset of investors require greater risk premium. A later work by Stulz and Wasserfallen (1995) further demonstrates that the deadweight costs, including

¹ Shanghai Stock Exchange, Shenzhen Stock Exchange, and Hong Kong Stock Exchange

information costs, for holding risky assets differ across investors and across countries, causing demand for domestic shares to vary between domestic and foreign investors.

Domowitz et al. (1997) provides evidence that higher perceptions of exchange rate risk imply less foreign investment and hence lower price premium.

This paper investigates the price differentials between A shares and H shares in the Chinese stock market. As Table 1 presents the price anomaly of A shares and H shares on a single day, we can see the A shares price premium compared with H shares is very significant, which arise our intention to analyze the possible causation of this peculiar phenomenon. As documented by Sun and Tong (2000), H shares are B shares equivalent in the Hong Kong market. Hence, an understanding of the price differentials between A shares and H shares can be applied to get an insight of the A-share premium over both B shares and H shares.

Table 1

A/H Shares price anomaly

Firm Name	A-shares (adjusted to HKD)	H-shares(HKD)	A-share Premium
TSINGTAO BREWERY	40.89	28	46.05%
JIANGSU EXPRESSWAY	11.17	9.18	21.65%
GUANGZHOU SHIP	85.28	48.45	76.02%
MAANSHAN IRON	13.01	8.08	61.01%
SINOPEC CORP	19.27	9.28	107.67%
SHENZHEN EXPRESSWAY	13.7	7.62	79.83%
CHINA EASTAIR	20.44	7.42	175.49%
GUANGZHOU PHARM	15.54	9	72.62%
HUANENG POWER	19.22	9.35	105.56%
TIANJIN CAPITAL	10.64	4.29	148.01%
DONGFANG ELECTRIC	84.92	62.1	36.75%
YANZHOU COAL	23	16.36	40.57%
ANGANG STEEL	30.76	25.45	20.87%
SHANGHAI PECHAM	19.4	6.12	216.93%
Average			86.36%
Date: 25/09/07			

This paper is also motivated by the recent efforts CSRC² made aiming at integrating Chinese capital markets. QFII³ has been introduced for foreign capital to access Chinese financial markets. QDII⁴, which was launched in 2007, allows domestic institutional investors to invest in overseas capital markets. HSAHP⁵, launched in July 2007, aims at tracking the changes in the price differential between A shares and H shares. These actions are introduced to help to diminish the price differential between A shares and H shares.

In this paper, we examine whether and how different factors could induce the price differentials between A shares and H shares, including explanatory factors reflect both market-wide information and firm-specific information, using panel data analysis. Furthermore, in order to see the effect of the launch of QFII, we test the change of price differentials between A shares and H shares, liquidity measures and daily volatility of both A shares and H shares after the launch of QFII.

The rest of the paper proceeds as follows: Section 2 presents some background information about Chinese stock markets; Data and methodology are given in Section 3; In Section 4, we perform analysis of price differentials between A shares and H shares and the effect of the launch of QFII; And the final section concludes the article.

2. The Chinese Stock Market

The Chinese public stock market is composed by the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZE), which opened on December 26th 1990 and April 11th 1991, respectively. The two exchanges are self-regulated, and it's not allowed to cross-list between them.

China's stock market (including Hong Kong Stock Exchange) has become world's second-largest, at the end of year 2007, with a capitalization of US\$6.73 trillion, while Shanghai Stock Exchange ranked 6th and Hong Kong Stock Exchange ranked

² China Securities Regulatory Commission

³ Qualified foreign institutional investors

⁴ Qualified domestic institutional investors

⁵ Hang Seng China AH Premium Index

7th individually⁶. By May 2008, the market capitalizations for Shanghai Stock Exchange and Shenzhen Stock Exchange are about CNY 19.15 trillion and CNY 4.7 trillion, respectively.

The shares initially listed on the SSE and SZE were called ‘A shares’ and could only be traded by Chinese investors, while ‘B shares’ were introduced exclusively for foreign investors since early 1992. The class A shares are domestic ordinary shares denominated and traded in Chinese Yuan by Chinese investors. The majority of A shares are issued by State-owned enterprises, and according to type of ownership, it can be classified into three different categories: (1) State shares, held by a designated government agency of the government; (2) legal shares, which are shares held by the Chinese ‘legal persons’ (i.e. the enterprises and or other economic entities except individuals); and (3) public shares, which are owned by ordinary Chinese individuals. According to the Chinese securities rules of CSRC, only public shares can be traded on the exchanges. Hence, these public shares could also be called ‘tradable’ shares. When going public, companies are required to issue no less than 25% of their total outstanding shares as tradable A shares.⁷

The class B shares are special Chinese Yuan-denominated ordinary shares offered to foreign investors, but they are traded in foreign currency. Owners of B shares have the same rights and bear the same obligations as holders of A shares. However, the dividends of B shares are paid in foreign currency: US dollars for the Shanghai B shares and Hong Kong dollars for the Shenzhen B shares. Individual investors are allowed to hold a maximum of 25% of a firm’s B shares, but total foreign ownership through the B share issues cannot exceed 49% of a firm’s total shares.⁸ The trading mechanism for B shares is similar to that for the A shares. Firms can choose to list their B shares on either of the two national exchanges, the SSE or the SZE, but not both.

By April 2008, 1606 companies had gone public, of which 864 firms were listed on the SSE and the remaining 742 firms were listed on the SZE. 109 companies have

⁶ Source: World Federation of Exchanges

⁷ Sugato Chakravarty, Asani Sarkar, Lifan Wu (1998)

⁸ Sugato Chakravarty, Asani Sarkar, Lifan Wu (1998)

issued B shares, among which 54 are traded on the SSE and 55 are traded on the SZE.

However, due to ownership restrictions, language and culture barriers, and excessive transaction and information costs, international investors may still find it difficult to invest in the Mainland Chinese security market directly in reality.

Along with the strengthening economy ties, the interrelations between Mainland stock markets and Hong Kong Stock Market are becoming stronger. Compared with the newly established Chinese stock market, Hong Kong's mature market should make more contributions in introducing foreign funds to mainland Chinese enterprises, especially with the first listing of H-shares on Hong Kong market in 1993. The selection of The Chinese companies to list in Hong Kong as H shares are mainly based on their economic importance, management quality, high level technology, profitability and international reputation. And it brought huge success at the initial stage. Tsingtao Brewery, the first batch of H shares listed in the Hong Kong Stock Exchange, received 110 times over-subscription and the six H-share companies together raised more than a billion US dollars⁹. There are currently 107 firms issuing H shares on the HKEX¹⁰.

H shares provide both Hong Kong and international investors with opportunities to invest in Chinese companies' stocks without having to concern too much about both excessive cost of investing directly in the Chinese Stock Market and various investment barriers.

3. Data and methodology

3.1 Hypotheses

$$PRM_{i,t} = \alpha_i + \beta X_{i,t} + \gamma PRM_{i,t-1} + \varepsilon_{i,t} \quad (i=1, 2, \dots, N; t= 1, 2, \dots, T)$$

We conduct a panel data analysis of the price differentials between A shares and H shares both with macroeconomic factors and firm-specific factors; Besides, the spread of two market indexes is also included as an explanatory factor, and all these chosen

⁹ Sun and Tong, (2000)

¹⁰ Hong Kong Stock Exchange

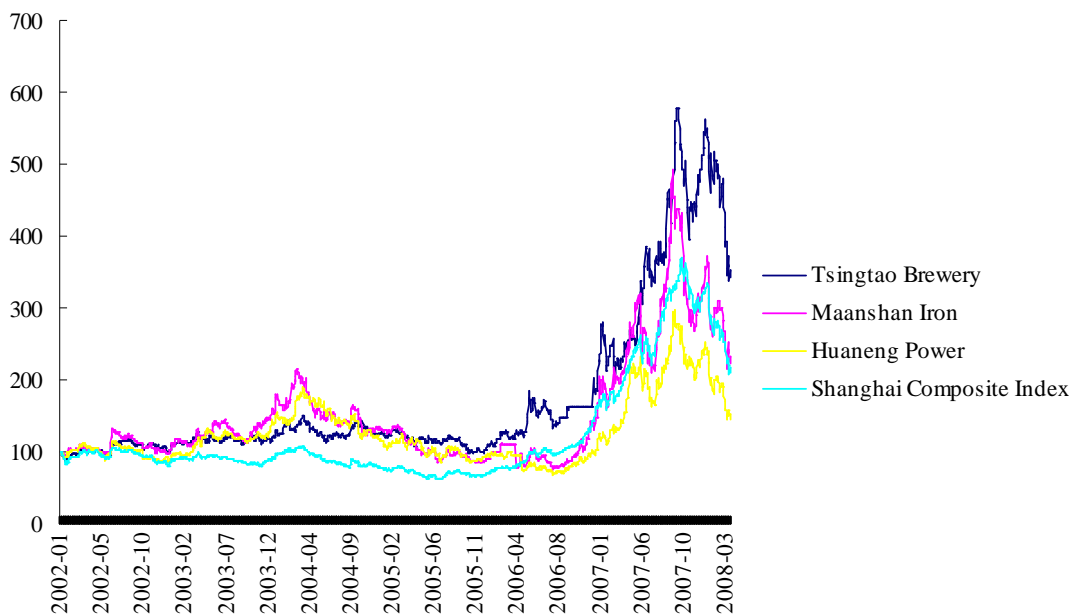
variables are denoted as a vector $X_{i,t}$ in the following equation. To control for serial correlations of monthly price premiums, we add the multifactor model with a lagged dependent variable, $PRM_{i,t-1}$.¹¹

3.2 Choice of Factors

We observe positive correlation between individual stock performance and index performance. As a result, we assume the local performance of different markets would have an impact on the price differentials between A shares and H shares via market premium.

Figure 1

Rebased daily price for Shanghai Composite Index and three A shares



And as shown in Table 2, the correlation between each individual A share(H share) and Shanghai Composite Index(Hang Seng Index) is significant. The average of the correlation between A shares and Shanghai Composite Index is 0.63, while the correlation between H shares and Hang Seng Index is about 0.45.

8. Domowitz et al. (1997)

Table 2.

Correlation with local market index

Firm Name	SHI	HSI
Tsingtao Brewery	0.6178	0.2662
Jiangsu Express	0.4993	0.3644
Guangzhou Ship	0.6562	0.4861
Maanshan Iron	0.6914	0.4617
Sinopec Corp	0.7881	0.5029
Shenzhen Express	0.6295	0.4526
China Eastair	0.5581	0.622
Guangzhou Pharm	0.5898	0.4022
Huaneng Power	0.6599	0.4693
Tianjin Capital	0.505	0.3291
Dongfang Elec	0.3969	0.4343
Yanzhou Coal	0.712	0.5066
Angang Steel	0.7795	0.4964
Shanghai Pecham	0.7354	0.4423
Average	0.6299	0.4454

Since A shares and H shares are traded in Chinese Yuan and Hong Kong Dollar respectively, we examine the exchange rate factor. This factor might have little impact before 2005 when both currencies were tightly pegged to US Dollar. However, the volatility of exchange rate of Chinese Yuan and Hong Kong Dollar has increased drastically after the removal of Yuan's peg to US Dollar¹².

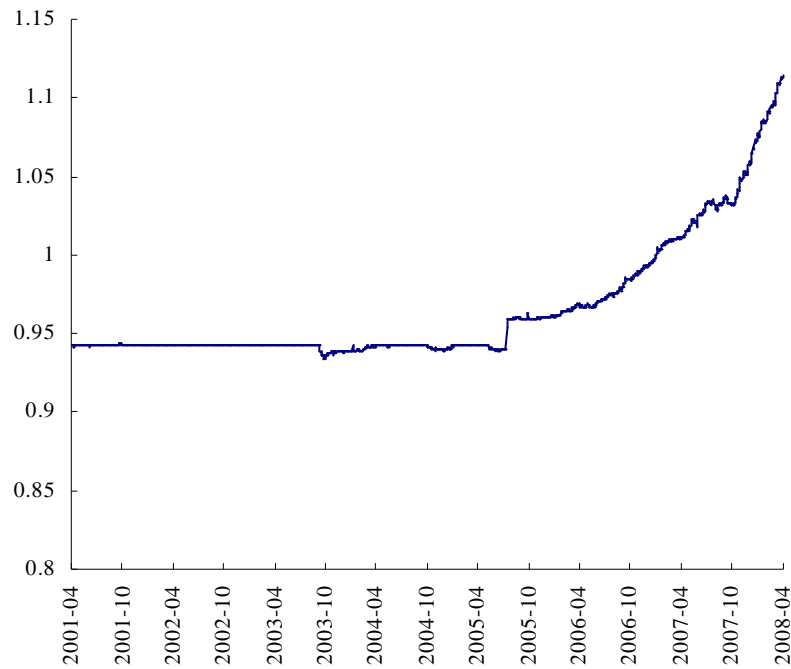
The difference in local interest rates, which imply different cost of capital to local investors, is taken into consideration. The inflation rate could also be a possible factor. However, we cannot predict whether it would be positively or negatively related with A-share price premium. To the extent that high inflation rate increases the risk of Chinese Yuan's depreciation, the variable would be negatively related to the price premium; on the other hand, high inflation would increase the market demand, resulting in A- share price driven up.

Apart from variables stated above which reflect market-wide information, some firm-specific factors are also taken into consideration. The difference of liquidity risk between A shares and H shares could have a positive impact on the price differentials,

¹² People's Bank of China removed Chinese Yuan's peg to US dollar on July 21, 2005.

Figure 2

Exchange Rate CNY/HKD



same as the difference in volatility between A shares and B shares. At firm level, risk exposure to information asymmetry is considered. Compared with domestic investors, foreign investors face more difficulties to acquire and assess information for mainland Chinese firms due to lack of reliable channel to the information of mainland Chinese economy and firms.¹³

3.3 Proxies of factors

In order to test the explanatory power of the factor chosen above, we first define the firm-specific price premium similar to Bailey (1994)

$$PRM_{i,t} = \frac{P_{i,t}^A - P_{i,t}^H}{P_{i,t}^H},$$

Where $P_{i,t}^j$ is the price of J-share (j= A, H) for firm i at month t.

Next, to examine whether and how the time-varying firm-specific price premiums could be explained by different market risk factors discussed above, we first construct

¹³ Kaye and Cheng, 1992; Sze, 1993

four proxies associated with local markets performance, interest rate, exchange rate, and inflation rate risk factors.

1. Index premium

$$IPM_t = \frac{I_{M,t}^A / I_{M,0}^A}{I_{M,t}^H / I_{M,0}^H} - 1,$$

where $I_{M,t}^A$ and $I_{M,t}^H$ denote monthly values of the Shanghai Stock Composite Index and the Hong Kong Price Index.

Since 13 out of 14 A shares in the sample are traded in the SHSE and all H shares are traded in HKSE, we use the Shanghai Composite Index (SHI) and the Hang Seng Price Index (HSI) to represent each local market performance. To be consistent with the monthly individual stock prices, we also use monthly stock index samples.

Since the two indices are traded in different currencies, we first convert Shanghai Composite Index into Hong Kong dollars denomination. To calculate the index premium, both index values are scaled by their beginning-of-sample values. Since stock returns on each class of shares are positively related to returns of their own local markets, the price premium is assumed to be positively associated with the index premium.

2. Interest rate spread

$$IRS_t = IR_t^{CH} - IR_t^{HK},$$

Where IR_t^{CH} and IR_t^{HK} refer to the monthly prime lending rates in local currency at month t in mainland China and Hong Kong, respectively. Since the interest rate spread indicates the difference between cost of capital for investors in Mainland China and Hong Kong, the A-share to H-share price premium is assumed to be positively correlated to the interest rate spread rate.

3. Exchange Rate Volatility

Historical monthly exchange rate volatility is calculated on the base of daily exchange

rate data, which is expected to be positively correlated with the A-share to H-share price premium. Higher exchange rate volatility raises the volatility of foreign assets held, which leads to a higher risk premium for H share investors and therefore lower H share price.

4. Inflation rate spread,

$$IFRS_t = CPI_t^{CH} - CPI_t^{HK}$$

Where CPI_t^{CH} and CPI_t^{HK} refer to the monthly CPI in local currency at month t in mainland China and Hong Kong, respectively. We use CPI as proxy of inflation rate. Inflation increases the risk of RMB depreciation resulting in lower A share price, while on the other hand, high inflation increases the market demand, resulting in higher price.

Apart from the proxies of macroeconomic factors listed above, we conduct the proxies of the firm-specific risk factors as follows.

1. Firm size

Market capitalization is used as the proxy of the firm size factor (i.e. the A share price times the number of A shares, plus the H share price times the number of H shares). Firm size is considered here considering information asymmetry problem. We assume the larger the firm size is, the more information would be disclosed. For example, large firms may attract more analysts' attention and media coverage, which could mitigate the information asymmetry problem, and therefore narrow the price differentials between A shares and H shares.

2. Liquidity

As proposed by Amihud and Mendelson (1986), comparatively more illiquid stocks have a higher expected return and are thus priced lower to compensate investors for the increased trading costs. The sum of volume of A shares and H shares (VoA+VoH)

is chosen as a proxy, where V_{oA} and V_{oH} are the monthly trading volume of each shares, respectively.

3. Volatility

The irrational investors' behaviour, especially speculative fever, is severe in the Mainland Chinese Stock market. Although there is no approach to test investors' irrationality, we use the stock return volatility as a simple way to partially capture the speculative activities of Chinese investors. Relative volatility ($StdA/StdH$) is conducted as a proxy, where $StdA$ and $StdH$ are the standard deviation of the corresponding shares respectively.

3.4 Data collection¹⁴

Our sample consists of 14 firms which have already issued both A shares in SSE or SZE and H shares in HKEX since January 2002, among which 13 firms listed their A shares in SHSE with the remaining 1 firm listing in SZE. We first collect daily stock prices for each pair of A shares and H shares from January 2002 to March 2008. Considering daily stock prices would show more noise which might affect the explanatory power of the regression model, we use monthly stock price by taking average of the daily prices. Since our sample covers a comparatively wide range of the crucial Chinese industries, it could be noted as both representative and effective in despite of the limited sample size. Besides, we collect monthly trading volume, and also, in order to obtain market capitalization, we get monthly number of shares outstanding for each pair of A shares and H shares.

We also collect data on market indices of Shanghai Stock Exchange and Hong Kong Stock Exchange.

3.5 Methodology

We employ fixed effects pooled regression to test the multifactor model. The fixed effects model can eliminate unobservable cross-sectional individual differences that

¹⁴ All data from Datastream

affect achievement¹⁵.

Since our regression model focus on both cross-sectional data, requiring us to make strong assumption of the comparability among different observations, and time-series analysis, imposing similar assumptions, we adopt panel data analysis which endows regression analysis with both a spatial and temporal dimension. It allows us to factor out the effect of the space-invariant and time-invariant parts of the data, which are known as fixed effects. Although it may not help to solve the problem of deriving causal disturbances from sample data, it could provide a solid foundation for causal disturbances than only comparing across either space or time. The fixed effects pooled regression model would get constant slopes but different intercepts according to the cross sectional data, such as the firms chosen in our model. Although there are no significant among time series unit, there are significant differences among cross section unit, which could be observed that the intercept differs according to cross-section data and in our case differs from firm to firm, it may not differ over time.

Suppose that we have N firms observed over T time points, we obtain $N \times T$ observations. Indexing the N firms by i and the T time points by t we get a model as followed:

$$Y_{i,t} = a + b_1 X_{1i,t} + b_2 X_{2i,t} + \dots + u_{i,t}$$

Where the vector X denotes both time varying and space varying independent variables. Therefore if we have a panel dataset in which 10 firms are observed over 10 months, we have $N \times T = 100$ observations.

In our regression, the dependent variable is price premium, and the chosen explanatory variables are Index premium, interest rate spread, exchange rate volatility, inflation rate spread, firm size, relative trading volume, relative stock return volatility, and lag of price premium.

3.6 Empirical model

¹⁵Robert Yaffee: A Primer for Panel Data Analysis(http://www.nyu.edu/its/pubs/connect/fall03/yaffee_primer.html)

In particular, our regression of A shares price premium are formulated in the following multi-factor model:

$$PRM_{i,t} = \alpha_i + \beta_1 IPM_{i,t} + \beta_2 IRS_{i,t} + \beta_3 IFRS_{i,t} + \beta_4 EX_{i,t} + \beta_5 MC_{i,t} + \beta_6 VO_{i,t} + \beta_7 STDAH_{i,t} + \gamma PRM_{i,t-1} + \varepsilon_{i,t}$$

($i=1, 2, \dots, N$; $t= 1, 2, \dots, T$)

Where $IPM_{i,t}$ denotes for the index premium between Shanghai Composite Index and Hang Sang Index; $IRS_{i,t}$ and $IFRS_{i,t}$ denotes for the interest rate spread and inflation rate spread respectively, and $EX_{i,t}$ stands for the monthly exchange rate volatility; $MC_{i,t}$, $VO_{i,t}$, and $STDAH_{i,t}$ represent the three firm-specific factors, which are market capitalization, trading volume and A share standard deviations relative to their counterparts, respectively. All prices are transformed into HKD denomination, and all variables are converted into deviation form.

4 Analysis and Results

4.1 Summary Statistics

Table 3 reports the monthly average premiums for A shares from the sample of 14 firms for the period January 2002 to March 2008. The average premiums for A shares

are calculated as the monthly mean of $PRM_{i,t} = \frac{P_{i,t}^A - P_{i,t}^H}{P_{i,t}^H}$, where, for stock i on

month t , $P_{i,t}^A$ and $P_{i,t}^H$ are the A share and H share prices, respectively.

Almost all A shares experience significant price premiums over H shares in the sample period. From the Table 3, we can see the A shares price premiums are distributed between 0 and 2.5, and the mean of the whole sample is 1.312, which indicates that during our sample period, the average A share price is 1.312 times higher than its corresponding H share price.

Table 3

Distribution of the monthly average A-share price premium

Monthly Average Premium	Whole Sample (no.=14)
0<PRM<0.5	2
0.5<PRM<1.0	3
1.0<PRM<1.5	4
1.5<PRM<2.0	2
2.0<PRM<2.5	3
Mean	1.312

Table 4 reports summary statistics of monthly excess returns on each single stock and market indices. All returns are expressed in Hong Kong dollars. It presents the results for the full sample. Except for five firms, the average excess return of A shares is lower than their H shares counterparts. More specifically, the average monthly excess return of A shares is -0.0355 compared with the corresponding H shares average return of -0.0309. Further, except for four firms, the standard deviation of excess returns on each H share is higher than that of corresponding A share, which is consistent with the result documented in Bailey (1994): higher volatility of stock returns in B shares relative to A shares be interpreted as foreign investors typically being less informative of the issuers than local investors. The correlation between the SHI and the HSI is 32.88%, while the correlations between each stock indices and Exchange Rate are much smaller in magnitude.

In order to get an overall view of the behaviour of A shares and H shares, we compute general statistics on share prices, return, volatility, trading volume, shares outstanding and market capitalization. The results are shown in Table 5. We divide the whole sample period into four sub-periods according to the changes of A share premium. It could be discovered that the monthly average A share premium between February 2005 to January 2007 is significantly lower than any other period of time, which might be effected by the poor performance of Shanghai Composite Index. Also, the average trading volume of A shares is smaller than that of H shares, while the gap

Table 4

Summary statistics for excess stock returns

Firm Name	A share		H share		HSI	SHI
	Mean	S.D	Mean	S.D		
Tsingtao Brewery	-0.0321	0.0904	-0.0266	0.0939		
Jiangsu Express	-0.0534	0.0776	-0.0414	0.0671		
Guangzhou Ship	-0.0167	0.1399	-0.0057	0.1649		
Maanshan Iron	-0.0361	0.1197	-0.0284	0.1272		
Sinopec Corp	-0.0314	0.0934	-0.0323	0.0836		
Shenzhen Express	-0.0470	0.0942	-0.0418	0.0737		
China Eastair	-0.0321	0.1391	-0.0344	0.1416		
Guangzhou Pharm	-0.0485	0.0852	-0.0435	0.0891		
Huaneng Power	-0.0442	0.0930	-0.0477	0.0734		
Dongfang Elec	-0.0179	0.1118	-0.0026	0.1451		
Yanzhou Coal	-0.0354	0.0909	-0.0307	0.0979		
Angang Steel	-0.0227	0.1215	-0.0131	0.1229		
Shanghai Pecham	-0.0336	0.1067	-0.0375	0.1131		
Tianjin Capital	-0.0464	0.0913	-0.0473	0.0954		
Average	-0.0355	0.1039	-0.0309	0.1063		
SHI					0.3288	
HIS						0.3288
Exchange rate					-0.1578	-0.0264

Note: Excess returns for A shares and H shares, are returns in excess of the mainland Chinese and Hong Kong Prime lending rates, respectively. All returns and prime lending rates are expressed in Hong Kong dollars.

is shrinking over time. Market capitalization is increasing substantially over the sample period. As considering shares outstanding, firms generally issue more H shares than their corresponding A shares, indicating that firms tend to issue more shares to attract foreign investors other than domestic investors. Comparing the return between A shares and H shares, the panel presents that the return of A shares is lower than that of H shares except the period February 2007 to March 2008, which is also consistent with the comparatively strong performance of Shanghai Stock Exchange during that period. We can also find the H-share volatility is lower than the corresponding A-share volatility, indicating the different trading activity in the two

markets (i.e. more speculative trading in China

To have a preliminary idea about whether and how the firm specific factors affect the price differentials between A shares and H shares, we cluster the 14 firms in our sample into several groups according to the scale level of market capitalization, trading volume and volatility, respectively.

As shown in Panel A of Table 6, 14 firms are divided into 4 groups according to the magnitude of their corresponding average market capitalization during the sample period. It presents that the price premium is smaller for the firms with greater market capitalization, which is consistent with our assumption. Since large firms would release more information through either media coverage or the follow of analysts, foreign investors are willing to pay a higher premium to them¹⁶. And the standard deviation also shows a downward trend except for the two lowest market capitalization interval (HKD 1500M-HKD 2500M) and (HKD 3000M-HKD 7000M). The summary result of volume, which is the proxy of liquidity, is presented in Panel B. In the light of trading volume, all of the 14 firms in sample are divided into 4 groups. The firms with greater average trading volume tend to have smaller the A shares price premium. And the standard deviation also decreases except for the volume interval (HKD 400000-HKD 1000000M) and (>HKD1000000M), which are the highest two volumes intervals. Panel C reports the result of another firm specific factor, which is the relative volatility (StdA/StdH). Despite the exception for the interval (2.60-3.40) and (3.40-4.00), both mean and standard deviation of A share premium are higher while the relative volatility is larger for each individual firm. All these findings presented above are consistent with the assumptions. As for liquidity, Amihud and Mendelson(1986) proposes that illiquid stocks have a higher expected return and are thus priced lower to compensate investors for increased trading costs, however, it could have either positive or negative with A share premium as decided by whether the price A shares or H shares be effected more. As in our case, it could be suggested that H shares are affected more significantly, inducing H shares price to increase more and negatively related to the A share premium. And relative volatility

¹⁶ Bailey and Jagtiani 1994

Table 5

Average monthly statistics on stock prices, trading volumes, return, shares outstanding and market capitalization

Sample of firms with both H and A shares					
	2002.01-2008.03	2002.01-2003.01	2003.02-2005.01	2005.02-2007.01	2007.02-2008.03
Average A premium	1.2152	2.9511	1.4391	0.2982	0.7916
Standard deviation	0.9810	0.3977	0.6762	0.0786	0.2648
Average A Volume	210658.46	80485.47	143922.22	202992.33	459080.28
Average H Volume	401795.48	196219.13	393866.67	416978.88	580251.38
Average A Return	0.0006	0.0002	-0.0002	0.0011	0.0016
Average H Return	0.0011	0.0008	0.0013	0.0013	0.0006
Average A Volatility	0.4123	0.1184	0.1327	0.2250	1.4854
Average H Volatility	0.3268	0.0355	0.0944	0.1866	1.2360
Average number of A Shares	570.92	450.56	469.89	524.43	935.56
Average number of H Shares	2185.26	2073.15	2118.29	2258.70	2278.28
Average market capitalization	13303.51	4516.89	7489.43	11237.04	35002.89
Standard deviation	11879.57	258.56	1544.03	2771.19	11414.56

This table provides information on average monthly A share premium, trading volume, return, volatility, number of shares outstanding and market capitalization for sample

firms listed on the Shanghai, Shenzhen, and Hong Kong Stock Exchanges. The A share premium is calculated as $\frac{P_{i,t}^A - P_{i,t}^H}{P_{i,t}^H}$. All share prices are converted into HK dollars.

Return is derived by taking average of daily log normalized return. the difference of average monthly prices. Volatility is denoted as the standard deviation of daily returns within a month. Market capitalization is the sum of market value of tradable A and H shares of each firm. Market capitalization is in terms of million HK\$. Trading volume, is in thousand shares while number of outstanding shares is in million shares.

Table 6 Summary Statistics

Panel A: Market Capitalization	1500-2500		3000-7000		8000-12000		>50000	
Firm name	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Full Sample: January 2002-March 2008								
Guangzhou Pharm	2.047102	1.356794						
Tianjin Capital	1.795714	1.109612						
Average	1.921408	1.233203						
Shenzhen Expressway			1.434479	1.411962				
Guangzhou Ship			2.259022	2.012462				
Dongfang Elec			2.217014	2.364174				
China Eastair			1.959128	1.013611				
Jiangsu Expressway			1.301299	1.427527				
Average			1.834189	1.645947				
Maanshan Iron					1.246577	1.549599		
Huaneng Power					0.431108	0.412903		
Tsingtao Brewery					0.414497	0.528110		
Shanghai Pecham					1.240206	0.846008		
Yanzhou Coal					0.719925	0.786170		
Angang Steel					0.590482	0.806843		
Average					0.773799	0.821605		
Sinopec Corp							0.709468	0.512181

(Continued)

Panel B: Volume	45000-90000		100000-200000		400000-1000000		>1000000	
Firm name	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Full Sample: January 2002-March 2008								
Dongfang Elec	2.217014	2.348360						
Guangzhou Pharm	2.047102	1.347718						
Tsingtao Brewery	0.414497	0.524577						
Guangzhou Ship	2.259022	1.999001						
Average	1.734409	1.554914						
Tianjin Capital			1.795714	1.102190				
Shenzhen expressway			1.434479	1.402518				
Jiangsu Expressway			1.301299	1.417978				
Average			1.510497	1.307562				
China Eastair					1.959128	1.006831		
Yanzhou Coal					0.719925	0.780911		
Huaneng Power					0.431108	0.410141		
Angang Steel					0.590482	0.801446		
Shanghai Pecham					1.240206	0.840349		
Average					0.988170	0.767936		
Maanshan Iron							1.246577	1.539233
Sinopec Corp							0.709468	0.508755
Average							0.978022	1.023994

(Continued)

Panel C: S.D.A/S.D.H	1.30-1.50		1.60-2.40		2.60-3.40		3.40-4.00	
Firm name	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Full Sample: January 2002-March 2008								
Angang Steel	0.590482	0.806843						
Tsingtao Brewery	0.414497	0.528110						
Average	0.502489	0.667476						
Yanzhou Coal			0.719925	0.786170				
Huaneng Power			0.431108	0.412903				
Sinopec Corp			0.709468	0.512181				
Maanshan Iron			1.246577	1.549599				
Shanghai Pecham			1.240206	0.846008				
Average			0.869457	0.821372				
Jiangsu Express					1.301299	1.427527		
Shenzhen					1.434479	1.411962		
Expressway								
Tianjin Capital					1.795714	1.109612		
Dongfang Elec					2.217014	2.364174		
Average					1.687127	1.578319		
China Eastair							1.959128	1.013611
Guangzhou Ship							2.259022	2.012462
Guangzhou Pharm							2.047102	1.356794
Average							2.088417	1.460956

could shed a light on the speculative activity of A shares traders, the result shows that the firms with higher relative volatility generally have a larger A share premium, indicating that irrational behaviour of traders would drive up the share price, which is also consistent with our assumption.

4.2 Panel Data Analysis

After the general comparisons, we carry out more rigorous tests. A panel regression of model (1) is done on the whole sample data and the results are presented in Table 8.

The coefficient of each variable is shown in column 1. The regression estimate is a significant positive with a t-statistic of 4.33, which is consistent with our assumption that the A shares premium is positively affected by the overall performance of the corresponding stock market. The better Shanghai Stock Exchange performs, the higher the A shares premium is. The estimate of exchange rate volatility is positively with a t-stat of 1.34, which is not significant at 10% level. Since the CNY do not remove its peg to US dollar until 2005, the result makes sense due to the factor may have not affect much before 2005. The A shares premium increases if the exchange rate volatility increases, which could be explained as foreign investors are more sensitive to exchange rate and require a price discount. Nishiotis (1997) also argues that foreign investors are more sensitive than local investors to changes in economic factors. The inflation rate spread is estimated as significantly negatively in the regression with a t-statistic of -5.34. Since CNY is pegged to US dollar before 2005, the inflation rate spread act as a proxy for currency risk. When the inflation rate increases, the CNY has a depreciation pressure, local investors seem to react more negatively than do foreign investors in our test, and causing the A shares premium to fall. One possible explanation is that as a proxy of macroeconomic, the rise of inflation rate might indicate a unstable economy.

The estimated slope coefficient of interest spread is positive significant with a t-statistic of 3.74. This is consistent with the assumption that A shares premium is positively related to the interest rate since it represents the risk free rate.

Table 7

Pooled regression results¹⁷

Total pool observations: 1027		
	coefficient	t-statistic
IPM	0.453551**	4.330786
EX	8.108642	1.344281
IRS	0.040193**	3.741781
IFRS	(-0.021881)**	-5.389875
VO	2.59E-08	1.425323
MC	-2.22E-07	-0.468639
STDAH	0.001579	0.425861
PREM(-1)	0.949065**	98.87459
R-squared	0.969301	
Adjusted R-squared	0.968659	

For the firm specific factors discussed above, we first take a look at volume, the proxy of liquidity factor, which is obtained as $VoA+VoH$. It is estimated to have a positive but tiny coefficient in the regression with a t-statistic of 1.42 which is not significant, and the result is different from what we get in descriptive statistics, we can not get any conclusion from it. The estimate of market capitalization is negative with a t-statistic of -0.46, which indicates larger firm tends to have lower A-share premium. This is consistent with our assumption about information asymmetry: Foreign investors can get information about a larger firm more easily, hence they are more willing to buy stocks of large firms, which could help to reduce the A-share premium. The relative volatility between the A-share and H-share markets, $StdA/StdH$, captures the speculative activity of A-share traders. The regression coefficient gives a t-value of 0.42 which means that higher of the A-share market volatility relative to the H-share market volatility would lead to a larger A-share premium, indicating that Chinese domestic investors' speculation on A shares seems

¹⁷ * Significance at 10%.

** Significance at 5%.

to be related to the A-share price premium.

However, all the firm specific factors are estimated as insignificant in the regression, which is not consistent with the results shown in summary statistics. One possible reason is although the variables may be a good cross-sectional proxy, it may not be a good time-series proxy in our test such as market capitalization. The issuance of both A share and H shares are comparatively stable through time due to the restrictions by the Chinese government. Another possible explanation is that fixed effects method itself inclines to eliminate cross-sectional variance in the independent variables. And also it could be caused by the limits of our sample. Given that A-share prices are always higher and more volatile than H-share, the lag term $Prem(-1)$ is quite significant positive in our regression, which is consistent with the findings of Domowitz et al. (1997). As presented by the adjusted R^2 , all these variables explain about 96% of the A-share premium.

4.3 Effect of QFII

China announced the introduction of a Qualified Foreign Institutional Investor (QFII) scheme on November 7th 2002 and it is launched on July 9th 2003. This is a programme that allows approved foreign institutional investors access to China's domestic capital markets. Therefore we expect the segmented mainland China stock market will be improved after the launch of QFII.

1. Hypotheses and data

According to Domowitz et al (1998), it can be hypothesized that volatility of dual-listed stock prices will decline and liquidity of stocks will increase if the two markets are integrated. However, if these markets are not integrated, liquidity will decline and the volatility of stock prices may increase or decrease depending on the quality of the information flow between these markets. And it is intuitive that the price differentials between A shares and H shares will be narrowed if the two markets are more integrated.

In this study, we test the changes of price differentials between A shares and H shares, the changes of stock price volatility and the liquidity of stocks after the launch of QFII. The sample period starts one year before the launch, which is July 9th 2002 and ends one year after the event, which is July 9th 2004. 18 Chinese companies were dual-listed on both Hong Kong Stock Exchange and Shanghai Stock Exchange/Shenzhen Stock Exchange during this period. Another factor which might affect the volatility and the liquidity are taken into account. Therefore, one restriction is imposed in order to assess the pure impact of event. The stocks with dividend payments close to the event (10 days before or 10 days after the launch of QFII) were excluded from the sample because stockholders have a tendency to reinvest their dividend income in the stocks of the dividend paying firm (Ogden, 1994). Hence, dividend payments might affect both the demand for these stocks and their behaviour. This elimination reduced the sample size to 16 firms.

2. Result

Descriptive statistics for the price premium of dual-listed Chinese stocks are presented in Table 8. It is found that price premiums are much lower after the launch of QFII for all firms. And all of them are found statistically significant, with a very large t-statistic. However, it might be affected by other variables than the event. Taking average of the price premium, we get a pure effect of the event, which is also statistically significant. Hence, the price differentials have decreased after the launch of QFII.

Descriptive statistics for the volatility and the liquidity measures of A shares are presented in Table 9. Liquidity measures-daily volume and turnover rate are increased after the launch of QFII, and both of them are found statistically significant. Measure of daily volatility-close to close volatility increases after the event and is found to be significant at 1%. The increase in liquidity may be the result of interests for foreign investors in China domestic stock market. It might also reflect on better “quality” of A shares since more information is required to be disclosed in order to attract foreign

Table 8

Descriptive Statistic of A-share premium before and after the launch of QFII

price premium	2002.07.09-2003.07.08		2003.07.09-2004.07.09		t-statistic
	Mean	S.D.	Mean	S.D.	
Tsingtao Brewery	0.85	0.31	0.13	0.17	32.6304
Jiangsu Express	3.63	0.50	1.31	0.54	51.4923
Guangzhou Ship	5.75	0.96	2.76	0.56	43.5711
Maanshan Iron	4.11	0.86	0.89	0.23	58.3310
Sinopec Corp.	1.41	0.26	0.57	0.13	46.0826
Shenzhen Express	3.97	0.47	1.85	0.39	56.2902
China East Air	3.83	0.56	2.09	0.35	43.0081
Guangzhou Pharm	4.13	0.61	2.53	0.34	37.1046
Huaneng Power	0.83	0.17	0.32	0.10	41.5676
Dongfang Elec.	6.31	1.26	2.49	0.68	43.1033
Angang Steel	1.91	0.50	0.47	0.18	44.3181
Shanghai Pecham	2.13	0.45	1.00	0.29	34.0006
Tianjin Capital	3.54	0.64	1.95	0.21	38.1391
Jiangxi Copper	4.06	1.13	1.14	0.45	38.9027
Anhui Couch	1.50	0.55	0.26	0.16	34.6908
China Ship Dev.	2.07	0.65	0.57	0.29	34.1809
Average	3.13	0.62	1.27	0.32	3.9513

investors. Imperfect information flow between the China mainland and Hong Kong stock markets might explain the increase in volatility. Furthermore, this increase might be related to trading activity. Noise trading and/or informed trading in China mainland market might increase after the launch of QFII, resulting in higher volatility and volume.

Descriptive statistics for the volatility and the liquidity measures of H shares are presented in Table 10. Both liquidity and volatility increase after the launch of QFII and found statistically significant. Comparing to A shares, liquidity of H shares increases much more in extent. This is understandable. Foreign investors are more interested in Chinese firms after the launch of QFII when more information is required to disclose. However, increasing noise trading and/or informed trading in China mainland market after the launch of QFII leads to their investing in Chinese enterprises in Hong Kong stock market.

Table 9

Descriptive Statistic of A-share volatility and volume before and after the launch of QFII

Variables	2002.07.09-2003.07.08		2003.07.09-2004.07.09		t-statistic
	Mean	S.D.	Mean	S.D.	
Daily returns	-0.0004	0.0166	0.0003	0.0202	1.9858
<i>Liquidity measure</i>					
Daily volume	5159	6147	7727	6892	0.8024
Turnover rate	0.0116	0.0135	0.0166	0.0151	2.0477
<i>Volatility measure</i>					
close to close Volatility	0.2690	0.0352	0.3275	0.0608	0.3358**

Notes: The means of all variables are calculated for each stock over the sample period and then the averages are taken across all stocks in the sample. There were 16 stocks in the sample. Turnover rate is calculated as the ratio of trading volume to the number of shares outstanding. t-statistics show the change in mean values after the launch of QFII on July 9th 2003.

** indicates significance at 5% level

Table 10

Descriptive Statistic of H-share volatility and volume before and after the launch of QFII

	2002.07.09-2003.07.08		2003.07.09-2004.07.09		t-statistic
	H share		H share		
Daily returns	0.0011	0.0258	0.0014	0.0332	0.8834
<i>Liquidity measure</i>					
daily volume	10484	10456	22208	20673	1.4946
turnover rate	0.0070	0.0073	0.0141	0.0106	2.7605
<i>Volatility measure</i>					
Close to close Volatility	0.4173	0.0834	0.5388	0.0997	3.7373

These findings provide mixed results for the integration of China mainland and Hong Kong stock markets. If these two markets were more integrated after the launch of QFII, a decline in volatility and an increase in liquidity would be expected. However, if the markets were fragmented, an increase in volatility and a decline in liquidity should be observed for the segments of the market. Hence, with the mixed results of this study, it is not possible to conclude that these two markets are integrated.

5. Conclusion

Although A shares in mainland China market are traded at a substantial premium relative to their H-share counterparts, opposite to what has been discovered in other markets, we have proven that the unusual phenomenon can still be explained by some economic theories.

Both macroeconomic factors, including local market performance, exchange rate risk, interest rate risk and inflation rate risk, and firm-specific factors including firm size, stock liquidity and stock volatility, have explanatory power to the A-share premium. Although the result of our fixed effect panel data analysis shows all the three firm-specific variables are insignificant, indicating their poor explanatory power, we can see quite direct and clear relationship between the three proxies and the A-share premium through the summary statistic analysis, which demonstrates the assumption that larger firms tend to have lower A-share premium, and more liquidity the firm's stock is, the lower A-share premium is, consistent with the idea suggested by Amihud and Mendelson (1986), the more liquid the stock is, the lower it is priced for the increased trading costs. We also show the A-share premium is positively affected by the relative volatility, indicating the speculate behavior of domestic investors would result in the increase of A-share premium. However, we are not sure as we do not have further testing variables or sample data to confirm the result. Also, we obtain evidence that foreign investors are more sensitive to macroeconomic factors like currency risk. When inflation rate spread increases, the A-share price premium decreases since comparatively higher inflation rate may indicate an unstable economy, for which domestic investors are more aware of. And an increase in the interest rate spread would raise the A-share price premium, which is consistent with that premium is positively related to risk free rate.

Besides all the factors discussed above, some principles of behavior finance could also help explain the phenomenon of price premium such as the existence of noise trader and the lack of arbitrage channels. All these possibilities can be important, yet they are difficult to test. Perhaps after a few years of further stock market

improvement and economic reforms in China, we will be in a better position to measure these changes and be able to examine their possible impacts on the A-share premium phenomenon in a more direct way and with greater explanatory power.

We also report the effect of the launch of QFII with the purpose of integrating Chinese stock markets. The A share price premium has a decline after the event. However, we cannot conclude that the China mainland stock market and the Hong Kong stock market has been more integrated after the launch of QFII.

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