Financial Liberalization and the H-A Price Differential in the Chinese Stock Markets: Effects of the Split-Share Structure Reform and QFII & QDII Schemes

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Abstract

We study the discount on H-share prices relative to A-share prices of Chinese securities traded both on their home stock exchanges and on the Hong Kong stock exchange and its relation to the degree of financial liberalization in China. Using a newly constructed dataset covering 59 cross-listed Chinese companies, we find that the H-A price differential was significantly reduced as a result of the split-share structure reform implemented from 2005 to 2007 and the increase in investment brought about by the Qualified Foreign Institutional Investors (QFII) and the Qualified Domestic Institutional Investors (QDII) schemes, after controlling for expected exchange rate change, investor sentiment, and other variables. The evidence suggests that the gradual liberalization of China's capital market has had a crucial impact on the valuation of H-shares and A-shares.

*JEL classification***:** G14; G15

Keywords: Split-share structure reform, QDII, QFII, H shares, A shares, China.

1. Introduction

Over the past decade or so, a considerable number of Chinese companies have raised capital on external stock exchanges, such as the Hong Kong stock exchange, in addition to the domestic stock exchanges in Shanghai and Shenzhen. In theory, as the shares traded in the different markets are issued by the same companies and their prices are presumably driven by the same long-term fundamental values, these securities should exhibit similar return-risk characteristics and their prices, after adjustment for the exchange rate, should not be affected by the difference in trading location (e.g., Jorin and Schwartz, 1986; Gultekin et al., 1989). However, large persistent price differentials have been observed for the shares of the same Chinese companies cross-listed in different financial markets. According to Peng and Chow (2007), the A-shares of Chinese companies (those traded on the Shanghai and Shenzhen stock exchanges) trading simultaneously on both a domestic stock exchange and the Hong Kong stock exchange enjoy a price premium ranging from 10% to 260% over their H-share counterparts (those traded on the Hong Kong stock exchange), with a market capitalization-weighted average of over 50%.

Several explanations have been proposed for this H-A price differential. The first is based on the discount-price model. It has been suggested that Chinese citizens require only a low return due to limited investment opportunities, and thus pay a higher price for A shares relative to H shares (e.g., Bailey, 1994; Li et al., 2005). An alternative explanation points to the importance of investor sentiment. Arquette et al. (2008), for example, show that the H-share discount on Chinese securities was significantly influenced by both changing exchange rate expectations and differences in investor sentiment from 1998 to 2006. Ma (1996) documents a positive relationship between A-share prices and the domestic beta risk, implying the prevalence of risk-seeking behavior among Chinese investors. A third explanation centers on the supply and demand of shares in the A-share and H-share markets. For instance, Sun and Tong (2000) argue that the co-existence of H-shares and B-shares (domestic shares traded in a foreign currency), coupled with the relatively small supply of A shares, makes the demand for H shares more elastic which, in turn, leads to low equilibrium prices for H shares.

This paper examines the H-A share price differential to determine whether it has been affected by the recent financial liberalization in China. Two major events of financial liberalization have taken place in China since 2000. First, the split-share structure reform (sometimes referred to as the non-tradable share reform) instituted

between 2005 and 2007 is one of the most important milestones in the evolution and liberalization of the Chinese capital market. Before 2005, the Chinese equity market was based on a split-share structure where the majority of the listed companies' shares were non-tradable. While this ensured strict state control over a great number of listed companies, it also caused significant liquidity, valuation, and corporate governance problems (Firth et al., 2010). The split-share structure reform during 2005-07 converted the non-tradable shares to tradable shares. This reform has significant implications for the valuation of H and A shares, and thus may affect the H-A price differentials.

The second major event of financial liberalization in China during the last decade has been the gradual easing of capital controls. Until recently, significant restrictions were imposed on foreign investors' access to A-shares and on mainland China investors' access to H-shares and this may have driven a wedge between H-share and A-share prices. Although this effect has been mentioned in various studies (e.g., Arquette et al., 2008), these studies have studied the effects of the dynamic changes that have been made to China's capital controls. Since 2002, the restrictions on capital outflow and inflow have begun to ease following the introduction of the Qualified Foreign Institutional Investors (QFII) and the Qualified Domestic Institutional Investors (QDII) schemes. The QFII scheme gives access to the A-share market to selected foreign investors, and the QDII

scheme allows certain mainland Chinese investors to trade H-shares. As of March 2010, the total approved investment quota under the QFII and QDII schemes had reached 80 billion USD. The H- and A-share markets have become more inter-connected as a result of the gradual lifting of capital accounts control and this also may affect the H-A price differential.

This paper contributes to the literature by examining whether and to what extent the split-share structure reform and the QFII and QDII schemes quantitatively affect the observed H-A share price differential. We argue that, while the split-share structure reform may have had a positive effect on the valuations of A- shares and H- shares, the subsequent increased price elasticity of the A-share market and the expectation of an increased supply of the A-shares reduced the H-A share price differential in the short run. However, the long-run effect is uncertain and remains to be seen. In addition, because the QFII and QDII schemes have made the A- and H-share markets significantly more interconnected, arbitrage conditions are thus more likely to hold. Accordingly, the resultant rise in the volume of investment under the QFII and QDII schemes caused the H-A price differential to decrease, *ceteris paribus*. Our empirical investigations provide strong support for this hypothesis. By implementing an estimation approach that extends the work of Arquette et al. (2008), we model the H-A share price discount as a function

of the split-share structure reform and the approved QFII and QDII quotas, after controlling for expected exchange rate changes, investor sentiment, and other variables. We find that the split-share structure reform and the expansion of the QFII and QDII schemes had a statistically significant effect in reducing the H-A price discount among Chinese companies that issued both A and H shares from 2003 to 2009. Our results are robust to alternative model specifications.

The remainder of this paper is organized as follows. Section 2 outlines the institutional background to the split-share structure reform and the QFII and QDII schemes. Section 3 explains the construction of the sample and the variable definitions. Section 4 presents the empirical results and Section 5 concludes the paper.

2. Financial liberalization in China since 2000

2.1 The split-share structure reform in China

The inefficiency of China's state owned enterprises (SOEs) has long been recognized in the literature (e.g., Qian 1996; Qian and Roland, 1996). Motivated by a strong desire to raise capital for Chinese enterprises and to achieve greater economic

efficiencies by establishing a "modern enterprise system" (Chen et al., 2002), China started to privatize small SOEs and corporatize large SOEs in the early 1990s, some of which were later publicly listed. To retain ultimate control over the semi-privatized SOEs, including those that were later publicly listed, the state created a split-share structure by separating the shares of the listed companies into tradable and non-tradable shares. The two classes of A-shares coexisted in the Chinese capital market before the split-share structure reform in 2005, and approximately 63% of the A-shares outstanding were non-tradable shares owned mainly by the Chinese government, its affiliates, and legal persons.

Although split-share structures are common around the world and typically warrant to owners different rights (Faccio and Lang, 2002), China's split-share structure had one unparalleled feature. The non-tradable shares entitled the holders to exactly the same voting and cash flow rights as the holders of tradable shares, except for the fact that the shares could not be traded publicly even after the company became listed. This resulted in a divergence of interest between the non-tradable shareholders and the tradable shareholders and caused many corporate governance problems in the listed companies. Chen et al. (2002) argue that the divergence of interest under the split-share structure is associated with a decline in the performance of China's public listing companies. The split-share structure also reduced the liquidity of the A-share market by

limiting the supply of A shares. Furthermore, it distorted the valuation mechanisms because the valuation of non-tradable shares was based on net asset value (NAV), while the open market determined the price of tradable shares.

After several failed attempts in 1999 and 2001, the China Securities Regulatory Commission (CSRC) initiated the split-share structure reform in April 2005, with the aim of converting non-tradable shares into tradable shares. The reform allowed the shareholders to bargain over the level of compensation the non-tradable shareholders should transfer to the tradable shareholders to make the previously non-tradable shares free-floating. The trial round of the reform involving four companies (Tsinghua Tongfang, Hebei Jinniu Energy Resources, Shanghai Zijiang Enterprise Group, and Sanyi Heavy Industry) proved to be a success and, in September 2005, the CSRC issued the "Measures on administration of split share structure reform of listed companies", which is the first official document providing details about the implementation of the reform. By January 2007, the reform was fully accomplished for 95% of China's publicly listed companies.

There are several reasons to believe that the reform could have influenced the valuation mechanisms for both the A and H shares. First, before the reform, the non-tradable state-owned shares could only be transferred privately to other government agencies, legal entities, and foreign investment firms subject to state approval. The

transfer price was typically based on the net book value per share, return on equity (ROE), return on investment (ROI), recent market price, or a reasonable price-to-earnings ratio. After the reform, these shares became tradable and their price was now determined by market forces. Second, as the reform gave all shareholders the same rights, the minority shareholders may have played an increased role in corporate governance and in affecting management decisions. Theoretically speaking, the reform opened the door for more mergers and acquisitions in the secondary market and may have strengthened the disciplinary rule of the market. This may have had positive effects on valuation. Third, the implementation of the reform resolved uncertainty about the timing of the reform and this may have also had a positive effect on the share prices[1]. Finally, as all the non-tradable shares became tradable, the supply of A shares increased significantly and, thus, the demand for A shares became more elastic (Sun and Tong, 2000). While the first three aforementioned factors affected the valuation of A-shares and H–shares alike, the final factor had a greater influence on A-share prices than on H-share prices.

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[1] In general, the Chinese stock markets reacted positively to the reform and posted an average return of 20% in a 21-day window around the time of the implementation of the reform plan.

2.2 Background of the QFII and QDII schemes

Chinese companies can issue shares on the domestic stock exchanges (such as A and B shares) and on overseas stock exchanges (such as H and N shares). The A-share market was a closed market only accessible by Chinese residents and institutions until 2001, whereas the B-share market was initially only for foreign investors, but was opened to domestic investors in 2001. H shares are issued by companies listed on the Hong Kong Stock Exchange (HKSE) and are traded in Hong Kong dollars, whereas N shares are listed on the New York Stock Exchange and are traded in US dollars. Compared to A-shares and H-shares, the B-shares and N-shares are characterized by low market value and trading volume. In this paper, we focus on the more liquid A- and H-share markets.

Until recently, the conversion of capital accounts was restricted in China, which meant the A-share and H-share markets were effectively segregated. In early 2002, the Chinese government decided to gradually open the capital market to foreign investors and launched the QFII scheme, which allowed qualified foreign institutional investors to trade Yuan-denominated stocks on the A-share market. Under this scheme, foreign institutional investors must obtain a license and an approved investment quota from the State Administration of Foreigner Exchange (SAFE) before participating in the A-share market. The first license was issued in May 2003 to UBS AG and Nomura Securities Co. and the

first approved investment quota of 0.35 billion USD was imposed in June 2003, although

the total amount increased rapidly thereafter. By March 2010, 88 foreign institutional

investors had obtained licenses under the QFII scheme, with the approved quota amounting

to 17.07 billion USD. Similar to the QFII scheme, the QDII scheme, which was

implemented soon after the approval of the first QFII investment, allowed certain domestic

financial institutions to invest in foreign bonds and stocks. Similar rules and regulations to

those of the QFII scheme have to be fulfilled before qualified domestic institutional

investors can invest in offshore markets. Since the first investment quota was approved in

December 2004, the number of qualified domestic investors and the approved investment

quota have both grown rapidly. By March 2010, 76 domestic institutional investors had

obtained licenses and the total investment amount had reached 64.26 billion USD. Figure 1

depicts the trends of the QFII and QDII schemes, and their combined approved quotas.

[Figure 1 here]

As shown in Figure 1, the approved quota of the QFII scheme increased steadily

between 2003 and 2010, which is consistent with the gradual opening up of the Chinese

capital market to foreign investors. According to the "Regulation on Domestic Securities

Investment by Qualified Foreign Institutional Investors," which was published on August

24, 2006 and came into effect on September 1 of the same year, a foreign institutional

investor cannot buy more than 10% of the total outstanding shares of a Chinese company listed on the A-share market. In addition, the proportion of outstanding A-shares of a Chinese company held by foreign investors cannot exceed 20%. Such limitations on QFII investment have effectively prevented foreign investors from taking over any publicly listed companies in China.

In comparison, the approved quota for the QDII scheme increased even more dramatically during the sample period, especially after 2004. For example, between July 2007 and August 2008, the approved QDII quota jumped from less than 20 billion to more than 50 billion USD, a growth rate of 250%. By the end of 2009, the approved quota for the QDII scheme was about three times the size of the approved QFII quota. According to the financial statements of the institutional investors participating in the QDII scheme provided by Windnet, more than 70% of QDII investment is focused on the Hong Kong market, with the overall investment being equivalent to about 7.5% of the total capitalization of H-shares on the Hong Kong market.

Under China's current regulatory system, the inflows and outflows of capital through the QDII and QFII schemes are the main, if not the only, legal sources of non-FDI capital that can cross the Chinese border and be invested in stocks. As there are also illegal "underground" capital flows between the mainland China and Hong Kong capital markets,

it is difficult to estimate the proportion of QDII and QFII funds in the overall capital flows between these two markets. Nevertheless, there is no doubt that capital flows under the QDII and QFII schemes have affected both markets considerably. The QDII and QFII schemes make it possible for arbitrage to take place between the mainland China and Hong Kong capital markets (Liu and Timmermann, 2010) which may in turn have a significant impact on the valuation of Chinese stocks cross-listed in these two markets.

3. Data and variable descriptions

Our sample consists of 59 Chinese companies for which the appropriate data series are available from Windnet and Bloomberg databases. Appendix Table 1 lists the names of these companies and the date from which trading information on their shares is included in the databases. Each of the 59 companies has an A-share listing on the Shanghai stock exchange (a few are listed on the Shenzhen stock exchange) and a corresponding H-share listing on the Hong Kong stock exchange. The Shanghai stock exchange accounts for approximately 75% of the total capitalization of the mainland China stock market. Our sample covers firms across a wide range of industries and includes almost all of the Chinese companies cross-listed on the mainland China and

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Hong Kong stock exchanges. Our sample period runs from January 2003 to December

2009. Consistent with Arquette et al. (2008), we focus on weekly data, rather than daily

or intra-day data.

We calculate the H-A discount ratio as:

$$H\text{-}A\ discount = \frac{H\ share\ price - A\ share\ price \times spot\ exchange\ rate}{A\ share\ price \times spot\ exchange\ rate}\ , \qquad (1)$$

where the spot exchange rate is measured as HKD/RMB. In general, the H-share price is

lower than the equivalent A-share price. Figure 2 shows the trend of the average H-A

discount during the period 2001 to 2009.

[Figure 2 here]

The H-A discount was nearly as large as 80% during 2001-2002. The price

differential then began to decrease in 2003, the year the first QFII investment was

approved. The H-A discount was close to zero in mid-2005. Between 2007 and 2009, the

gap widened again and then fluctuated at around 20-40%. Table 1 reports the summary

statistics of the H-A discount and the other variables included in our analysis.

[Table 1 here]

The main focus of this paper is on testing the effects of the split-share structure

reform and QFII and QDII investment on the H-A discount. The effect of the split-share

structure reform is captured by a dummy variable that takes the value "one" for the

period April 2005-January 2007 when the reform was carried out and "zero" otherwise. In other words, we treat the split-share structure reform as an event and test its immediate impact on the H-A discount[2].

The variables related to QFII and QDII investment are measured by the quota approved by the Chinese government using data from the SAFE database. These variables are good measures of the officially allowed capital inflow and outflow between the mainland Chinese and Hong Kong markets. It should be noted that, apart from the official capital flow, there are illegal, or unregulated, capital flows that may have been used by Chinese residents to buy shares in Hong Kong, including in IPOs by mainland China firms listed in Hong Kong (e.g., Giradin and Liu, 2007). At the same time, illegal capital inflow from abroad may have been used to invest in the A-share market. However, as the exact amount of this illegal or unregulated capital flow cannot be accurately estimated, an examination of its effects is beyond the scope of this paper. The QFII and

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[2] We have also looked at the after-reform impact by including a dummy variable that takes the value one for the period after January 2007 in the regressions. The coefficient estimate on this variable is generally insignificant, indicating that the long-run effect of the split-share structure reform is uncertain or that the year coverage of our data set is not sufficiently long to capture the long-run effect. Therefore, we focus on the immediate market reaction to the split-share structure reform in this paper.

QDII schemes make it possible for investors participating in the A- and H-share markets to purchase the shares of a company in which they are interested at whichever is the lower price between the two markets. This tends to cause the H- and A-share prices to converge, *ceteris paribus*. In addition, the QFII and QDII schemes have made arbitrage between the two markets partially feasible (although subject to constraints, such as the no short-selling rule in the A-share market until 2009), which should also have the effect of reducing the H-A price differential. Thus, a positive relation is expected between QDII and QFII investment and the H-A discount, in that a greater volume of QFII and QDII investment results in the H-A discount becoming less negative and, thus, reducing the price differential between H shares and A shares.

Several other variables that may affect the H-A discount need to be considered. Numerous studies have documented that, when the same or equivalent securities are traded in multiple markets, the expected change in exchange rates plays an important role in explaining price differences across markets (e.g., Arquette et al., 2008; Auguste et al., 2006; Burdekin, 2008). For example, when the renminbi is expected to appreciate against the Hong Kong dollar, renminbi-dominated listed companies will show a higher profit on their income statements when those profits are translated into Hong Kong dollars. This makes these Chinese companies more attractive to Hong Kong investors. The rising H-

share prices then shrink the price gap between A and H shares. In this paper, the expected exchange rate is measured by the predicted change in exchange rates embedded in the 12-month renminbi non-deliverable forward contract rate versus the US dollar. As the Hong Kong dollar is pegged to the US dollar at a fixed rate with only a narrow band of fluctuation, we can use the expected exchange rate of the renminbi versus the US dollar as a proxy for the expected exchange rate of the renminbi versus the Hong Kong dollar. It is clear from Table 1 that the mean expected exchange rate change is negative, which implies that the general expectation is for the renminbi to appreciate against the Hong Kong dollar over the sample period.

Another important factor that can affect the H-A discount is investor sentiment in Shanghai and Hong Kong (e.g., Wei, 2000; Wang and Jiang, 2004; Kim et al., 2000; Arquette et al., 2008). The relative market P/E ratio, which is calculated as the price-earnings ratio of the Shanghai A-share Composite Stock Index divided by the price-earnings ratio of the Hang Seng Index, measures the view of mainland investors versus that of Hong Kong investors on the future prospects of their respective markets (Arquette et al., 2008). A higher value for this variable suggests that mainland China investors are more optimistic about the future and will thus be willing to pay a higher price for the same amount of earnings in the A-share market than their counterparts in the H-share

market. This, in turn, results in a larger H-A price differential. We expect a negative relation between the H-A discount and this variable. As shown in Table 1, the Shanghai index trades on average as much as 1.9 times the price-earnings ratio of the Hang Seng Index, which may be explained by the attitude to risk of Chinese investors, who are "risk-lovers who want to make money in the short run" (Wang et al., 2004, p. 439).

Second, investor sentiment about a specific company may vary across markets, thus affecting the H-A discount. Following Arquette et al. (2008), we measure such company sentiment using the (one-period) lagged natural log of each company's price-earnings ratio relative to the natural log of the overall price-earnings ratio in the A-share market.[3] A relative company P/E ratio greater than 1 suggests that investors expect a better future for a specific company than for the overall market. If this expectation is not shared by Hong Kong investors, then the H shares of the company may be traded at a lower price than the corresponding A shares. Not surprisingly, the mean relative company P/E ratio is around 1 (Table 1). A negative coefficient on this variable is expected.

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[3] The one-period lagged price-earnings ratio is applied to avoid presenting the stock price contemporaneously on both sides of the regression model. Although the firms in our sample do not have negative earnings, there are several cases of extremely small earnings. Natural log is used to minimize the impact of extreme values resulting from an overly small earnings value.

In addition, market capitalization, as an indicator of the size of a firm, is often a component of the regression models employed in previous related studies. This is calculated as the A-share stock price of a company times the total outstanding shares on the Shanghai stock exchange (in million renminbi). If the company size is large, then the liquidity risk is lower, transaction costs are reduced, and the barriers to arbitrage or hedging are also lower (for investors in the H-share market). We expect that, the larger the market capitalization, the greater the value of the H-A discount (and the smaller the price differential). Finally, we include the dividend payment in our analysis as a control variable. Individuals in mainland China face a 20% tax rate on income from dividends and a 0% tax rate on capital gains (Lau and Wang, 2003; Milonas et al, 2006). There is essentially no tax on either dividends or capital gains in Hong Kong. With the enactment of the Double Tax Agreement in August 2006, the withholding tax rates for Hong Kong residents receiving dividends from investments in mainland China were halved from 20% to 10%, and there is still no capital gains tax. Because of the tax advantages for Hong Kong investors, firms paying higher dividends will be priced more favorably in the H-share market than in the A-share market. Thus, a positive relation between dividends and the H-A discount is expected.

4.   Model and empirical results

Simple correlation analysis reveals that the H-A discount has the expected correlations with the explanatory variables (Table 2). QFII investment and QDII investment are both positively correlated with the value of the H-A discount.

[Table 2 here]

We implement a cross-sectional panel approach to examine the effects of the split-share structure reform and the QFII and QDII schemes on the variation in the H-A discount after controlling for the expected exchange rate change, investor sentiment, and other variables. The primary estimation model is as follows.

$$H\text{-}A \quad discount_{it} \quad = \quad \alpha_0 \quad + \quad \beta_1 Expected\_Exchange\_Rate\_Change_t \quad +$$

$$\beta_2 Market\_Sentiment_t \ + \ \beta_3 Company\_Sentiment_{it} \ + \ \beta_4 Market\_Capitalization_{it} \ +$$

$$\beta_5 Dividends_{it} + \beta_6 QFII\&QDII_t + \beta_7 Split\_Share_t + \beta_8 Firm\_Effects_i + \varepsilon \qquad (2)$$

The dependant variable is the H-A discount, for which a higher value indicates a smaller H-A price differential. *Split_Share* is a dummy variable which takes the value one for the period April 2005 to January 2007 and zero otherwise. Natural log values of market capitalization and QFII&QDII investment are used in the regressions. To account for zero values of QFII&QDII investment in the sample, we first add one to the value of

QFII or QDII investment and then take the log value of the total. Among the variables, H-A discount, relative company P/E ratio, market capitalization, and dividends are company-specific (firm *i*) and time-specific (time *t*) variables, whereas expected exchange rate change, relative market P/E ratio, the dummy variable for split-share structure reform and QFII&QDII investment are time-specific variables only.

Table 3 presents the estimation results. White-robust standard errors are reported for all the regression models. The estimation results are generally consistent with our expectations. Coefficients on the split-share structure dummy are positive and statistically significant in all regression models, indicating that the reform reduces the H-A price differential. This result is consistent with the argument that the split-share structure reform creates the expectation of a significant increase in the supply of A shares and thus the demand for A shares becomes more elastic. Consequently, the H-A price differential is reduced, although the valuations of the H shares and A shares are both positively affected by the split-share structure reform (see section 2).

[Table 3 here]

In Table 3, regression models (1) and (2) examine the effects of QFII and QDII investment on the H-A discount separately. Model (3) uses the sum of QFII and QDII investment in the regression. To account for possible non-linearity in the relation between

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QFII&QDII and the H-A discount, model (4) adds the quadratic form of QFII&QDII to the regression. All of the coefficients on QFII, QDII, and their sum are positive at the 1% significance level, indicating that QFII and QDII have the effect of reducing the H-A price differential. In addition, strong non-linearity is detected in this relationship, with a negative coefficient on the quadratic form of QFII&QDII. This suggests that, although increasing QFII&QDII investment reduces the H-A price differential, its marginal effect is decreasing. Our empirical approach also allows us to quantify the effects of QFII and QDII individually. The coefficient on QFII investment in model (1) is 0.034, with a standard deviation of 4.841. A one-standard-deviation movement in the QFII measurement changes the H-A discount by 0.165. Furthermore, the smaller coefficient (0.016) on QDII investment suggests that it has a weaker impact on the price difference between the A- and H-shares.

The sign of the expected exchange rate change is significantly negative, which is consistent with the study of Arquette et al. (2008). This indicates that the appreciation of the renminbi significantly reduces the H-A price differential. The negative sign of the market sentiment variable implies that the higher the overall A-share market price is relative to the H-share market price, the more the dual-listed H-share price is discounted relative to its A-share counterpart. The negative coefficient of the relative company P/E

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ratio shows that, when the A-share price of an individual company rises relative to the overall market price, the company's H-share price lags behind after considering the overall H-share market conditions. This is consistent with the argument of Arquette et al. (2008) that, if the change in sentiment is local in origin, then the effect does not appear to spill over to holders of the same security in the other market. The coefficient estimates of the market capitalization and dividend variables are also as predicted. All of the coefficients are statistically significant at the 5% level or better.

We also test for alternative model structures and compare their results. Table 4 reports the results with firm fixed effects in the regression models. The sign and significance level of the coefficients on split-share structure reform and the QDII and QFII schemes are unchanged, although the values of the coefficients are somehow lower.

[Table 4 here]

In addition, as a sensitivity test, we run regressions with the absolute value of the H-A discount as the dependant variable. As the H-share prices of most of the companies are lower than those of the A shares, a negative coefficient indicates that a higher value of the explanatory variable helps to reduce the price discrepancy between the A- and H-

shares, and vice versa. All of the coefficients on split-share structure reform and the QFII

and QDII schemes become negative and the coefficient estimates remain significant.[4]

5. Conclusion

The split-share structure reform and the QFII and QDII schemes have been the

two major breakthroughs in China's gradual process of financial liberalization since 2000.

Our empirical results indicate that both events had a significant effect on the H-A

discount of Chinese companies listed on the A- and H-share markets from 2003 to 2009.

The split-share structure reform significantly changed the valuation mechanisms of the

A-shares and H-shares and has played a role in reducing the size of the H-A discount.

Meanwhile, as a result of the gradual lifting of capital controls in mainland China, as

represented by the implementation of the QFII and QDII schemes, the two financial

markets have become more interconnected and arbitrage opportunities have begun to

emerge between the A- and H-share markets. Consequently, the H-A price differential

has decreased. QFII investment also appears to have had a stronger impact than QDII

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[4] These results are available from the authors on request.

investment on H-A discount. Our results are robust to alternative model structures and to

the inclusion of various control variables, including the expected exchange rate, investor

sentiment, market capitalization, dividend payment, and company fixed effects in the

regression models.

It should be acknowledged that our paper studies the immediate effect of the split-

share structure reform and its long-term impact on the H-A price differential remains to

be seen. In addition, while we examine the impact of the approved quotas of QFII and

QDII investment, the effects of the real use of the quota may be different. However,

complete information about how authorized institutional investors utilize their quotas and

set up their investment portfolios is unavailable. When such data becomes available,

further research could be conducted to examine the investment behavior of QDII and

QFII participants and the impact their investment decisions have on the H-A discount.

Appendix Table 1. The 59 cross-listed Chinese companies in the sample

Company Name	A Shares		H Shares	
	Data Begins	Data Ends	Data Begins	Data Ends
China Pacific Insurance (Group) Co., Ltd.	2007/12/25	2009/12/31	2009/12/23	2009/12/31
China Minsheng Banking Corp., Ltd.	2000/12/19	2009/12/31	2009/11/26	2009/12/31
Metallurgical Corporation Of China Ltd.	2009/9/21	2009/12/31	2009/9/24	2009/12/31
China South Locomotive and Rolling Stock Corporation Limited	2008/8/18	2009/12/31	2008/8/21	2009/12/31
Shandong Chenming Paper Holdings Limited	2000/11/20	2009/12/31	2008/6/18	2009/12/31
China Railway Construction Corporation Limited	2008/3/10	2009/12/31	2008/3/13	2009/12/31
China Railway Group Limited	2007/12/3	2009/12/31	2007/12/9	2009/12/31
China CITIC Bank Corporation Limited	2007/4/29	2009/12/31	2007/4/29	2009/12/31
China Coal Energy Company Limited	2008/2/3	2009/12/31	2006/12/19	2009/12/31
Industrial and Commercial Bank Of China Limited	2006/10/29	2009/12/31	2006/10/29	2009/12/31
China Merchants Bank Co., Limited	2002/4/9	2009/12/31	2006/9/24	2009/12/31
Bank Of China Limited	2006/7/5	2009/12/31	2006/6/1	2009/12/31
China Construction Bank Corporation	2007/9/25	2009/12/31	2005/10/27	2009/12/31
China COSCO Holdings Company Limited	2007/6/26	2009/12/31	2005/6/30	2009/12/31
Bank of Communications Co., Ltd.	2007/5/15	2009/12/31	2005/6/23	2009/12/31
China ShenHua Energy Company Limited	2007/10/9	2009/12/31	2005/6/15	2009/12/31
Shanghai Electric Group Company Limited	2008/12/7	2009/12/31	2005/4/28	2009/12/31
Air China Limited	2006/8/20	2009/12/31	2004/12/15	2009/12/31
ZTE Corporation	2000/1/4	2009/12/31	2004/12/9	2009/12/31
Ping An Insurance (Group) Company of China Limited	2007/3/1	2009/12/31	2004/6/24	2009/12/31
China Shipping Container Lines Company Limited	2007/12/12	2009/12/31	2004/6/16	2009/12/31
Weichai Power Company Limited	2007/4/30	2009/12/31	2004/3/11	2009/12/31
Zijin Mining Group Co., Limited	2008/4/27	2009/12/31	2003/12/23	2009/12/31
China Life Insurance Company Limited	2007/1/9	2009/12/31	2003/12/18	2009/12/31
China Oilfield Services Limited	2007/9/30	2009/12/31	2002/11/20	2009/12/31
Aluminum Corporation of China Limited	2007/4/30	2009/12/31	2001/12/12	2009/12/31
China Petroleum and Chemical Corporation	2001/8/8	2009/12/31	2001/1/19	2009/12/31
Petrochina Company Limited	2007/11/5	2009/12/31	2001/1/19	2009/12/31
Huadian Power International Corporation Limited	2005/2/3	2009/12/31	2001/1/19	2009/12/31
Yanzhou Coal Mining Company Limited	2000/1/4	2009/12/31	2001/1/19	2009/12/31
Huaneng Power International, Inc.	2001/12/6	2009/12/31	2001/1/19	2009/12/31
Guangzhou Pharmaceutical Company Limited	2001/2/6	2009/12/31	2001/1/19	2009/12/31
Anhui Conch Cement Company Limited	2002/2/7	2009/12/31	2001/1/19	2009/12/31
Chongqing Iron and Steel Company Limited	2007/2/28	2009/12/31	2001/1/19	2009/12/31
Sichuan Expressway Company Limited	2009/7/27	2009/12/31	2001/1/19	2009/12/31
China Southern Airlines Company Limited	2003/7/27	2009/12/31	2001/1/19	2009/12/31
Angang Steel Company Limited	2000/1/4	2009/12/31	2001/1/19	2009/12/31
Jiangsu Expressway Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Jiangxi Copper Company Limited	2002/1/13	2009/12/31	2001/1/19	2009/12/31
Beijing North Star Company Limited	2006/10/16	2009/12/31	2001/1/19	2009/12/31
Datang International Power Generation Company Limited	2006/12/20	2009/12/31	2001/1/19	2009/12/31
Shenzhen Expressway Company Limited	2001/12/25	2009/12/31	2001/1/19	2009/12/31
China Eastern Airlines Corporation Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Shandong Xinhua Pharmaceutical Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31

Anhui Expressway Company Limited	2003/1/7	2009/12/31	2001/1/19	2009/12/31
Hisense Kelon Electrical Holdings Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Guangshen Railway Company Limited	2006/12/24	2009/12/31	2001/1/19	2009/12/31
Nanjing Panda Electronics Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Jingwei Textile Machinery Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Northeast Electric Development Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
China Shipping Development Company Limited	2002/5/23	2009/12/31	2001/1/19	2009/12/31
Luoyang Glass Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Dongfang Electric Corporation Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Tianjin Capital Environmental Protection Group Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Sinopec Yizheng Chemical Fibre Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Shenji Group Kunming Machine Tool Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Maanshan Iron & Steel Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Beiren Printing Machinery Holdings Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Guangzhou Shipyard International Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Sinopec Shanghai Petrochemical Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31
Tsingtao Brewery Company Limited	2001/1/19	2009/12/31	2001/1/19	2009/12/31

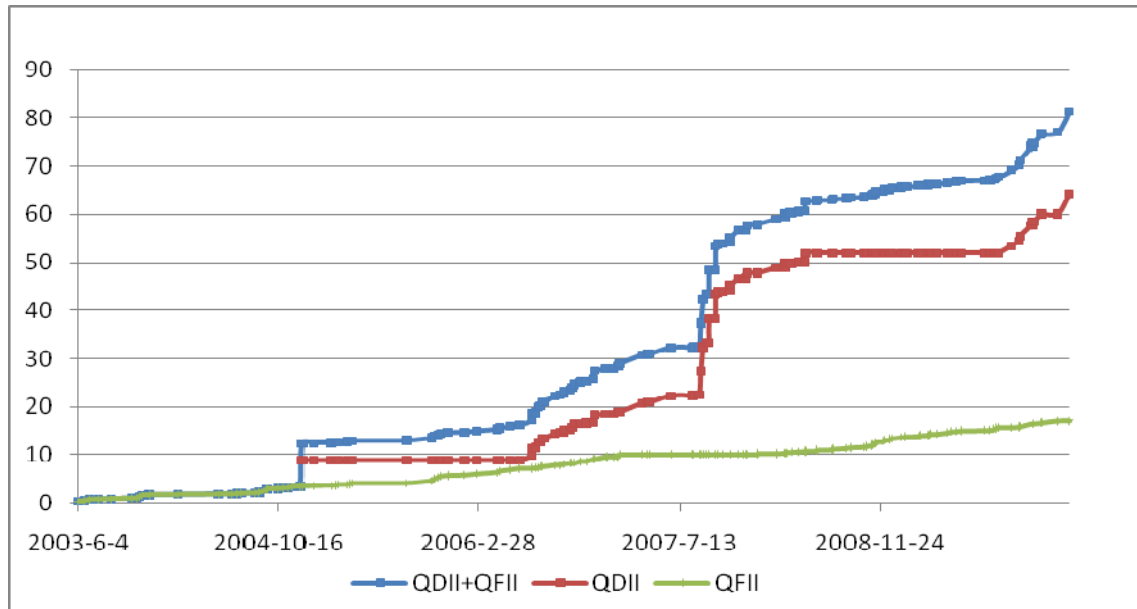Figure 1. Approved quotas for the QFII and QDII schemes (billion USD)
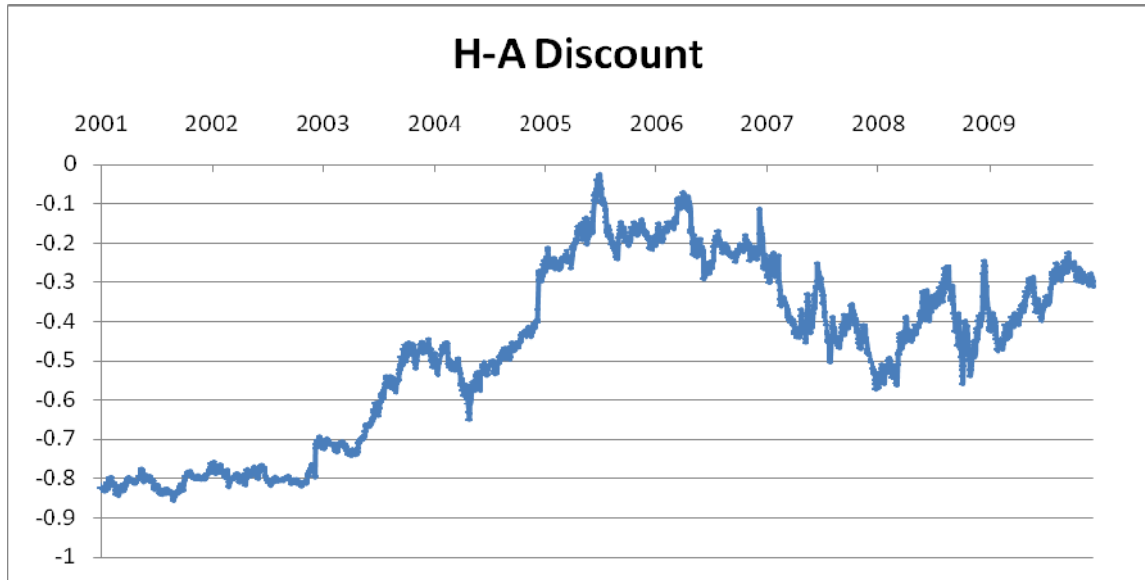
Figure 2. H-A discount (January 2001-December 2009)

H-A Discount

Table 1 Summary statistics for the weekly variables in the sample

	Obs.	Mean	Std. Dev.	Minimum	Maximum
H-A discount	12025	-0.383	0.315	-0.909	2.486
Expected exchange rate change (RMB/USD)	466	-0.264	0.215	-0.810	0.473
Relative market P/E ratio	466	1.907	0.484	1.194	3.413
Relative company P/E ratio (natural log of P/Es)	12025	1.035	0.252	0.318	2.384
Market capitalization (in million renminbi)	12025	104.382	268.211	0.496	2495.219
Annual dividend (in renminbi)	607	0.124	0.125	0.000	1.269
QFII (in billion USD)	100	8.286	4.841	0.000	16.470
QDII (in billion USD)	82	26.410	21.277	0.000	59.080

Table 2. Correlations among the variables

	H-A discount	Expected exchange rate	Market sentiment	Company sentiment	Dividend	Market cap (log)	QFII (log)	QDII (log)
H-A discount	1.000							
Expected exchange rate	-0.049	1.000						
Market sentiment	-0.297	-0.182	1.000					
Company sentiment	-0.228	-0.057	0.050	1.000				
Dividend	0.278	-0.025	-0.053	-0.413	1.000			
Market cap (log)	0.212	-0.026	0.062	-0.320	0.403	1.000		
QFII (log)	0.221	0.018	-0.307	-0.008	0.225	0.348	1.000	
QDII (log)	0.185	0.023	-0.207	0.003	0.235	0.364	0.939	1.000

Notes: The expected exchange rate change is the exchange rate change embodied in the 12-month renminbi non-delivery forward contract rate. Market sentiment is measured as the market relative P/E ratio. Company sentiment is calculated as the company P/E over the market P/E. Market cap is the natural log value of the company's market capitalization. QFII and QDII are the total approved quotas under the QFII and the QDII schemes (natural log value).

Table 3. Estimation results (pooled OLS models)

	Regressions			
	（1）	（2）	（3）	（4）
Expected Exchange Rate Change	-0.064	-0.067	-0.063	-0.040
	（0.010）	（0.010）	（0.010）	（0.012）
Market Sentiment	-0.126	-0.136	-0.131	-0.100
	（0.005）	（0.005）	（0.005）	（0.006）
Company Sentiment	-0.121	-0.117	-0.118	-0.113
	（0.015）	（0.016）	（0.015）	（0.015）
Dividend	0.344	0.348	0.347	0.349
	（0.020）	（0.021）	（0.020）	（0.020）
Market Cap	0.031	0.033	0.032	0.034
	（0.002）	（0.002）	（0.002）	（0.002）
Split-share Structure Reform	0.234	0.232	0.234	0.168
	(0.008)	(0.008)	(0.008)	(0.010)
QFII	0.034	--	--	--
	（0.003）			
QDII	--	0.013	--	--
		（0.002）		
QFII&QDII	--	--	0.016	0.192
			(0.002)	(0.012)
QFII&QDII Square				-0.037
				(0.002)
Constant	-0.285	-0.240	-0.261	-0.423
	（0.023）	（0.022）	（0.022）	（0.026）
Company-specific fixed effects	No	No	No	No
Observations	12025	12025	12025	12025
R-square	0.197	0.267	0.268	0.279

Notes: The dependant variable is the H-A discount. The expected exchange rate change is the exchange rate change embodied in the 12-month renminbi non-delivery forward contract rate. Market sentiment is measured as the market relative P/E ratio. Company sentiment is calculated as the company P/E over the market P/E. Market Cap is the natural log value of a company's market capitalization. Split-share Structure Reform is a dummy variable that takes the value "1" during the period April 2005 to January 2007 when the reform was implemented and "zero" otherwise. QFII&QDII is the total approved quota for the QFII and QDII schemes combined (natural log value). White-robust standard errors are in parentheses. All of the coefficients are significant at the 5% level or better.

Table 4. Estimation results (with fixed firm effects)

	Regressions			
	(1)	(2)	(3)	(4)
Expected Exchange Rate Change	-0.110	-0.105	-0.104	-0.017
	(0.007)	(0.007)	(0.007)	(0.008)
Market Sentiment	-0.109	-0.121	-0.117	-0.089
	(0.003)	(0.003)	(0.003)	(0.003)
Company Sentiment	-0.175	-0.170	-0.172	-0.163
	(0.007)	(0.007)	(0.007)	(0.007)
Dividend	0.072	0.087	0.081	0.102
	(0.018)	(0.018)	(0.018)	(0.017)
Market Cap	0.001	0.013	0.010	0.013
	(0.004)	(0.004)	(0.004)	(0.004)
Split-share Structure Reform	0.196	0.120	0.199	0.145
	(0.004)	(0.004)	(0.004)	(0.004)
QFII	0.029	--	--	--
	(0.002)			
QDII	--	0.008	--	--
		(0.001)		
QFII&QDII	--	--	0.011	0.165
			(0.001)	(0.007)
QFII&QDII Square	--	--	--	-0.032
				(0.001)
Constant	-0.133	-0.113	-0.123	-0.273
	(0.012)	(0.012)	(0.012)	(0.013)
Company-specific fixed effects	YES	YES	YES	YES
Observations	12025	12025	12025	12025
Number of groups	59	59	59	59
R-square	0.425	0.420	0.421	0.447

Notes: The dependant variable is the H-A discount. The expected exchange rate change is the exchange rate change embodied in the 12-month renminbi non-delivery forward contract rate. Market sentiment is measured as the market relative P/E ratio. Company sentiment is calculated as the company P/E over the market P/E. Market Cap is the natural log value of a company's market capitalization. Split-share Structure Reform is a dummy variable that takes the value "1" during the period April 2005 to January 2007 when the reform was implemented and "zero" otherwise. QFII&QDII is the total approved quota for the QFII and QDII schemes combined (natural log value). The standard errors are in parentheses, and the within-group R-square values are reported. All of the coefficients are significant at the 5% level or better, except for the market cap variable in regressions (1) and (2).

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