Short Sell Constraints and the Price Premium of Chinese Stock A-shares Over Hong Kong H-shares

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I examine the impact of short sale constraints on the price premium of Chinese A-shares over Hong Kong H-shares (AH share premium) using a firm-fixed effect panel regression method. It shows that after controlling for variables related to other documented hypotheses, relaxation of short sale constraints in A-shares explains the narrowing AH share premium. Both the launch of CSI Index Future and the introduction of short sale pilot program in 2010 on mainland China stock markets mitigate short sale constraints, improve market efficiency, and therefore help reduce AH share premium.

Keywords: short sale constraints, AH premium share premium, CSI Index Futures, market efficiency

INTRODUCTION

The law of one price holds that in the absence of trade frictions identical securities sold in different markets must sell for the same price. However, the law of one price is often violated when the same stocks trade in different markets, due to information asymmetry between domestic and foreign investors, restrictions on foreign ownership, language and cultural differences, and other direct or indirect barriers. (Froot & Dabora,1999; Chan, et al., 2003). Many Chinese companies issue both A-shares on either Shanghai Stock Exchange (SHSE) or Shenzhen Stock Exchange (SZSE) and H-shares on Hong Kong Stock Exchange (HKSE). While A- and H-shares have the same stream of underlying future cash flows and shareholders' rights, A-shares are restricted to mainland Chinese investors and H-shares are only available to Hong Kong and international investors. The stock price gap between China A-shares and Hong Kong H-shares was astonishingly large. Wang and Jiang (2004) document that average daily price of A-shares is 334% (560%) higher than that of H-shares from 1994 to 2000. Existing literature suggest that A-shares price premium over H-share can be attributable to information asymmetry between domestic and foreign investors (Chakravarty, et al.,1998; Karolyi & Li, 2003; Chan, et al., 2008), different market investor sentiment (Suh, 2003; Wang & Jiang, 2004; Arquette, et al., 2008), different market liquidity (Chen, et al., 2001; Wang & Jiang, 2004; Chan & Kwok, 2005; Lee, et al., 2008), and different risk aversion between domestic and foreign investors (Eun & Janakiramanan, 1986; Ma, 1996; Su, 1999; Sun & Tong, 2000).

Alternatively, Chen et al. (2009) argue that short sale constraints contribute to the price discrepancy between A- and H-shares because most H-shares can be shorted but all A-shares are prohibited from short selling prior to 2010. According to the theory that short sale constraints lead to overvaluation of stocks (Miller, 1977), short-sale eligible H-shares are likely to be priced more efficiently whereas short-sale prohibited A-shares tend to be over-priced, generating significant AH share premium. Similarly, MSCI Research (2010) examines the effect of relaxation of short sale constraints on AH share premium for 26

China A-share stocks during a pilot program imposed by China government. However, both studies have limitations. For instance, Chen et al. (2009) only examine the differences in AH premium between shortable and non-shortable H-shares. Without looking into the differences in AH premium between shortable and non-shortable A-shares, the short sale constraint hypothesis is not fully supported. MSCI Research (2020) conduced an event study, where AH premium is examined surrounding the introduction of A-share short sale pilot program implemented by china government in 2010. Yet, the sample period in this study is too short (6 months) to generalize the conclusion, and the event study is not well controlled for other factors that contribute to AH share premium. To mitigate the shortcomings in previous studies, I adopt two different measures of short sale constraints in a panel regression framework to test the hypothesis that relaxation of short sale constraints can lower the AH share premium for a long sample period from 2000 to 2012. This rest of the paper is organized as follows. Section 2 reviews related literature and develops hypothesis. Section 3 describes data, sample, and methodology. Section 4 discusses empirical testing results. Section 5 remarks the conclusion.

LITERATURE REVIEW

To explain the puzzle of stock price premium of Chinese A-shares over H-shares, previous studies developed following hypotheses, namely, the information asymmetry hypothesis, the liquidity hypothesis, the market sentiment hypothesis, the expected exchange rate hypothesis, risk differential hypothesis, and short sale constraint hypothesis.

The information asymmetry hypothesis argues that information asymmetry between foreign and local investors due to language barriers, different account standards, and the lack of reliable information on local economy and firms causes the AH share premium (Chakravarty, et al. 1998). Using firm size as a proxy for information asymmetry, Karolyi and Li (2003) find supporting evidence that information asymmetry contributes to china B-share price discount relative to A-shares. This paper follows the existing literature and adopt the firm size and AH relative bid-ask spread as the proxies for information asymmetry in our analysis. The liquidity hypothesis suggests that illiquidity lowers stock prices and leads to price differential between identical shares traded on different markets (Amihud &Mendelson 1986). Longstaff (1995) contends that marketability restriction can lead to significant discount in asset prices. With respect to China stock markets, Chen et al. (2001) study A-B share price premium and find that illiquidity of the B-share market contributes to the discounted B-share prices. Wang and Jiang (2004) use the share turnover as the proxy of liquidity and find evidence that is consistent with the liquidity hypothesis. Similarly, Chan and Kwok (2005) suggest that the difference in liquidity costs between domestic- and foreign-listed shares has significant impact on the level of price premium. More recently, Lee (2009) incorporates both spread and quoted depth as proxies of liquidity in the analysis and finds that the percentage difference in quoted spread and depth between A- and H-shares explain a significant proportion of the price premium. The market sentiment hypothesis contends that the difference in investor sentiment between A- and H-share markets is a source of AH share premium. Wang and Jiang (2004) finds that market and individual firm sentiment may be important factors explaining the price differential between A- and H-shares. More recently, Arquette et al. (2008) find that cross-sectional variation in AH share premium can be explained by additional market-specific and company-specific sentiment effects. The exchange rate expectation hypothesis states that even in a world without arbitrage opportunities, the price differential between A- and H-shares would differ from zero due to expected changes in exchange rate and transaction costs. Arquette et al. (2008) use a panel data approach to examine the extent to which expected exchange rate explains price differentials between A- and H-shares over a period from 1998 to 2006. They find that expected exchange rate changes alone account for approximately 40% of total variation in AH share premium. The risk differential hypothesis states that domestic investors and foreign investors have different level of risk aversion, therefore, the foreign share discount relates to the ratio of the aggregate risk aversion of domestic investor to that of foreign investors (Eun and Janakiramanan 1986). However, empirical findings on risk differential hypothesis are inconclusive depending on what is used to proxy for risk preference. For example, Sun and Tong (2000) use stock return volatility as the proxies for risk preference to examine the risk

differential hypothesis and find supporting evidence. On contrary, Chen et al. (2001) use the ratio of return variance between A- and B-share as the proxy for risk differential. They find no reliable relation between A-B share premium and risk level. Wang and Jiang (2004) employ the ratio of volatility of A- and H-share as a proxy for risk aversion. Their multivariate regression results do not carry any consistent and significant coefficient on that variable.

The short sale constraints hypothesis argues that short sale constraints prohibit pessimists registering their opinions into stock prices in a timely manner, thereby resulting in asset overpricing in the short-term (Miller, 1977). On the China A-share markets, short sales are prohibited by the law prior to 2010. On the Hong Kong H-share market, however, short sales are allowed for many stocks. Based on the Miller's overpricing theory, short-sale eligible H-shares are likely to be priced more efficiently whereas short-sale prohibited A-shares tend to be over-priced, generating significant AH share premium. Chan et al. (2009) examine the effect of short sale constraints on AH share premium during a period from 1996 to 2008. They show that short sale constraints explain the change of AH share premium when the market goes down. They also find that when the market trends down, short sale constraints reduce A-share trading volume relative to H-shares. More recently, MSCI Research (2010) examines the effect of relaxation of short sale constraints for 26 China A-share stocks during a pilot program imposed by China government on AH share premium. Comparing AH premium changes of a group of dual listed Chinese firms allowed for short selling with a group with short-sale restriction, they find that relaxing short sale constraints lower AH share premium. The eligibility of short sales on the A-share market after the implementation of short selling pilot program is incorporated in this analysis.

This paper aims at examining the effect of short sale constraints on AH share premium. It hypothesizes that relaxation of short sale constraints in mainland China A-share market decreases AH share premium while controlling for other facts documented in previous studies. Prior to 2010, short selling is prohibited by the law in mainland China while Hong Kong Stock Exchange allows short sales in most stocks. According to the short sale hypothesis, the AH premium can be explained by the short sale constraints imposed on A-shares. Although individual A-shares are generally prohibited from short selling, investors can short sell Chinese stock indices on the futures market. The Chinese Security 300 Index (CSI 300) futures contract was traded on the China Financial Futures Exchange (CFFEX) starting in the Spring of 2010. It is expected that CSI 300 member firms, which are subject to less degree of short sale constraints, have lower AH premium. Along with the introduction of index futures, the Chinese government adopted a pilot program which allows short selling in 90 stocks in March 2010. Allowing short selling of those stocks would reduce the overvaluation in A-shares, and consequently lower AH share premium.

DATA, SAMPLE, AND METHODOLOGY

Our data is obtained from Bloomberg. Our sample includes 71 Chinese companies that have A-share listed on either the Shanghai Stock Exchange (SHSE) or the Shenzhen Stock Exchange (SZSE) and corresponding H-shares listed on the Hong Kong Stock Exchange (HKSE), for which data is available on Bloomberg. I also obtain data of the spot and forward exchange rate between Chinese Yuan (CNY) and Hong Kong Dollar (HKD) from Bloomberg. AH share premium is defined as the ratio of A-share price and H-shares price, all minus 1, where HKD denominated H-share prices are converted into CYN equivalent prices based on the spot exchange rate. Table 1 summarizes the average AH premium from 2000 to 2012. It shows that the AH premium for companies in our sample was astonishingly high in year 2000; on average, A-share price is higher than H-share price by nearly 600%. This number has declined dramatically since 2000. In 2003, the average A-share price was about 120% above the average H-share price. In 2012, the average A-share price is just 18% higher than the average H share price.

TABLE 1
AH PREMIUM FROM 2000 TO 2012

		Value weighted		Equally weighted			
Year	n	Mean	stderr	Mean	stderr	Min	Max
2012	71	1.18	0.04	1.63	0.12	0.79	4.67
2011	71	1.21	0.05	1.69	0.12	0.77	4.66
2010	65	1.19	0.06	1.67	0.13	0.82	4.86
2009	63	1.47	0.07	2.04	0.15	0.92	4.98
2008	58	1.58	0.07	2.12	0.17	0.99	5.48
2007	54	1.55	0.06	1.96	0.19	1.13	8.25
2006	46	1.08	0.04	1.42	0.13	0.88	3.67
2005	42	1.22	0.05	1.58	0.16	0.87	3.45
2004	38	1.59	0.09	2.22	0.16	1.13	4.53
2003	36	2.21	0.19	3.12	0.31	1.37	5.81
2002	27	3.15	0.28	4.49	0.39	2.03	7.67
2001	23	5.79	0.64	6.62	0.85	3.75	12.57
2000	17	6.92	1.23	10.49	1.68	4.46	19.42

To examine how short sale constraints and other the market-wide influences (e.g., exchange rate expectations and regulatory policy changes) and firm-specific characteristics (e.g., firm size and stock liquidity) jointly contribute to the vanishing AH premium, I adopt the following firm-fixed-effect panel regression model, where

$$\begin{aligned} AH_{premium_{it}} = \alpha + \beta 1 \cdot Shortable_{it} + \beta 2 \cdot Index_future_{it} + \beta 3 \cdot firm_{size_{it}} + \beta 4 \\ \cdot AH_relative_bid_ask_spread_{it} + \beta 5 \cdot AH_relative_share_turnover_{it} + \beta 6 \\ \cdot AH_relative_P/E_t + \beta 7 \cdot AH_relative_price_volatility + \beta 8 \\ \cdot Expected_change_HKD/CNY_t + \beta 9 \cdot Capital_control_t + +\varepsilon_{it} \end{aligned} \quad (1)$$

The dependent variable *AH_premium* is measured as the ratio of A-share stock price in CNY to the CNY-equivalent H-share stock price. The first independent variable of interest, *Shortable* is a dummy variable, which equals one if the stock is shortable after March 31, 2010, and equals zero otherwise. A negative coefficient for this variable is expected because allowing short selling of those stocks would reduce the overvaluation in A-shares and the AH share premium. The second independent variable *Index_future* is a dummy variable for CSI 300 Index Futures, which equals one if the firm is a member of the CSI 300 Index after April 16, 2010, and equals zero otherwise. A negative coefficient on this variable is expected. Negative coefficients on both independent variables would provide support to the hypothesis that relaxation of short sale constraints in A-shares help reduce overvaluation in A-shares thus decreases AH share premium.

Previous studies documented that several other market-wide and firm-specific factors contribute to the AH share premium. I include those control factors in the panel regression. *Firm_size* is the A- and H-market combined value of firm's equity. I expect that on average large firms are subject to less information asymmetry between A- and H-markets. Given a negative relation between information asymmetry and AH premium, I expect a negative coefficient on this variable. *AH_relative_bid_ask_spread* is ratio of the bid-ask spread on the A-share market to that on the H-share market. This variable is included as a trading-cost based measure of liquidity. Difference in trading costs contributes to the AH price discrepancy. Relatively lower trading costs for A-shares will lead to higher A-share prices. The expected coefficient for this variable is negative. *AH_relative_share_turnover* is the ratio of share turnover on the A-share market to that on the

H-share market. This variable is used in the analysis as a liquidity measure based on trading volume. To compensate for illiquidity, investors demand liquidity premium in stock returns, which leads to lower stocks prices. If A-shares are more liquid than H-shares, then A-share prices would be higher than H-share prices. A positive coefficient for this variable is expected. Mei et al. (2003) suggest that AH premium can be explained by the speculative nature of trading on the A-share market. If relative share turnover is a good for speculative trading, then a positive coefficient is also expected. *AH_realtive_price_volatility* is measured as the ratio of 30-day price volatility of the A-share market to that of the H-share market. This variable is used to measure the risk difference between A- and H-share markets. If A-shares have higher risk, then A-shares would be priced lower than H-shares. Therefore, a negative coefficient for this variable is expected. *AH_relative_P/E* is the ratio of price-to-earnings ratio on the A-share market to that on the H-share market. AH price difference could be affected by different market sentiments between A- and H-share markets. If investor sentiments are higher on A-share market than on the H-share market, then a higher A-share price than H-share price would be expected. Thus, a positive coefficient is expected for this variable. *Expected_change_HKD/CNY* is the expected changes in the exchange rate of HKD to CNY, which is measured as the ratio of the exchange rate in the 12-month forward contracts to that in the spot contract, all minus one. When CNY is expected to appreciate against HKD, the HKD dollar value of A-shares is expected to increase. When CNY is expected to depreciate against HKD, then HKD value of A-shares is expected to decline. This variable is expected to carry a positive coefficient.

Lastly, the law of one price indicates that the price difference between A- and H-shares can be arbitraged away if a perfect market. However, when A-share is priced at a much higher price than H-shares, A-share investors are not be able to exploit the arbitrage opportunity due to the fact that domestic investors used to be banned from the H-share market. But the regulatory scrutiny was loosened in April 2006, when the Chinese government announced the Qualified Domestic Institutional Investor (QDII) program, allowing certain Chinese institutional investors to invest in overseas markets. On 11 May 2007, the scope of QDII was expanded to include not only fixed income and money market instruments but also equity products. Therefore, the QDII program relaxes the arbitrage limitation and is expected to lower the AH premium. In our regression, we use a dummy variable, *Capital_control*, which equals one prior to May 11, 2007 and equals zero after it, to account for the QDII program. The coefficient of this variable is expected to carry a negative sign.

EMPIRICAL RESULTS

A firm-fixed effect panel regression is estimated. All models are estimated using daily data. Robust standard errors are estimated based on clustering of firms.

TABLE 2
FIRM-FIXED EFFECT PANEL REGRESSION

Variable (expected sign)	Dependent variable: AH share premium		
	1	2	3
Shortable (-)	-0.154**		-0.132**
	(0.015)		(0.065)
Index future (-)		-0.354*	-0.212*
		(0.195)	(0.122)
Firm size (-)			-0.355***
			(0.006)
Relative bid-ask spread (-)			-0.073***
			(0.004)
Relative shares turnover (+)			0.0012***
			(0.0001)
Relative price volatility (-)			-0.008

			(0.007)
Relative market sentiment (+)			1.151***
			(0.006)
Expected exchange rate change (+)			9.904***
			(0.112)
Capital Control			-0.345**
			(0.168)
Constant	1.586***	1.443***	2.935***
	(0.026)	(0.026)	(0.076)
# of obs	22,650		
R square	0.107	0.051	0.649

Table 2 presents the firm-fixed effect panel regression model specified in Equation (1). All models are estimated using daily data. Robust standard errors clustered by company are in parentheses; ****,**, and * are significant at 1%, 5%, and 10% levels, respectively. Columns (1) to (2) report coefficient estimates for panel regressions that use each explanatory variable individually. Column (3) presents the results for panel regression based on equation (1). Column (1) shows that *Shortable* is negatively associated with AH share premium, suggesting that AH share premium in shortable A-share stocks are significantly lower than that in non-shortable A-share stocks, supporting the hypothesis that allowing short sale in A-share stocks help mitigate overvaluation in A-shares and subsequently decrease AH share premium. Column (2) examines the effect of being CSI Index Future member stocks on AH premium. The significant and negative coefficient indicates that lower AH premium is associated with being one of member stocks of CSI Index Future. Column (3) shows that the results are robust after controlling for a variety of factors that explain AH share premium according to existing literature. More specifically, firm size is negatively associated with AH premium, suggesting that larger firms tend to demonstrate lower AH premium. The result here is consistent with the information asymmetry hypothesis, which states that larger companies have lower trading costs, less cross-market information asymmetry and fewer limitations to arbitrage, resulting in lower AH premium (Arquettee, et al., 2004). The coefficient on relative share turnover is positive and significant at the 1% level, consistent with both the liquidity hypothesis and speculative trading hypothesis. Column (3) also shows a negative coefficient on relative 30-day stock price volatility. However, it is not statistically significant, indicating a weak correlation between AH premium and risk differential between A- and H-share markets. Consistent with Arquette et al. (2008), both relative market sentiment and expected changes in the exchange rate explains variations in AH premium on the firm level, confirming that lower level of AH premium can be explained by lower relative market sentiment and weaker expectation that CNY will appreciate against HKD. Finally, a significant and negative coefficient on *Capital_control* variable, which controls for the degree of market segmentation, suggests that allowing domestic investors to invest in H-shares help reduce AH share premiums.

CONCLUSION

China's A-shares listed on the Shanghai Stock Exchange or Shenzhen Stock Exchange had been traded at much higher prices than H-shares listed Hong Kong Stock Exchange. This so-called "AH share premium" dilemma constitutes a violation of the law of one price and attracts much attention from finance researchers, practitioners, and regulators. This paper shows that the launch of Chinese stock index futures, and a pilot program that allows short selling in a limited number of stocks on the A-share market are associated with the narrowing stock price gap between A- and H-shares, supporting the short sale constraint hypothesis. The results are robust after controlling for both market-wide and firm-specific determinants that are associated with AH share premiums. In addition, the introduction of QDII scheme, which mitigates market segmentation also reduces AH share premium.

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