

RISK, SPECULATION AND CHINA'S CROSS-LISTING SHARE PREMIUMS

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ABSTRACT

The A-H premium is a long standing puzzle facing Chinese stock market. This paper finds that this premium can be largely explained by its exposure to Chinese special treatment (ST) stocks, which have high delisting risk. The exposure to the ST index explains more than half of the variations of the A-H premium. A positive delisting risk premium is estimated by the Fama-Macbeth regressions. These results suggest that investor speculation is the main driver of the premium, in contrast to previous research that attributes the A-H premium to a difference between the risk behaviors of investors in the two share classes. The potential effect of conditional character of the Chinese stock market and its role in terms of the A-H premium are also discussed in this paper.

BIOGRAPHICAL SKETCH

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1. Introduction

China's stock market contains a great number of puzzles that are hard to fully explain through classic finance theory. The long lasting premium of A shares to their cross-listed H shares is one of these puzzles. Nevertheless, the price difference between domestic board and alien board is not a unique phenomenon in China. Previous research (See E.G. Hietala (1989) and Bailey and Jagtiani (1994)) shows that the stock in alien board tends to have higher prices than its domestic equivalent for many countries, such as Finland, Thailand and so on. This can be understood intuitively, since foreign investors usually have a low risk exposure to the domestic market, which means that there is the a diversification benefit for foreign investors and they are willing to pay a higher price for domestic stocks than domestic investors. However, China has a completely different story. In general, the A (domestic) share is much more expensive than the H (traded in offshore market) share. The average A-H premium was more than 10-fold in certain periods of history, and hardly negative. The A-H premium also shows huge cross-sectional variation. Even after China opened its markets to international investors and allowed short selling, the premium persisted. The A-H premiums for some stocks are extremely large. These premiums range from negative to more than 500% according to most recent data.

Most research on the subject relies on the assumption of market segmentation, which predicts that barriers between markets prevent prices from convergence. There are several hypotheses to explain the premium: difference in risk, difference in elasticity of demands, difference in liquidity and differences in the scope of asymmetric information. These theories explain the premium from a classic angle, but some cannot provide satisfying explanations for Chinese case. For example, it is counter-intuitive that the multi-fold A-H premiums of some stocks can be fully

explained by difference in the required return since they have identical cash flows. It is also hard to imagine that there is no room for speculation with the A-H premium given the fact that about 80% of trades are made by individual investors, among whom most are possible noise traders and speculators.

Using the most updated data, this paper finds that the premium is largely explained by the risk exposure to Chinese special treatment (ST) stocks, which have a particularly high delisting risk. Specifically, in the paper I run a pooled OLS regression of the A-H premium as a function of the risk exposure (beta) of ST stocks. In this estimation, the coefficient of the A-H premium on the delisting risk exposure is 2.64 and significant at the 1% level, which means that for an increase of 0.5 in the delisting risk exposure, the A-H premium increases of more than 100%. Furthermore, these findings indicate that the exposure of A-H stock to ST stocks explains about 53% of the A-H premium variation, which is strong evidence in favor of my explanation.

This paper also provides some discussion of how this delisting risk connects with the speculation, exerting substantial influence on the A-H premium. Using the Fama-Macbeth regressions, the delisting risk premium is estimated. The results indicate that the delisting risk premium is not negative. For the group of stocks not included in the CSI 300 index, the estimated delisting risk premium even reaches 12 basis point per day and is significant at 5% level. The result of estimated delisting risk premium is contradictive to the prediction inferred by previous research that the risk premium in China should be negative. Since high delisting risk predicts high A-H premium and delisting risk premium is not negative, it is reasonable to posit the delisting risk has certain connection with speculative demand, which drives up the A-H premium.

In addition, this paper not only offers the analysis of the aggregated market, but also offers an analysis of the different A-H premium patterns of different sub group of stocks.

By incorporating the speculation dimension into the analysis, this paper shows consistency between the classic academic research and the anecdotal evidence about the importance of speculation in the A-H premium. In this paper, I answer three related questions: 1) What is the role of speculative behavior and risk seeking in the A-H premium puzzle? 2) What is the role of the limits of speculation and noise traders demand on the A-H premium? 3) Are the drivers of the A-H premium similar for different groups of cross-listed stocks?

This paper proceeds as follows: Section 2 reviews previous literature. Section 3 presents parts of the Chinese stock market history and structure that are relevant for the analysis. Section 4 includes the empirical analysis using the classic approach. Section 5, 6 and 7 present the analysis of three research questions in turn; each of these sections include a description of the specific data, methodology, empirical results, and discussion of the respective question. Section 8 concludes.

2. Literature Reviews

The phenomenon that Chinese restricted shares for foreign investors are discounted relative to A shares is first discussed in detail by Bailey (1994), though it is B rather than H shares that are discussed. The topic of differential valuation in a situation of market segmentation, however, was raised much earlier, in the 1970s. There are several major hypotheses to explain this puzzle: the classic equilibrium pricing hypothesis (differential required returns or differential expectations), differential demand hypothesis, liquidity hypothesis and asymmetric information hypothesis.

2.1 the Classic equilibrium pricing hypothesis

In the CAPM framework, different required returns can be caused by different risk loadings (betas), different risk premiums and different risk-free rates. Hietala (1989) empirically tested the Finnish market to show that the beta of restricted shares on domestic market portfolios and the beta of unrestricted shares on world market portfolios can explain the premium, to a certain degree. Bailey and Jagtiani (1994) also showed that the explanatory power of betas is significant, while the sign of the coefficient is contradictive to their prediction. Ma (1996) investigated China's case and found that the premium of domestic (A) shares to the foreign (B) shares is positively correlated to the betas of A shares. He and other scholars (See E.G. Sun and Tong (2000) and Ba (2008)) tend to believe that Chinese investors are risk seekers and are willing to pay higher price for stocks as a result. Using return volatility as the risk measure instead of beta (Sun and Tong (2000) and Chan and Kwok (2005)), the claim that Chinese investors are speculative still holds. Bailey (1994) also suggests that lower cost of capital caused by the lack of alternative investment opportunities is another possible cause of the premium. However, because Bailey has only a small

sample of data for the early stage, this may not be able to explain the current situation. It is also hard to explain why the premium still exists considering the current situation of high nominal interest rates and the impact of wealth management products provided by the huge shadow banking system of China.

Domowitz et al. (1998) pointed out that investors may have different information and interpretations of the information because of market segmentation. For example, Nishiotis (1997) argues that foreign investors are more sensitive to change in economic factors than domestic investors. Sun and Tong (2000) found evidence that when China's official reserve deteriorates, B shares drop deeper than A shares. This could be interpreted in terms of the sensitivity of foreign investors to currency risk. They also believe that Chinese investors tend to have more optimistic expectations for companies' growth, because China's government possibly overstate the GDP growth rate and it may be interpreted differently by Chinese and foreign investors, though this is difficult to prove.

2.2 Differential demand hypothesis

Stulz and Wasserfallen (1995) point out that the investors' demand curves are not perfectly elastic as described in classic finance theory. More specifically, foreign investors' demand is less elastic than that for domestic investors because of different deadweight costs across countries. A company's management can utilize price discrimination by tightening the supply of shares for foreign investors in order to increase firm values. In their empirical test, they found that the price of unrestricted shares fell while the price of restricted shares rose when Nestle in Switzerland increased the supply of unrestricted shares, which is consistent with the differential demand hypothesis. The empirical result of Domowitz et al. (1998) also supports the differential demand hypothesis. They studied the Mexican equity market and found

that, for those companies with high foreign demand, the price of unrestricted shares also tends to be high. Several other studies also found evidence that supports the differential demand hypothesis. Bailey et al (1999) thoroughly tested the hypothesis using data from 11 countries. They construct the proxy of international investor demand using flows of international mutual funds, sentiments of foreign investors, the country's credit rate and firm size. Their results show that the foreign shares premium has high positive correlation with the international investor demand proxy.

2.3 Liquidity hypothesis

Extensive research work shows that liquidity matters, whether in equity or bond markets. Longstaff (1995, 2001) reported that illiquid assets can be traded at a huge discount that can be as high as 90 percent.

As for the topic of premiums for identical shares traded in different markets, Bailey and Jagtiani (1994) used two measures, which are the ratio of number of shares traded on alien board to the number of shares traded on both boards and number of shares traded on alien board itself, to describe liquidity effects in the Thai market. They found the link between liquidity and the price premium to be both statistically and economically significant. In the context of China's market, however, the result is not clear. Chan and Kwok (2005) also prove that liquidity plays a role in China's markets. However, when examining the premium between A and B shares in China's market, the results of Ma (1996) had a negative coefficient for the liquidity proxy, which is not consistent with the theory and statistically insignificant. In his cluster analysis, Ba (2008) showed the liquidity effect is not significant for the low premium group but significant for the high premium group and full sample.

2.4 Asymmetric information hypothesis

In their pioneering work, Bailey and Jagtiani (1994) argue that foreign investors can acquire information more easily for big companies. As a result, they are willing to pay higher prices for big companies and this leads to higher premiums. Their empirical result for the Thai market is consistent with this hypothesis. Their argument can be accepted easily and intuitively. However, it is hard to identify and isolate the asymmetric information effect from other possibilities. For example, small companies in China probably have higher premiums because foreign investors do not have as much information as domestic investors and thus require a discount. It is also probably because that small companies are usually illiquid, difficult to arbitrage, easily affected by investor sentiment and manipulation, and have lower degrees of consensus in terms of growth expectation. Another challenge to the asymmetric information hypothesis is the it is difficult to identify which side has information edge. Chakravarty et al. (1998) and Chui and Kwok (1998) have different opinion on this. Chakravarty et al. (1998) believe China domestic investors have better information. However, Chui and Kwok (1998) found that the return of B shares in China led the return of A shares. They explain this as a result of the information barrier in China. Li et al. (2001) also found that return of H shares led the return of A shares. It seems strange that foreign investors would have better information than domestic investors. However, if we consider that the Chinese domestic market is dominated by individual investors and most foreign investors are institutional investors, this argument is also plausible. Chen, Lee and Rui (2001) also used the Granger causality test to examine the direction of the information flow between A and B shares markets in China. Their result, nevertheless, turned out to be that there was no significant one-way casual direction between A shares returns (or volatility) and B shares returns (or volatility), which is not consistent with the results of either Chakravarty et al. (1998) or Chui and Kwok (1998). In their panel data analysis, they used firm size as a proxy of asymmetric information as

Bailey and Jagtiani (1994) did, but their result was not consistent with the asymmetric information hypothesis.

2.5 Behavioral hypothesis

Chen, Lee and Rui (2001) argue that the premium for A shares market is caused by overvaluation of domestic shares rather than discounting of foreign shares required by foreign investors. In their analysis based on a dynamic rational expectations model, B shares' prices moved more closely with market fundamentals. They explain this by possible irrational factors.

3. Background for the Chinese Stock Market

The Chinese stock market was born as a big step in the economic reforms begun in the 1980s. Unlike developed markets like the United States, the Chinese stock market has only a short history, of about 20 years. Some related markets, like bonds, funds, and the foreign exchange market also have short histories. This history leads to some unique characteristics of the Chinese stock market and creates a background for finance research in China.

3.1 Different share types and non-tradable share reform

From the very beginning, one important political "mission" of the Chinese stock market has been to help reform SOEs (state owned enterprises). At the same time, there are worries on the part of the leadership that the speed of reform may be too fast that the reform may lead to "leakage" of state owned assets. As a result, shares of the companies were divided into different classes. Each class has the same voting rights and dividends but different costs. There are three major classes of shares in the Chinese market. First, there are government shares that cannot be traded, to prevent losing control of certain companies. This class occupies a large proportion in the structure of ownership. Second, there are legal entity shares owned by other SOEs and government controlled entities. Legal entity shares are not tradable on the Shanghai and Shenzhen exchanges. Third are public shares, which can be traded. Public shares include employee shares, A shares, which are domestically owned and traded on two major exchanges, B shares, which are foreign owned and traded on the Shanghai and Shenzhen exchanges as well and H shares, which are listed and traded in Hong Kong.

However, this design has some obvious flaws. First, because the major shareholders' stocks (essentially the government shares and legal entity shares) are not

tradable, there is a severe problem concerning corporate governance. In particular, the board of directors and management do not care about share prices. This also divides shareholders into different group, which creates conflicts of interest between shareholders. Major shareholders often bully tradable shareholders when they make finance and capital decisions. In addition, this design makes the market inefficient. For example, M&A is almost impossible and the company's business is isolated to the stock market under this mechanism.

In order to solve the problems brought on by non-tradable shares, the Chinese government decided to embark on non-tradable share reform in 2005. This reform is intended to make non-tradable shares tradable, but non-tradable shareholders need to compensate tradable shareholders in the form of special dividends, bonus shares or warranties, because non-tradable shares were acquired at much lower cost. This reform took several years to complete because it involved a great deal of negotiation and bargaining between non-tradable and tradable shareholders.

3.2 Specially Treatment (ST) Stocks in China

Special Treatment (ST) Stocks are a unique market mechanism in China. It was released in 1998. According to the rule, stocks that are in a "special situation" are "specially treated." The "special situation" basically means two situations: 1) the net earnings of the stock have been continuously negative for two years; 2) the book value of the equity is lower than the par value of the stock, which is usually 1 RMB in China. Generally speaking, ST stocks tend to be junk stocks..

If the ST stock is not able to make its net earning positive within one year, its listing will be suspend. After six months, the stock will be delisted if the company still cannot make a profit.

ST stocks would have "ST" placed in front of their stock ticker in order to warn investors of the delisting risk. The upper and lower daily price movement limit for an ST stock is 5% instead of 10%, which is the limit for other regular stocks.

ST stocks also have a different price movement pattern. The correlation of the ST index and Shanghai composite index is only -0.0888 in the sample period. These indexes are presented in Figure 1.

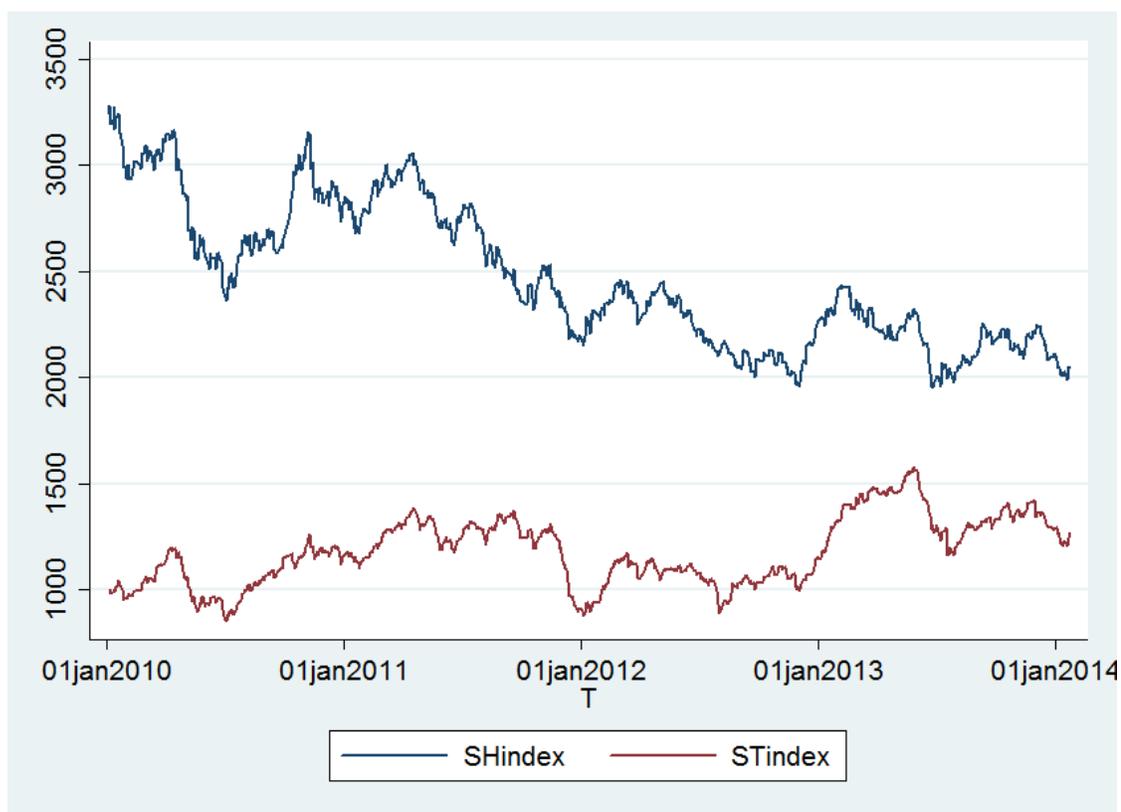


Figure 1 The Shanghai composite index and ST index, 2010-2014. The data is from 01 January 2010 to 24 January 2014. The ST index is calculated by the WIND database firm.

4. Classic Theories, ST Stocks and Empirical Analysis for the A-H Premium Puzzle

4.1 Data

The data used in this paper is provided by the WIND database, which is a major finance database in China. The sample includes all available data for the premiums of A-H cross listed companies. The A-H premium is calculated when both A-H prices are available. If the company gets listed in Hong Kong first, we start calculating the premium when it gets listed in main land China and vice versa. The data ranges daily from 01 January 2010 to 14 January 2014.

The formula used to calculate the A-H premium is as follows:

$$Premium_t^i = \frac{Adjusted\ Price A_t^i}{Adjusted\ Price H_t^i \times Exchange\ Rate_t} - 1$$

In calculating the premium, most previous studies failed to consider two factors that would cause bias in the sample. The first is different timing of execution of stock split and dividends. Second is the impact of non tradable share reform. Using adjusted price instead of regular price in the sample would solve both problems.

Even though A shares and H shares in China have the same voting rights and dividends, they have different time tables. For example, Anhui Conch Cement has exercised a 10 for 10 bonus for H shares (0914.HK) and A shares (600585.SZ) on 30 Apr 2010 and 21 Jun 2010 respectively. Between 30 Apr 2010 and 21 Jun 2010, one A share essentially equaled two H shares. If the traditional method applied by most previous studies is used, the premium will be upward biased.

Starting in 2005, the Chinese government launched non tradable share reform. During the reform, non-tradable shareholders would compensate tradable shareholders in the form of special dividends, bonus shares or warranties, which were worth

approximately 30% of the market value of tradable shares. This special compensation is only available to A shareholders and could explain a significant proportion of the premium, though the premium still existed after adjustment of ex-right. This means that A shares essentially had more rights than H shares before the reform. The traditional method would mistakenly estimate the premium upward, as well.

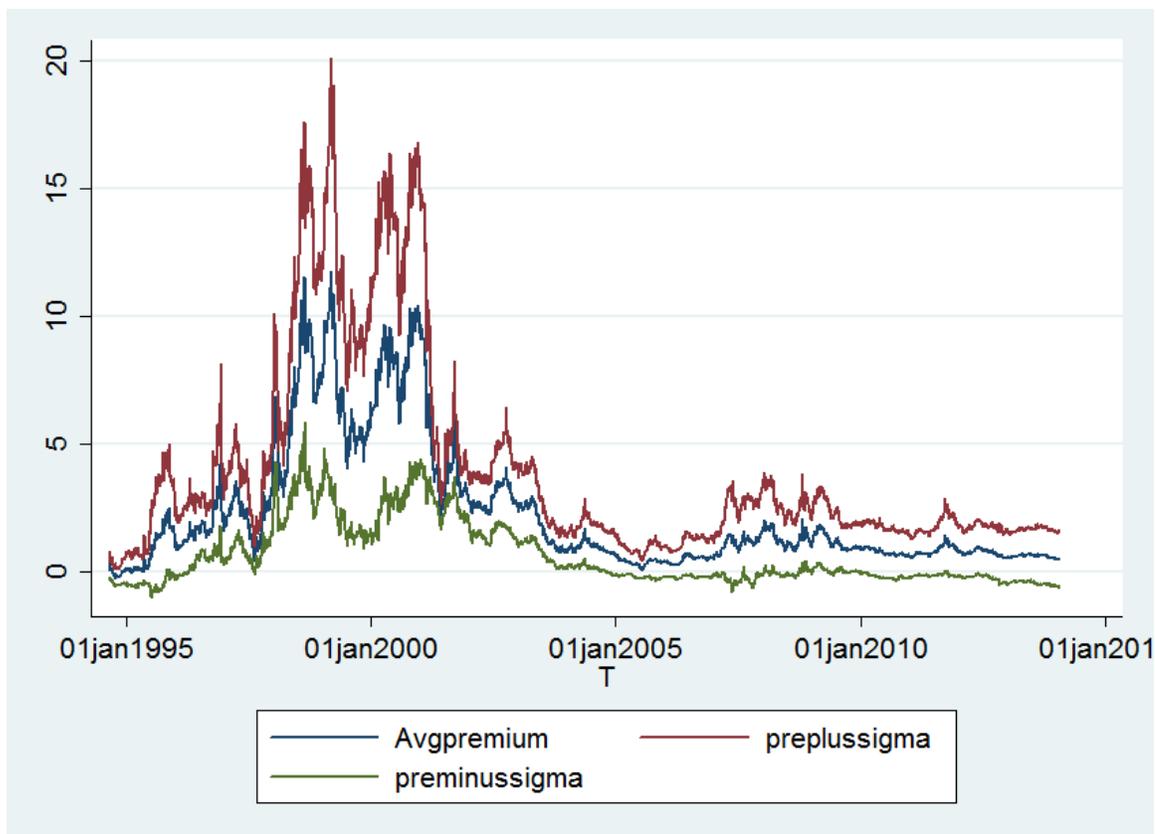


Figure 2 The average A-H premium, 1994-2013. The sample is daily from 01 September 1994 to 24 January 2014. The upper and lower band represents the average premium plus/minus one standard deviation. At the beginning date of the sample, there are only 6 companies dual-listed in mainland China and Hong Kong with an average premium of 20% . At the end date of the sample, there are 84 companies dual-listed with an average premium of 54%. The average premium reached a peak at more than 11-fold at 15 March 1999. The lowest point of the average premium was on 18 October 1994, with the number at -23%. There are only 39 days with negative premium in the sample.

Figure 2 represents the time-series of the average A-H premium with a band of plus or minus one (cross-sectional) standard deviation beginning in 1994. Though only data after 2010 are used in this paper, the picture is able to provide us the brief history of the A-H premium. The average premium reached the peak of more than 11-fold on 15

March 1999, which is a huge number compared to other markets with similar puzzles. The premium is almost always significantly positive. Even with a declining trend, the value of the average premium of 54% in 24 January 2014 is still very high.

Hang Seng Indexes Company released the Hang Seng A-H Premium Index (HSAHP) in 2006. The method they applied is the weighted average rather than arithmetic average method applied in this paper. However, the time series movements of average premium and HSAHP are very similar. HSAHP is always lower than average premium in the sample period, which means that companies with larger market capitalization tend to have lower premiums.

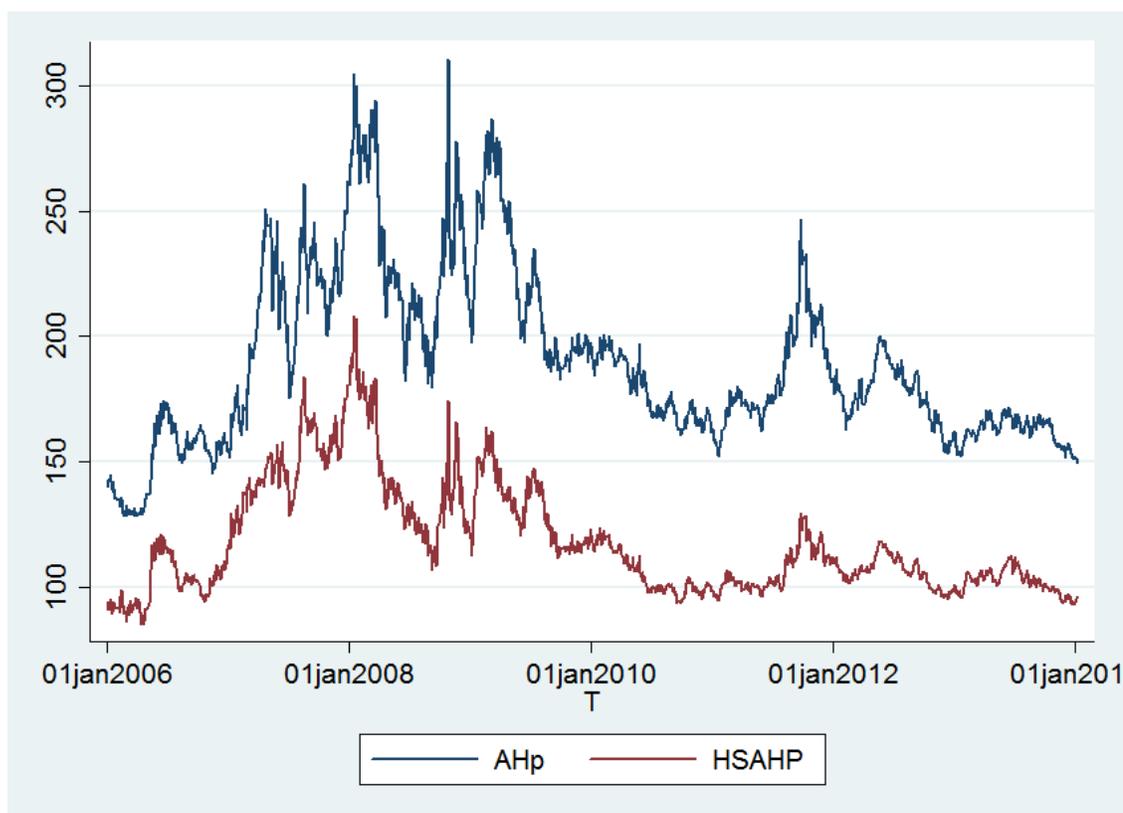


Figure 3 Average premium and Hang Seng A-H Premium Index (HSAHP), 2006-2014. Hang Seng A-H Premium Index (HSAHP) represents the ratio of total market capitalization calculated by A shares prices to total market capitalization calculated by H shares prices for A-H dual listed companies. The higher line in the figure represents the average premium plus one in order to convert premium into the comparable ratio.

4.2 Methodology

Based on four classic hypotheses (differential risk hypothesis, differential demand hypothesis, liquidity hypothesis and asymmetric information hypothesis), several proxies are used in this paper to capture these factors as has been done in previous work. The objective of this regression is to examine whether these hypotheses hold or still hold for recent data. It is also helpful for us to provide some useful evidence in the analysis for the A-H premium puzzle. These hypotheses and factors are not isolated and their explanatory power also needs to be examined in detail.

Risks and their loadings, as indicated by classic finance theory, should be the major causes of different required return rates. In the CAPM framework, the appropriate risk measure used in pricing is beta and the required return should be set by different betas to different equilibrium portfolios. In the Chinese case, if we assume market segmentation, the required return of A shares should be determined by the risk exposed to the Chinese market portfolios and the required return of H shares should be determined by the risk exposed to the world equilibrium market portfolio. Bailey and Jagtiani (1994) used betas as the measure of risk. Some other previous work (See E.G. Chan and Kwok (2005)), however, used total risk (variance or standard deviation) as a proxy of risk because it was believed to be a better measure of risk in emerging markets. In this paper, I choose both standard deviation of returns (total risk) and betas as measures of risk. If the hypothesis holds, it would be expected that the A-H premium declines as relative total risk increases, if we assume that investors in both the Chinese domestic market and Hong Kong market are risk averse. Otherwise, if the Chinese domestic investors are still "risk seeking" as described by Ma (1996), the A-H premium should have positive and significant exposure to risk factors.

According to the differential hypothesis, the relatively high A-H premium is the result of a large demand for stocks from domestic investors and a limited supply of

stocks. The hypothesis implies when there is a greater supply of A compared to H shares, the A-H premium will decline. Considering that non-tradable A shares cannot determine price, I use the ratio of the number of free floating A shares to the number of H shares as a measure of relative A-H stocks supply, as did most previous work.

The liquidity hypothesis predicts that the A-H premium will be higher if A shares are more liquid than H shares because investors tend to require higher returns for illiquid stocks. Bailey and Jagtiani (1994) used the ratio of volume of alien shares to total shares outstanding as a measure of relative liquidity, while relative turnover ratio is also a popular proxy to measure relative liquidity. I apply both measures in this paper. The liquidity hypothesis predicts that the A-H premium should rise as the relative liquidity ratio increases.

Asymmetric information is usually measured empirically by firm size. It is asserted that bigger companies tend to have more information available to international investors. If this hypothesis holds, we should find the firm size negatively correlated with the A-H premium. In the context of the Chinese market, I posit that total firm value (calculated by total number of shares outstanding) is a better to measure firm size, as opposed to free floating firm value (calculated by number of free floating shares), because there is a possibility that some big companies have a large proportion of non-tradable shares for political reasons and free floating firm value would distort the information. As predicted by Figure 3, firm size should be significantly negatively correlated with the A-H premium.

The regression method is similar to Bailey and Jagtiani (1994) and Ma (1996). The regression formula and explanations are as follows:

$$\begin{aligned}
 Premium_{it} = & a + b_1 * Risk\ factor_{it} + b_2 * Supply\ factor_{it} + b_3 \\
 & * Liquidity\ factor_{it} + b_4 * Asymmetric\ information\ factor_{it} \\
 & + \varepsilon_{it}
 \end{aligned}$$

Where

$Premium_{it}$ = Daily A-H premium for stock i at time t . The period starts from 01 January 2010 to 24 January 2014;

$Risk\ factor_{it}$ = Betas against different markets (represented by the Shanghai Composite Index or MSCI World Index for either A or H shares) for stock i or the standard deviation of A shares return/standard deviation of H shares return for stock i at time t ;

$Supply\ factor_{it}$ = Ratio of Number of free floating A shares/ Number of H shares for stock i at time t ;

$Liquidity\ factor_{it}$ = Turnover of A shares (calculated by number of free floating A shares)/turnover of H shares or volume of A shares/volume of H shares for stock i at time t ;

$Asymmetric\ information\ factor_{it}$ = Total market capitalization of stock i at time t .

4.3 Empirical results of pooled OLS regression

Table 1 summarizes the results of the regressions. The regression is based on pooled OLS method.

First, the coefficients of risk factors are positive but not significant statistically. This does not support the conclusion made by most previous research about Chinese investors, which is that Chinese investors are risk seekers (See E.G. Ma (1996); Chan and Kwok (2005)). (Actually it is questionable to say that Chinese domestic investors are risk seekers here based only on the positive exposure of the A-H premium to risk factors. Detailed discussion is included in later sections). The reason why risk factors are not significant is that the double clustering robust standard error are used in this paper. As pointed out by Thompson (2011) more robust standard error formulas tend

to have less bias, but more variance. Actually, in unreported results, the coefficients of risk factors are significant if white robust standard error or standard error clustered by time are applied, which is consistent with the result of previous work where white robust standard error is commonly applied. (See E.G. Ma (1996)). The sign of coefficient of risk factors is the major difference between the Chinese stock market and other international markets. For example, Hietala (1989), in his analysis of Finland's market, found that the exposure of the premium to risk factor is negative.

Second, the result provides supporting evidence for the differential demand hypothesis. The A-H premium is negatively correlated with relative supply of A to H shares. This means that when a company chooses to issue more A shares compared to H shares, the A-H premium will drop. This result is consistent with the argument that Chinese investors have fewer alternative investment opportunities and the A-H premium was caused by a limited supply of A shares.

Third, the liquidity hypothesis also has some explanatory power for the A-H premium. The coefficient of A-H turnover ratio is positive and highly significant, which is consistent with the prediction given by the hypothesis. It indicates that when A shares have more liquidity than H shares, the prices of A shares tend to be higher. This is also consistent with most results from previous work (See E.G. Ba (2008)). The other liquidity indicator, the A-H volume ratio, is also statistically significant and positive.

Fourth, as predicted by the asymmetric information hypothesis, firm size has a significantly negative correlation with the A-H premium. This can also be observed and predicted by Figure 3. This result is consistent with that of Bailey and Jagtiani (1994) and Ba (2008), but not with Chan and Kwok (2005) or Chen, Lee and Rui (2001). A possible reason is that their data concerns an early period and the situation has changed with time.

Table 1 Regression Results for Classic Theories

Panel A summarizes the regression results. The panel data is daily from 01 Jan 2010 to 24 Jan 2014 including 84 companies cross listed in both mainland China and Hong Kong. Pooled OLS is used in these regressions. The company A-H premium is regressed on proxies of classic hypotheses, including the differential risk hypothesis, differential demand hypothesis, liquidity hypothesis and asymmetric information hypothesis. For the risk factor, betas and total risk are both applied. The number of free floating A shares divided by the number of H shares is the proxy for the security supply. Both relative turnover ratio and volume ratio are used as liquidity proxies. Firm size is used as the proxy for asymmetric information, as in previous work. Double-clustered t-statistics by firms and time are reported in parentheses beneath each efficient estimate.

Constant	Risk			Supply/Demand	Liquidity		Asymmetric information	Number of observations	Adj-R ²
	Beta of A shares	Beta of H shares	Standard deviation of return A/Standard deviation of return H	Free floating shares A / Shares outstanding H	TurnoverA/TurnoverH	VolumeA/VolumeH	Log Firm size (total)		
10.20114			0.14297	-0.08567	0.00295		-0.38254	68006	0.4263
(7.45)			(1.12)	(- 2.36)	(4.46)		(- 7.13)		
10.21644			0.15202	-0.08971		0.00140	-0.38294	68006	0.4237
(7.41)			(1.16)	(- 2.47)		(2.25)	(- 7.08)		
9.99070	0.10283	-0.52938		-0.09400	0.00296		-0.35556	68016	0.4322
(5.90)	(0.30)	(- 1.18)		(- 2.63)	(4.20)		(- 5.49)		
10.00650	0.11171	-0.53989		-0.09829		0.00130	-0.35566	68016	0.4295
(5.87)	(0.33)	(- 1.20)		(- 2.73)		(2.16)	(- 5.47)		

4.4 BetaST and the A-H premium

In addition to proxies of classic theories, the exposure of return to the return of the ST index is found to have significant explanatory power for the A-H premium.

ST (Special Treatment) stocks are a special mechanism of the Chinese stock market. When a company faces the risk of delisting, "ST" is added to the stock's ticker as a warning to investors. These stocks tend to have negative earnings continuously for at least two years. Thus, ST stocks have extreme risk, which is a different dimension of risk than that captured by beta. The data also shows that they have different movement patterns than common stocks. Similar to the logic of the Fama-French three factor model, the return pattern of ST stocks deviated from the market portfolio represents the risk premium of delisting. The risk story predicts a positive sign of coefficient if Chinese investors are risk seekers, as described by previous research. In this case, Chinese investors would require lower returns for high risk stocks, while international investors require higher returns, which leads to a higher premium.

The result of regressions provide evidence that there is a significant link between the exposure of stocks to ST index returns and the A-H premium. This may help us understand the A-H premium from another perspective.

In the empirical analysis, the methodology is as follows:

First, the return of the ST index is regressed on the return of Shanghai Composite Index, which is a proxy for return of the market. The formula used in the regression is as follows:

$$ReturnST_t = \alpha + b_1 ReturnMarket_t + \varepsilon$$

The residual is the component that cannot be explained by return of the market, which may represent the risk premium of the delisting risk. It may also represent the tendency of speculation. It is orthogonal to the return of the market.

Then the return of each A share is regressed on the residual noted above to obtain the exposure to the factor. The formula used in the regression is as follows:

$$Return_{it} = \alpha + \beta_i ReturnSTresidual_t + \varepsilon$$

The beta loading β_i represents the exposure to the delisting risk, which is possibly another dimension of risk. This beta loading β_i is named as betaST.

Figure 4 shows the relationship between the betaST and the average A-H premium cross-sectionally. A relationship can be observed clearly that when the exposure to the return of ST index (orthogonal) is larger, the A-H premium is higher.

A more rigorous test is applied by pooled OLS regressions. The results of regressions in Table 2 indicates that betaST is significant both statistically and economically. Individually, it is able to explain about 53% of the variability in the A-H premium. The coefficient of betaST is 2.64, which means when betaST increases 0.5, the A-H premium tends to increase more than 100%. This result can explain why some stocks have extremely high premiums, like 500%.

It is also necessary to mention that only the liquidity factor keeps its explanatory power after betaST is added into the regressions while each classic proxy is significant statistically if regressed individually. This indicates that the explanatory power of classic proxies can be captured by betaST.

The positive coefficient of betaST, based on classic finance theory, means that in Chinese market investors tend to pay much higher prices for stocks that look like ST stocks that have the risk of being delisted, which is consistent with the plausible risk seeking story described in previous research.

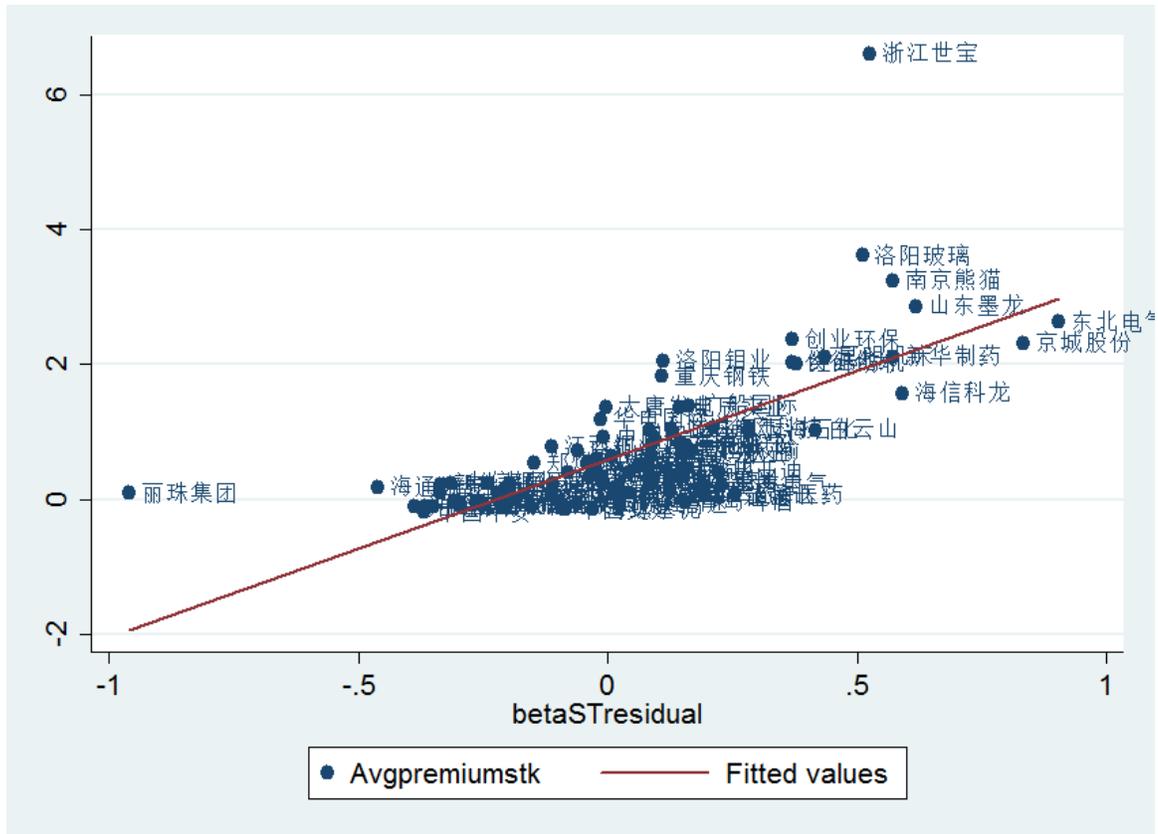


Figure 4 The average A-H premium of stocks and beta against the ST index. The data ranges daily from 01 January 2010 to 14 January 2014. The A-H premium is averaged for each company. The average premium ranges from -19.3% to 660% during the sample period. The betaST(orthogonal) ranges from -0.96 to 0.90.

Table 2 Regression Results with BetaST(orthogonal)

Panel A summarizes the regression results. The panel data is daily from 01 Jan 2010 to 24 Jan 2014 and includes 84 companies cross listed in both mainland China and Hong Kong. Pooled OLS is used in these regressions. The company A-H premium is regressed on betaST(orthogonal) and proxies of classic hypotheses, including the differential risk hypothesis, differential demand hypothesis, liquidity hypothesis and asymmetric information hypothesis. The number of free floating A shares divided by the number of H shares is the proxy for the security supply. Both relative turnover ratio and volume ratio are used as liquidity proxy. Firm size is used as the proxies for asymmetric information as in previous work. Double-clustered t-statistics by firms and time are reported in parentheses beneath each efficient estimate.

Constant	Risk			Supply/Demand	Liquidity		Asymmetric information	Number of observations	Adj-R ²
	Beta of A shares	Beta of H shares	BetaST	Free floating shares A / Shares outstanding H	TurnoverA/TurnoverH	VolumeA/VolumeH	Firm size (total)		
1.1152 (3.37)	1.1840 (3.47)	-2.1314 (- 4.44)						69194	0.17
0.5859 (10.78)			2.6395 (10.05)					69194	0.528
0.5032 (2.01)	0.2691 (1.08)	-0.2634 (- 0.73)	2.5401 (8.45)					69194	0.5316
0.7186 (7.78)			2.5696 (10.38)	-0.0543 (- 1.78)				69194	0.5355
0.5723 (1.00)			2.6068 (9.84)		0.0035 (6.62)			68016	0.5294
2.7248 (1.96)			2.2483 (6.36)				-0.0861 (- 1.54)	69194	0.5342
2.4561 (1.35)	0.1686 (0.57)	-0.2111 (- 0.55)	2.1400 (5.95)	-0.0544 (- 1.77)	0.0028 (5.45)		-0.0710 (- 1.04)	68016	0.5434
2.4714 (1.35)	0.1777 (0.60)	-0.2219 (- 0.58)	2.1412 (5.92)	-0.0584 (- 1.88)		0.0012 (2.33)	-0.0711 (- 1.03)	68016	0.5408

5. Risk, Speculation and the A-H Premium Puzzle

5.1 Risk seeking and speculation

The explanation of empirical results, particularly risk factors described by beta and beta_{ST}, needs more discussion.

One possible explanation for the strong and positive relationship between the beta_{ST} and the A-H premium is risk seeking as described by most previous work, which means Chinese investors have a negative risk premium and would required lower return for higher risk while Hong Kong investors need higher return as compensation for risk. As a result, the riskier the stock is, the larger discrepancy of required return rates the investors have and higher the A-H premium. However, the previous research that argues that Chinese investors are risk seekers is based only on the empirical result that the A-H premium has positive exposure to risk factors, such as beta, which means that the conclusion that Chinese investors are risk seekers is only inferred by the fact that the A-H premium have positive exposures to risk factors.

In order to estimate the risk premium of Chinese investors and test whether they are risk seekers, two stage Fama-Macbeth regressions (1973) are applied in this paper. Risk premiums of different risk factors for different groups of stocks are estimated. If the beta_{ST} represent the delisting risk, we should expect to see a negative risk premium according to the fact that the A-H premium have positive exposures to risk factors.

In the Fama-Macbeth regression, I assume that the Chinese A-share return is determined by two risk factors. One is the beta to the market and the other is the beta_{ST} (orthogonal). For Hong Kong H shares, I assume that beta to MSCI world and beta_{ST} (orthogonal) are the factors in the pricing model. I also separate the stocks into two sub groups according to whether they are included in the CSI 300 index or not,

because of the possible conditional effect that will be mentioned later. Though ST is unique in the Chinese A shares market, it is reasonable to assume that H shares may be affected by delisting risk as well. As a result, I assume β_i^{STr} is the same for both A and H shares.

Thus, for A shares, we assume:

$$Return_{it} = \alpha + \beta_i^M ReturnMarket_t + \beta_i^{STr} ReturnSTresidual_t + \varepsilon$$

Where:

β_i^M = the beta of A shares to Shanghai Composite Index

β_i^{STr} = the beta of A shares to the residual of ST index return.

For H shares, we assume:

$$Return_{it} = \alpha + \beta_i^{World} ReturnWorld_t + \beta_i^{STr} RiskPremiumST_t + \varepsilon$$

Where:

β_i^{World} = the beta of H shares to MSCI World Index

It needs to be noted that the β_i^{STr} is estimated from A shares Data and the β_i^{World} is estimated by single variable regression (estimated in the previous section). The underlying assumption is that $ReturnWorld_t$ and $RiskPremiumST_t$ are orthogonal. This is also consistent with the data. (The correlation between return of MSCI world index and $ReturnSTresidual_t$ is only -0.0009). The reason that I use this assumption is that the consistency for β_i^{World} estimated in the previous section can be kept.

Table 3 shows the result of Fama-Macbeth regressions. Most of the risk premiums estimated are not significant. However, for the group of stocks not included in the index, the investors indeed received compensation for the "delisting risk" they are bearing. The estimated risk premium of delisting risk is significant both statistically and economically. The estimated risk premium of delisting risk reached 0.12% per day, which is more than 20% per year. The large risk premium can be understood intuitively because delisting risk is an extreme risk. However, it is the opposite of our

expectation and contradictive to the risk seeking story described by previous research. If the risk premium is positive for Chinese domestic investors, the high risk loading should lead to a high required return and thus a low A-H premium.

One possible explanation for these contradictive results is that beta_{ST} represents not only the risk of delisting, but also the sensitivity to speculation, since junk stocks' return relative to market is a measure of speculation as well, because ST stocks tend to have highly subjective valuations and thus are easily influenced by investor sentiment (defined as propensity to speculate by Baker and Wurgler (2006)). In the regression of the A-H premium and risk factors, both the risk and speculation stories lead to similar predictions. The risk story predicts a positive sign of coefficient if Chinese investors are risk seekers as described by previous research. The speculation story also predicts a positive sign of coefficient because the demand of speculators would merely drive up the price. However, the risk premiums estimated by the Fama-Macbeth regressions provide evidence that Chinese investors do receive compensation for the risk they bear and are not risk seekers.

The risk story and speculative story can hold at same time. For example, when a stock tends to be "specially treated", the required rate of return indeed increased and the price should drop according to the equilibrium pricing model. However, the speculative demand also increases and leads to higher premium. This means that the risk factors may affect the A-H premium through both channels.

In conclusion, it is possible that Chinese investors are not real risk seekers. The A-H premium is probably a product of speculation. Nevertheless, whether this speculative demand is driven by irrationality of investors is not tested in this paper.

Table 3 Risk Premiums Estimated by Fama-Macbeth Regressions

Panel A summarizes the Fama Macbeth regression results. The panel data is daily from 01 Jan 2010 to 24 Jan 2014, and includes 84 companies cross listed in both mainland China and Hong Kong. The estimated risk premium for each risk factor is reported. t-statistics are reported in parentheses beneath each coefficient estimate. In the Fama-Macbeth regression, Chinese A shares and H shares are assumed to be priced by two risk factors models (classic beta/betaworld and betaST). Risk premiums are estimated by two subgroups according to indexing.

	Beta	Betaworld	BetaST	Number of Days
A shares Risk Premium	0.0002		0.0005	957
	(0.31)		(0.99)	
Not Indexed	-0.0004		0.0012	957
	(- 0.53)		(2.03)	
Indexed	0.0003		0.0007	957
	(0.49)		(0.84)	
H shares Risk Premium		-0.0005	0.0005	957
		(- 0.60)	(1.04)	
Not Indexed		-0.0007	0.0011	957
		(- 0.64)	(1.48)	
Indexed		-0.0005	0.0010	957
		(- 0.60)	(1.37)	

6. Discussion of Speculation on the A-H Premium Puzzle

In addition to betaST, limits of speculation and noise trader demand may also play an important role on the topic of the A-H premium. It is expected that limits of speculation has a negative relation to the A-H premium and that noise trader demand has the positive coefficient.

In empirical analysis, I include whether the stock is included in the CSI 300 index or not as a dummy variable as a proxy of limits of speculation. The CSI 300 Index is the underlying index for the index future of the Chinese stock market. For stocks included in the index, there are more investors involved and tools to exploit mispricing. As a result, indexed stocks tend to be more difficult to speculate on. The individual holding is used as noise trader demand as described by Shiller (1984).

After adding these two variables, the function of the regression can be represented as:

$$Premium_{it} = \alpha + b_1' \mathbf{X}_t^i + b_2 \emptyset_i + b_3 Y_{it} + \varepsilon$$

where i represents stocks, t is time, \mathbf{X}_t^i is a vector of firm characteristics (classic factors proxies and betaST), \emptyset is a proxy for limits of speculation and Y_{it} is the individual investor holding level as the proxy for noise trader demand. This equation predicts that the A-H premium is not only affected by different required rates and speculation caused by firm characteristics \mathbf{X}_t as classic theories and the speculation story describe, but also would be affected by limits of speculation \emptyset and noise trader demand Y_{it} .

Table 4 includes the result of regressions with the proxy of limits of speculation and noise trader demand. The coefficient of the proxy of noise trader demand is not significant. One possible reason for this is that the data for individual holding level is quarterly and with low variability. Another reason is that the betaST has already

captured the effect of noise trader demand. The coefficient of the indexing dummy, however, is significantly negative. After controlling for firm size and betaST, the stocks included in the index tend to have lower premiums by about 40%. It is consistent with the speculation story that stocks that hard to speculate tend to have lower premiums.

Table 4 Regression Results with Limits of Speculation and Noise Trader Demand

Panel A summarizes the regression results. The panel data is daily from 01 Jan 2010 to 24 Jan 2014, and includes 84 companies cross listed in both mainland China and Hong Kong. Pooled OLS is used in these regressions. The company A-H premium is regressed on proxies of limits of speculation, noise trader demand and classic hypotheses, including the differential risk hypothesis, differential demand hypothesis, liquidity hypothesis and asymmetric information hypothesis. For the risk factor, betas are applied. The number of free floating A shares divided by the number of H shares is the proxy for the security supply. Both relative turnover ratio and volume ratio are used as liquidity proxies. Firm size is used as the proxy for asymmetric information as in previous work. The dummy variable of indexing is the proxy for limits of speculation. The individual holding is a proxy of noise trader demand. Double-clustered t-statistics by firms and time are report in parentheses beneath each efficient estimate.

Constant	Risk			Supply/ Demand	Liquidity		Asymme tric infor mation	Indexing	Individu al invest or holdin g	Number of obser vations	Adj-R ²
	Beta of A shares	Beta of H shares	BetaST	Free floa ting shar es A / S hares out standing H	Turnove rA/Turn overH	Volume A/Volu meH	Firm siz e (total)				
0.29539	0.34807	-0.27363	2.1453	-0.05499	0.00295		0.02341	-0.39697	-0.02402	66907	0.5645
(0.15)	(1.24)	(- 0.73)	(5.83)	(- 1.73)	(6.04)		(0.33)	(- 2.33)	(- 0.34)		
0.26038	0.35650	-0.28296	2.1518	-0.05776		0.00113	0.02508	-0.40142	-0.02128	66907	0.562
(0.13)	(1.27)	(- 0.75)	(5.82)	(- 1.80)		(2.16)	(0.35)	(- 2.36)	(- 0.30)		
7.55958	0.28246	-0.59144		-0.08605	0.00335		-0.25497	-0.41345	0.03167	66907	0.4545
(4.00)	(0.89)	(- 1.34)		(- 2.15)	(5.84)		(- 3.55)	(- 2.06)	(0.35)		
7.54415	0.29164	-0.60290		-0.08933		0.00131	-0.25401	-0.41853	0.03495	66907	0.4512
(3.98)	(0.91)	(- 1.36)		(- 2.23)		(2.10)	(- 3.52)	(- 2.09)	(0.38)		

7. Chinese Market Character and the A-H Premium Puzzle

Previous research (E.G. Ba(2008)) indicates that the underlying driver of the A-H premium may be different for different groups of stocks. One possible explanation based on the speculative story is that there is an interact effect between limits of speculation and speculative demand, which is similar to the conditional effect depicted by Baker and Wurgler (2006). Considering that stocks may have different properties depending on limits of speculation, I divided Chinese stocks into two groups based on the indexing dummy variable as a proxy of limits of speculation. The group included in the index, like banks and petroleum companies, should has smaller conditional effect. The other group, which is easily affected by speculative demand, should have larger conditional effect.

Figure 5 shows the results of double sorting to describe both the unconditional and conditional effect between beta and indexing to the A-H premium. In Figure 5, the average A-H premium of stocks not included in the index (blue bars) is always higher than the average premium of stocks included in the index (red bars). The average premium also increases along with the beta level. These describe the unconditional effects of limits of speculation and speculative demand on the A-H premium. As for the conditional effect, we can observe that the difference of premiums between stocks included in the index and the stocks not included in the index increases along with the beta level.

Figure 6 depicts the results of double sorting to describe both the unconditional and conditional effects between beta and indexing on the A-H premium similar to Figure 5.

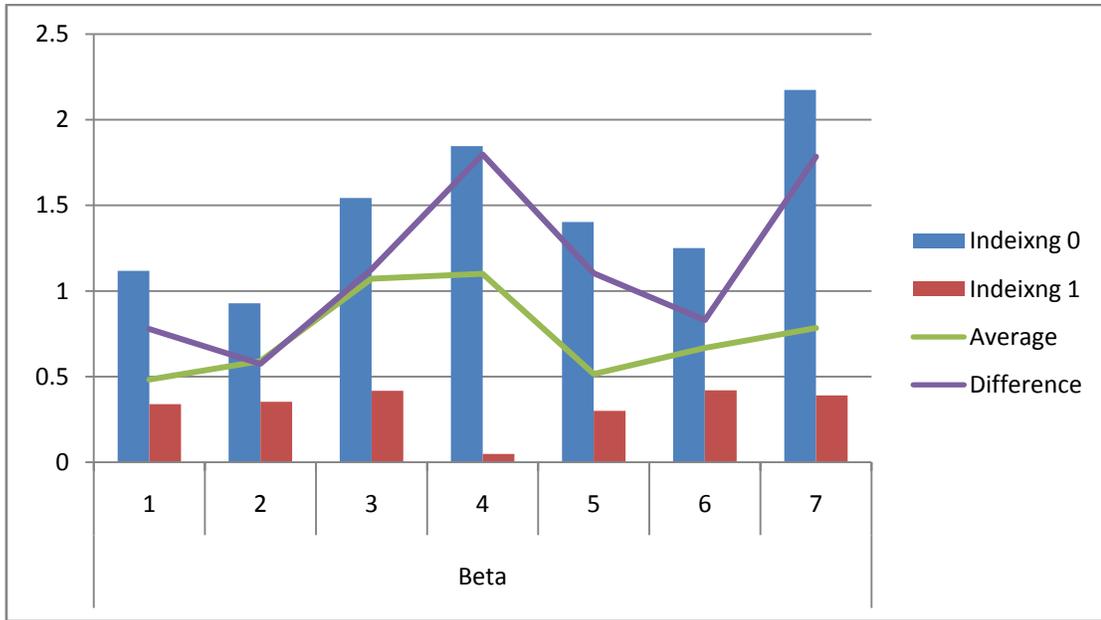


Figure 5 Two-way sorts: The unconditional and conditional effects of risk factor and limits of speculation. The observations are sorted into ten groups according to total risk ratio level. The blue bar is the average premium of stocks not included in the CSI 300 index. The red bar is the average premium of stocks that is included in the index. The green line is the average premium at different relative beta levels. The purple line represents the difference of premium between stocks included in the index and stocks not included in the index at different relative beta levels.

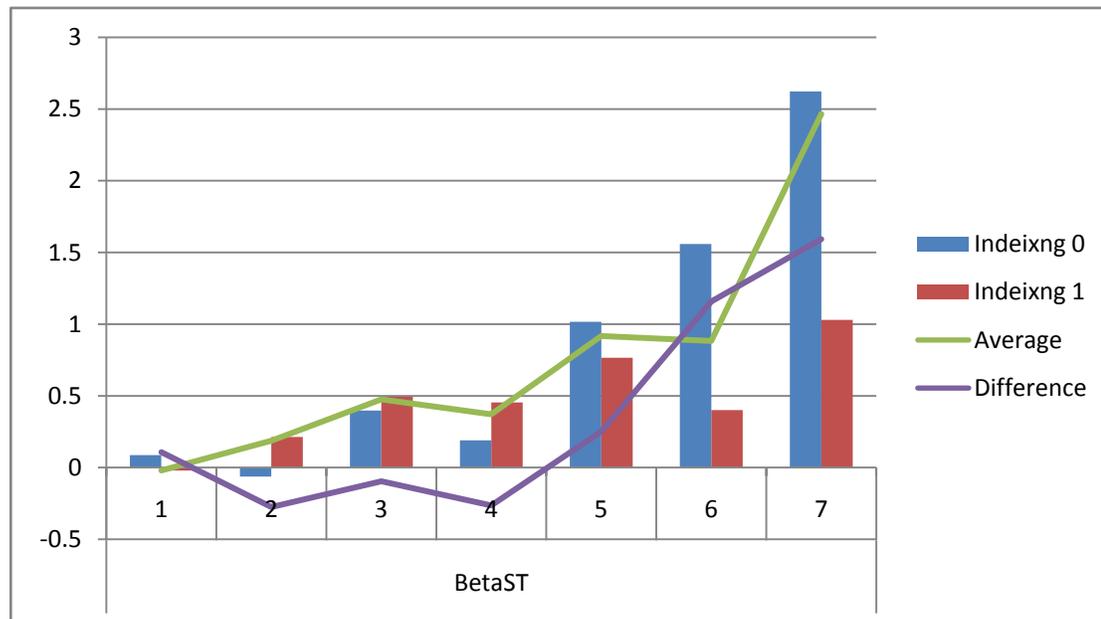


Figure 6 Two-way sorts: The unconditional and conditional effects of betaST and limits of speculation. The observations are sorted into ten groups according to betaST level. The blue bar is the average premium of stocks not included in the CSI 300 index. The red bar is the average premium of stocks included in the index. The green line is the average premium at different relative betaST levels. The purple line represents the difference in premiums between stocks included in the index and stocks not included in the index at different relative betaST levels.

To capture the "conditional effect" and test it more rigorously, I add cross terms into the "unconditional effect" regressions. The regression can be represented as:

$$Premium_{it} = \alpha + \mathbf{b}'_1 \mathbf{X}_t^i + b_2 \Phi_i + b_3 \Phi_i Beta_i + b_4 \Phi_i BetaST_i + \varepsilon$$

where i represent stocks, t is time, \mathbf{X} is a vector of firm characteristics (classic factors proxies and betaST(orthogonal)), Φ is a dummy variable of indexing as a proxy of limits of speculation. The cross term between dummy variable of indexing and beta or betaST(orthogonal) is added to capture the possible "conditional effect" model. According to the speculative story, for stocks difficult to speculate on, the speculative demand would have stronger impact on the premium.

The results of regressions in Table 5 shows that the two group of stocks divided based on indexing have significantly different patterns. For stocks included in the index, the partial effect of betaST on the A-H premium would drop sharply as captured by the cross term. This implies that for stocks not included in the index, speculative demand may be the major reason driving the A-H premium up. However, for stocks included in the index, the coefficients of risk factors are much lower, indicating that the speculation and risk effects probably cancelled each other out and have no effect generally.

In conclusion, the Chinese stock market has a "conditional" character on the A-H premium issue. This structure is possibly caused by the limits of speculation, which finally makes the A-H premium varies hugely for different companies.

The conditional character of the A-H premium issue is also found by Ba (2008), who found that high premium stocks have different patterns than low premium stocks. However, he did not point out the underlying reason why the group should be sorted by premium levels. In this paper, the speculative story explains the underlying logic.

Table 5 Regression Results with Risk Factor Cross Term

Panel A summarizes the regression results. The panel data is daily from 01 Jan 2010 to 24 Jan 2014. Pooled OLS is used in these regressions. The A-H premium is regressed on proxies of limits of speculation, cross terms and classic hypotheses, including the equilibrium pricing hypothesis (differential required returns or differential expectations), differential demand hypothesis, liquidity hypothesis, and asymmetric information hypothesis. For the risk factor, betas and betaST are both applied. The number of free floating A shares divided by the number of H shares is the proxy for the security supply. Both relative turnover ratio and volume ratio are used as liquidity proxies. Firm size is used as the proxy for asymmetric information as in previous work. The dummy variable of indexing is the proxy for limits of speculation. Double-clustered t-statistics by firms and time are reported in parentheses beneath each efficient estimate.

Constant	Risk			Supply/Demand	Liquidity		Asymmetric information	Indexing	Indexing* Beta	Indexing* BetaST	Number of observations	Adj-R ²
	Beta of A shares	Beta of H shares	BetaSTresidual	Free floating shares A / Shares outstanding H	Turnover A/Turnover H	VolumeA/VolumeH	Firm size (total)					
2.2739	0.2659	-0.2624	2.9869	-0.0572	0.0020		-0.0707	-0.0415		-2.3724	68016	0.6237
(1.32)	(1.12)	(- 0.79)	(5.46)	(- 2.37)	(2.93)		(- 1.08)	(- 0.28)		(- 4.23)		
2.3019	0.2772	-0.2765	2.9941	-0.0598		0.0002	-0.0714	-0.0432		-2.3878	68016	0.6220
(1.33)	(1.17)	(- 0.83)	(5.43)	(- 2.43)		(0.67)	(- 1.08)	(- 0.29)		(- 4.21)		
0.0212	1.2049	-0.2951	2.0109	-0.0517	0.0024		-0.0045	0.7813	-1.0753		68016	0.5720
(0.01)	(2.30)	(- 0.80)	(6.02)	(- 1.85)	(3.49)		(- 0.07)	(1.28)	(- 2.07)			
2.0622	0.9952	-0.2671	2.8572	-0.0589	0.0018		-0.0935	0.9575	-0.9134	-2.3135	68016	0.6324
(1.22)	(2.10)	(- 0.80)	(5.42)	(- 2.46)	(2.39)		(- 1.43)	(1.79)	(- 1.98)	(- 4.29)		
2.093	1.019	-0.282	2.863	-0.061		0.00004	-0.095	0.974	-0.929	-2.329	68016	0.6310
(1.23)	(2.14)	(- 0.85)	(5.40)	(- 2.50)		(0.11)	(- 1.44)	(1.82)	(- 2.01)	(- 4.28)		

8. Conclusion

The A-H premium is a long lasting phenomenon in the Chinese stock market. However, explanations given by street views and academic research are not consistent on this topic. In this paper, I provide evidence that the classic hypotheses may only partially explain the topic. In addition, I also find some evidence that the exposure to the returns of the ST index is able to explain the A-H premium significantly. Though the exposure to the return of ST index represents both delisting risk and degree of speculation, this paper points out that it is speculation that drives up the A-H premium and that Chinese investors are not actually risk seekers based on the Fama-Macbeth regression, which is different from the conclusion of previous research. This paper also argues that the Chinese stock market has "conditional" character. Specifically, because of some reasons including politics and market design, the cross listed stocks not included in the CSI 300 index tend to have high premium and be affected easily by speculative demand.

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