

Factors of Price Difference between A-Shares and H-Shares under SH-HK Stock Connect

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Abstract: The main focus of this paper is to test how Shanghai-Hong Kong (SH-HK) Stock Connect contributes to the price difference between A-shares and H-shares based on panel data of 53 A-H shares dual listed companies. The aim of this paper is not only to examine the effectiveness of the stock connect program, but also trigger reference significance for the launch of Shenzhen-Hong Kong (SZ-HK) Stock Connect. The paper includes three parts. Firstly, five important factors which influence the price difference between A-shares and H-shares are put forward. These are asymmetric information, liquidity, demand elasticity, risk preference and launch of SH-HK Stock Connect. Secondly, the panel data model is set up for running regressions. The result of empirical analysis indicates that the launch of SH-HK Stock Connect enlarges A-H shares price difference due to the limited investment quota, differential trading amount and short running period. In addition, the other four factors have negative relationship with price difference which is consistent with theoretic analysis. Finally, we recommend that government should improve SH-HK Stock Connect and advance the launch of SZ-HK Stock Connect; strengthen A-share investors' education; speed up financial innovation and establish an effective mechanism of arbitrage.

Keywords: SH-HK Stock Connect, price difference, panel data model

1. Introduction

The phenomenon of the same stock with different prices has always been a problem in China's stock market. With the call of opening up of China's stock market, SH-HK Stock Connect was officially approved on April 10th 2014, but not formally launched until November 17th 2014. On one hand, it was an important attempt to build the capital market with perfect systems and rational structure. The aim of this attempt was to increase market liquidity of A-shares and optimize investors' structure. On the other hand, it was not only an important step to boast the internationalization of China's currency and offshore RMB market, but also consolidate Hong Kong's status as international financial center and advance the construction of Shanghai financial center.

The significance of research has following points:(1) We can find out the factors influencing the difference between A-share and H-share so that we can offer investors with reliable information and put forward recommendations to eliminate the price difference.(2) SH-HK Stock Connect aims to accelerate the opening up of China's capital market, promote a healthy stock market and rebuild the valuation system in A-shares market. The research wants to find out how SH-HK Stock Connect contributes to the A-H share stock price difference. (3) For the time being, SH-HK Stock Connect is just the beginning of interconnection between foreign and domestic market. In future, the SZ-HK Stock Connect will effectively connect mainland and Hong Kong market. The research from perspective of SH-HK Stock Connect is instructive for further study on differences between A-shares and H-shares.

In China, the phenomenon of the same stock with different prices long exists. This problem originates from the study on A-B shares price difference. Early scholars conducted a lot of research and proposed four hypotheses (including Asymmetric Information Hypothesis, Liquidity Hypothesis, Differential Demand Elasticity Hypothesis and Differential Risk Preference Hypothesis) to illustrate the cause of A-B shares price difference, which is the foundation for our further study on A-H shares price difference.

The research upon A-H shares stock price difference started later and was based on study on A-B shares stock price difference. Yang (2007)¹ studied the difference based on the sample of dual listed companies and concluded asymmetric information, liquidity, market demand and speculation were the important factors. Like no other time before, turnover ratio was firstly used as ratio to measure speculation instead of liquidity. Xu (2009)² considered that stock connect had significant influence on A-H share difference while QDII did not. Liu (2012)³ did empirical study on 45 dual-listed companies from 2009 to 2011 and proposed that asymmetric information, liquidity difference, elasticity of demand were the influencing factors; however; investment philosophy did not significantly impact the A-H share difference.

2. Overview of SH-HK stock connect

This paper focuses on the impact of launch of SH-HK Stock Connect on A-H shares price difference. So in this part, the paper specifically describes the SH-HK Stock Connect.

2.1. Origin of SH-HK stock connect

On April 10th, 2014, Premier Li Keqiang raised a new round high level opening up at the Boao Forum for Asia and one of important aspects was expanding the services sector including opening up of capital market, for example creating positive conditions for interconnection between Shanghai and Hong Kong stock market, implementation of two-way healthy market and integration with international capital market. To support the call of the Third Plenary Session of the 18th Central Committee of the Communist Party of China, China Securities Regulatory Commission (CSRC) and Hong Kong's Securities and Futures Commission (SFC) gave an official response for trial of SH-HK Stock Connect to Shanghai Stock Exchange (SSE), Stock Exchange of Hong Kong Limited (HKEx), China Securities Depository & Clearing Corporation Limited (CSDCC) and Hong Kong Securities Clearing Company Limited (HKSCC).

2.2. Scheme of SH-HK stock connect

SH-HK Stock Connect is a mutual market access program between Shanghai and Hong Kong stock market. In other words, Shanghai Stock Exchange (SSE) and HKEx allow potential investors to buy or sell listed stocks on the other market via the exchange and clearing house in their local market. SH-HK Stock Connect is an advanced scheme of high-level two-way opening-up of China's capital market. In addition, the program was an important step of SSE towards the goal of internationalization. This move will also trigger great possibilities such as SZ-HK Stock Connect.

¹ Yang, P & Xu, X & Yang, Y 2007, 'The Cross-sectional analysis of price differences of dual-listed shares', *Management World*, no. 9, pp. 107-116.

² Xu, S 2009, 'The empirical study on the price difference between A and H-share of Chinese dual-listed companies', *Securities Market Herald*, no. 2, pp. 54-60.

³ Liu, X 2012, 'The analysis of price difference factors with panel data between A-share and H-share', Jiangxi University of Finance & Economics.

2.3. Performance of SH-HK stock connect

By November 17th 2015, SH-HK Stock Connect had already been running for one year. In the first year, the total trading amount of SH-HK Stock Connect was RMB2.13 trillion. To be specific, the Shanghai Stock Connect traded RMB1.54 trillion, with RMB120.77 billion or 40.24% of the total quota limit used while the total trading amount of Hong Kong Stock Connect was RMB589.86 billion, with RMB92.15 billion or 36.86% of the total quota limit utilized. Generally speaking, the stock trading had been proceeded smooth with transaction settlement, quota control and currency swap functioned orderly. Therefore, SH-HK Stock Connect had passed the test of fluctuations of foreign and domestic capital markets and met the preliminary goal.

3. Theory analysis of A-H shares price difference

In this part, theory analysis will explain the A-H shares difference from four aspects in detail including asymmetric information, liquidity, and elasticity of demand and risk preference.

3.1. Asymmetric information hypothesis

Some scholars think that A-shares investors have information advantages over H-shares investors. The advantages come from two aspects. On one side, most A-H shares dual-listed companies register and operate in mainland, the geography, culture and differences in regulations hinder H-shares investors from accessing information. On the other side, the transaction period is different. Since H-shares market close behind A-shares market, the stock price of H-shares contains more information. However, other scholars hold the opposite opinion due to timelier information disclosure in Hong Kong market. The important point is, the greater scale of the company, the clearer of information disclosure, the lesser degree of asymmetric information. In the empirical analysis, negotiable market capitalization is used to express asymmetric information, which bears to have negative relationship with A-H price difference.

3.2. Liquidity hypothesis

Liquidity Hypothesis suggests A-shares market is more liquid than H-shares market. There are two reasons. Firstly, the investment channel of mainland investors is narrow, so the A-shares stock market is investors' first choice of equity investment. As a result, A-shares market gathers numbers of participants and these players provide market with good liquidity. In contrast, Hong Kong market has a lot of alternatives such as red chip, leading to illiquid H-shares market. In the second place, A-shares market is full of short-term speculators. Their frequent trading provides good liquidity for A-shares market. In the empirical analysis, turnover ratio of H-share to A-share is used to denote liquidity, and the coefficient is predicted to be negative.

3.3. Differential demand elasticity hypothesis

Hong Kong investors have a lot of investment channels; however, A-shares is almost the only choice of mainland investors. Therefore the elasticity of A-shares investors is a lot smaller than H-shares investors, which means A-shares investors can afford higher price than H-shares. In the empirical analysis, the proportion of H-shares in the total outstanding shares is used to express elasticity of demand, which is expected to have negative relationship with A-H price difference.

3.4. Differential risk preference hypothesis

A-shares investors focus on short-term stock fluctuations and earn profit from bid-ask spread.

These investors buy low and sell high. They do not consider the payback period of dividends. On the contrast, H-shares investors pay attention to long-term return and gain profit from dividend yield. Most of players are institutional investors. They buy the underpriced stock and sell the overpriced. That’s why the variation of H-shares market is not so large as the A-shares market. In the empirical analysis, variance of return is used to denote risk preference and the coefficient is predicted to be positive.

4. Empirical analysis

Based on theory analysis, we will run the regression on panel data to test how asymmetric information, liquidity, demand elasticity, risk preference and launch of SH-HK Stock Connect contribute to the A-H shares price difference. Statistics are downloaded from Wind database and official website of the Bank of China¹(on a monthly basis). Since SH-HK Stock Connect was launched on 17thNovember 2014, the period is chosen from 17th November 2013to 17th November 2015. After deduction of suspended listed companies, there are 53 dual-listed companies left, which are the sample of dual-listed companies in this paper.

4.1. Selection and description of variables

4.1.1 Selection of dependent variables

In this paper, the ratio of A-shares price divided by converted H-shares price is used as the dependent variable to measure the level of price difference between A-shares and H-shares, denoted as $DIS_{i,t}$. The computing formula of A-H price ratio is shown as below.

$$DIS_{i,t} = \frac{P_{Ai,t}}{P_{Hi,t}E_t}$$

Where $P_{Ai,t}$ represents A-share price of the i_{th} company at transaction date t ; $P_{Hi,t}$ represents H-share price of the i_{th} company at transaction date t ; E_t represents CNY to HKD spotexchange rate at transaction date t .

Then the price ratio of 53 dual listed companies on each transaction date can be computed and we further get the distribution of A-share price premium shown as the table1.

Table1. Distribution of A-share price premium²

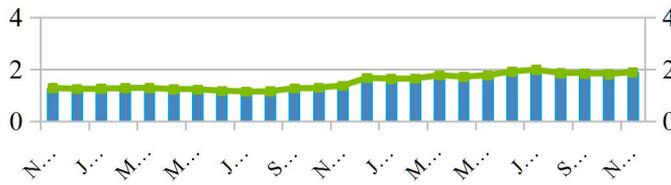
Range of Average A-share Price Premium	# of Companies	Proportion
Less than 0	6	0.113208
Greater than 0 and less than or equal 50%	21	0.396226
Greater than 50% and less than or equal 100%	19	0.358491
Greater than 100% and less than or equal 200%	7	0.132075

Among 53 dual-listed companies, 47 companies’ price ratios are greater than one, indicating that most of dual-listed companies have A-share price premium. Then the arithmetical average of A-H price ratio is calculated monthly to get Picture1. Before the approval of SH-HK Stock Connect, the average A-H share price premium was between 20% and 30%. When the Stock Connect was officially approved, the A share stock premium first fell back then returned to the

¹ **Source:** BOC official website:<http://www.boc.cn/sourcedb/whpj/>

² **Source:** Wind, computed by the author.

premium level before. When the Stock Connect was formally launched, the A-H share price premium significantly increased, with the highest premium 91.87% in June 2015.



Picture 1. A-H price ratio chart¹

4.1.2. Selection of independent variables

(1) Asymmetric Information Hypothesis

In this paper, company's total negotiable market capitalization is chosen as the proxy variable, denoted as $SIZE_{i,t}$. The formula of total negotiable market capitalization is shown below and is calculated in RMB billion.

$$SIZE_{i,t} = P_{Ai,t} S_{Ai,t} + P_{Hi,t} S_{Hi,t} E_t$$

Where $P_{Ai,t}$ represents the A-share price of the i_{th} company at the transaction date t ; $P_{Hi,t}$ represents the H-share price of the i_{th} company at the transaction date t ; $S_{Ai,t}$ represents the number of outstanding A-shares of the i_{th} company at the transaction date t ; $S_{Hi,t}$ represents the number of outstanding H-shares of the i_{th} company at the transaction date t ; E_t represents CNY to HKD spot exchange rate at transaction date t .

(2) Liquidity Hypothesis

In this paper, turnover ratio of H-shares to A-shares is chosen as the proxy variable, denoted as $LIQ_{i,t}$.

$$LIQ_{i,t} = \frac{TURNOVER_{Hi,t}}{TURNOVER_{Ai,t}}$$

Where $LIQ_{i,t}$ denotes turnover ratio of A-share to H-share of the i_{th} company at the transaction date t ; $TURNOVER_{Hi,t}$ denotes the turnover of H-share of the i_{th} company at the transaction date t ; $TURNOVER_{Ai,t}$ denotes the turnover of A-share of the i_{th} company at the transaction date t .

(3) Differential Demand Elasticity Hypothesis

The proportion of H-shares in the total outstanding shares is used to test the elastic of demand hypothesis, denoted as $DEMAND_{i,t}$. The formula of the proportion of H-shares in the total outstanding shares is shown as below.

¹ Source: Wind

$$DEMAND_{i,t} = \frac{S_{Hi,t}}{S_{Ai,t} + S_{Hi,t}}$$

Where $DEMAND_{i,t}$ represents the proportion of H-shares in the total outstanding shares of the i_{th} company at the transaction date t ; $S_{Ai,t}$ represents the number of outstanding A-shares of the i_{th} company at the transaction date t ; $S_{Hi,t}$ represents the number of outstanding H-shares of the i_{th} company at the transaction date t .

(4) Differential Risk Preference Hypothesis

In this paper, ratio of A-H variance of return is used to represent risk preference difference, denoted as $RISK_{i,t}$. The formula of the ratio of A-H variance of return is shown as below.

$$RISK_{i,t} = \frac{VARIANCE_{Ai,t}}{VARIANCE_{Hi,t}}$$

Where $RISK_{i,t}$ represents ratio of A-H variance of return of the i_{th} company at the transaction date t ; $VARIANCE_{Ai,t}$ represents variance of A-share's return of the i_{th} company at the transaction date t ; $VARIANCE_{Hi,t}$ represents variance of H-share's return of the i_{th} company at the transaction date t .

(5) Dummy Variables on SH-HK Stock Connect

As the main focus of this paper is test whether the launch of SH-HK Stock Connect has impact on A-H share difference, we introduce the dummy variable D_t . The value of D_t is defined as 0 before the November 17th 2015, otherwise defined as 1 to test the influence of launch of SH-HK Stock Connect.

4.2. Panel data model analysis

Based on previous study, we establish the model below to test the impact of asymmetric information, liquidity, demand elasticity, risk preference and launch of SH-HK Stock Connect on the A-H share price difference.

$$DIS_{i,t} = b_0 + b_1 SIZE_{i,t} + b_2 LIQ_{i,t} + b_3 DEMAND_{i,t} + b_4 RISK_{i,t} + b_5 D_t + \mu_{i,t} \quad (1)$$

4.2.1. Unit root test

To avoid the spurious regression and ensure the effectiveness of model estimation, we should test whether each variable is stationary of the same order in panel data model. One of the most common stationary tests is unit root test, so we apply this test. The null hypothesis assumes common unit root process. The result indicates that the p-value of four variables are less than 0.05 in the 1st difference and we find the variable SIZE has unit root in level, and then we go on to test SIZE in the 1st difference. Finally, we conclude that DIS, LIQ, DEMAND and RISK are I(0) and SIZE is I(1), so we change the formula (1) to the formula (2) as shown below.

$$DIS_{i,t} = b_0 + b_1\Delta SIZE_{i,t} + b_2LIQ_{i,t} + b_3DEMAND_{i,t} + b_4RISK_{i,t} + b_5D_t + \mu_{i,t} \quad (2)$$

4.2.2. Hausmantest

The Hausman Test is used to test the validity of random effects regression model. The null hypothesis is to build the random effect regression model. As a result shown in table 2, the p-value equals to 0.0003, which is less than 0.05. So we build the fixed effects regression model.

Table 2. Result of Hausman test¹

Correlated Random Effects - Hausman Test			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	22.95423	5	0.0003

4.2.3. Regression and result of panel data model

Based on Hausman Test, we choose the fixed effects regression model to run the regression. The result of panel date model is shown in table 3.

Table 3. Result of panel data regression²

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.6165	0.1227	13.1761	0.0000
SIZE	(0.0684)	0.0234	2.9185	0.0036
LIQ	(0.0048)	0.0013	(3.7338)	0.0002
DEMAND	(0.9746)	0.1900	(5.1301)	0.0000
RISK	(0.0001)	0.0001	(1.9396)	0.0526
D1	0.4274	0.0142	30.1733	0.0000

(1) The impact of four hypotheses

The value of coefficient b_1 is -0.0684 which means if total negotiable market capitalization increases by 1%, the A-H price ratio will decrease by 0.000684 units. The p-value is 0.0036, which is significant at the 0.05 significance level. So negotiable market capitalization has negative relationship with A-H share price ratio and we confirm the asymmetric information hypothesis.

The value of coefficient b_2 is -0.0048 which suggests that if turnover ratio of H-share to A-share increases by one unit, the A-H price ratio will decrease by 0.0048 units. The p-value is 0.0002, which is significant at the 0.05 significance level. So H-A share relative liquidity has negative relationship with A-H share price ratio and we confirm the liquidity hypothesis.

The value of coefficient b_3 is -0.9746 which indicates that if the proportion of H-shares in the

¹ **Source:** computed by the author based on EViews.

² **Source:** computed by the author based on EViews.

total outstanding shares increases by one unit, the A-H price ratio will decrease by 0.9746 units. The p-value is 0.0000, which is significant at the 0.05 significance level. So the proportion of H-shares in the total outstanding shares has negative relationship with A-H share price ratio and we verify the elastic of demand hypothesis.

The value of coefficient b_4 is -0.9746, which means the ratio of A-H variance of return has negative relationship with A-H price ratio. However, the p-value of b_4 is not significant at the 0.05 significance level, so the model do not explain the Differential Risk Preference Hypothesis well.

(2) The Impact of SH-HK Stock Connect

The value of dummy variable D_1 is positive and the p-value is significant at the 0.05 significance level. So we can conclude that the launch of SH-HK Stock Connect has significant impact on the A-H share stock price ratio. However, the coefficient is 0.4274, which means; with other things being equal; the launch of SH-HK Stock Connect will increase the A-H share price ratio by 0.4274. In other words, the A-H price difference will increase due to the official launch of Stock Connect, which does not accord with the market expectations since the public hold the belief that the SH-HK Stock Connect will decrease the price difference. There are mainly three reasons to explain this abnormal phenomenon.

Firstly, the quota of SH-HK Stock Connect is limited with Shanghai Stock Connect RMB300 billion and Hong Kong Stock Connect RMB150 billion. Compared with hundreds of billions of A-shares turnover, the arbitration among SH-HK Stock Connect is too weak to decrease the A-H share price difference. Secondly, the trading of Shanghai Stock Connect is more active than transaction in Hong Kong Stock Connect. As a result, Shanghai Stock Connect has net buyers, increasing the A-H share price ratio. Thirdly, so far the Stock Connect had just been running for over one year. The market still has irrational factors due to the short open time. In addition, during this period, A-share was a bull market, appealing numbers of players investing in the stocks, which boosted the A-share stock price and increased the A-H share price difference.

5. Research conclusions and policy recommendations

In this part, we will summarize the research conclusions and explain the results based on the results of empirical analysis and then put forward meaningful suggestions for the government.

5.1. Research conclusions

Asymmetric Information Hypothesis, Liquidity Hypothesis, Differential Demand Elasticity Hypothesis can explain the difference of price between A-shares and H-shares well. In addition, the launch of the SH-HK Stock Connect significantly improves the premium of A-share relative to H-share. The bull A-share market triggered by the interest rate cut, greatly inspired the enthusiasm of the A-share investors, which lead to the phenomenon that numbers of investors pour into the stock market and queue up to open a securities account. Large quantities of funds are invested into the A-share stock market, improving the liquidity, boosting the price and enlarging the gap between A-share and H-share.

The reasons why Differential Risk Preference Hypothesis cannot explain the price difference

can be listed as follows. Firstly, A-share investors are gradually becoming rational in investments, not pursuing for short-term profits. Secondly, the A-share market has 5% and 10% price limit. Thus the return of the stock is controlled by the regulations of stock market. However, H-share market has no price limit and is influenced by the international stock market, leading to large fluctuations of H-share stock price. To sum up, it is reasonable that the risk difference will be eliminated or decreased between A-share market and H-share market.

Then, we summarize the influence of SH-HK Stock Connect. In the panel data model, we add the dummy variable related to SH-HK Stock Connect and analyze the influence on the price difference between A-shares and H-shares. Then we found the fact that the launch of SH-HK Stock Connect has great influence on the price difference. After officially launched, the premium was increased significantly, which was affected by three reasons. Firstly, investment quota of SH-HK Stock Connect is limited. Secondly, Shanghai Stock Connect enjoys more popularity than Hong Kong Stock Connect. Thirdly, the official running period is just one year and still has irrational factors. To sum up, SH-HK Stock Connect increases the disparity between A-share and H-share since the official launch.

5.2. Policy recommendations

5.2.1. Accelerating the launch of SZ-HK stock connect

Nowadays, the market separation of A-H share stock market has much to do with the capital control. Although the mechanisms of QFII, QDII and RQFII have already been established to strengthen the link between the China and the international stock market, the effect is limited due to the limit of investment quota and investors' qualifications. SH-HK Stock Connect is a great milestone. We suggest that the authorities should increase the investment quota of SH-HK Stock Connect and expand the range of underlying assets. In addition, CSRC shall continue to push forward the SZ-HK Stock Connect, which will further enhance the integration of two markets. It is also necessary for CSRC and securities in mainland to learn from the experience of Hong Kong in internationalization, marketization, regulations and other aspects.

5.2.2. Strengthening A-share investors' education

The rational investment atmosphere is helpful to realize the function of price discovery in stock market. Nowadays, A-share market is dominated by individual investors. Due to lack of professional knowledge, most of A-share investors are speculators. Therefore, strengthening investors' education is the foundation for developing healthy stock market. Firstly, government should emphasize on education of individual investors through distributing brochure. Also, the government should improve investors' analytical ability and develop rational investment philosophy. Secondly, the government should cultivate more institutional investors and issue investment instruments to attract institutional investors. Then the proportion of institutional investors will rise up and further advance the internationalization of A-share market. Thirdly, CSRC not only needs to enforce the education for domestic investors, but also attracts more foreign investors by loosening the investment limits of QFII and SH-HK Stock Connect.

5.2.3. Speeding up the financial innovation

The difference between two markets has much to do with the lack of mechanism of arbitrage. For the time being, the amount and trading activities of derivatives in our country is far less than mature market. Therefore, it is very necessary to push forward the innovation of financial instruments. Since March 2nd 2015, the short-mechanism has been introduced into SH-HK

Stock Connect, but there have been still many limits. As a result, few investors show interest in short-mechanism. Therefore, we must speed up the financial innovation from the perspective of “range and depth” to eliminate the A-H share price difference. The “range” refers to creating more derivatives to enrich the investment channels based on bonds and stocks. The “depth” refers to strengthening the interconnection among markets to attract more participants. The introduction of financial derivatives is beneficial to the development of mechanism of arbitrage between two markets and will further decrease the A-H share price difference.

6. Research prospects

Due to limit of objective factors and author’s level, this paper has shortcomings and can be improved in following aspects in future. Firstly, the factors influencing the A-H price difference in this paper may be not comprehensive. Secondly, further study can be done if the two exchanges disclose more information and statistics about two-way Stock Connect. Thirdly, the launch of SH-HK Stock Connect is just over one year and the statistics may be too short to tell the whole story. To sum up, we still hold the belief that SH-HK Stock Connect will decrease the price difference between A-share and H-share in future although we do not get the expected results in this paper. We wish more reliable study on this topic can be carried out when the SH-HK Stock Connect becomes mature with irrational factors eliminated or decreased.

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