Correlation Study on the Stock Premium of Companies with Dual Listing of A Shares and H Shares

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Abstract

Chinese stock trading system allows Chinese companies to list on stock markets of the mainland China, Hong Kong, and other countries. Under different considerations, enterprise management will choose one or more markets. A company listed on multiple securities markets simultaneously is a cross-listed company. When a company is listed in different stock markets, the prices of the stocks in different markets are different due to differences in trading systems, investor types, and investment strategies. There has always been a discrepancy in the stock prices between A-share and H-share cross-listed companies, with A-share prices often being higher than H-shares. The excessive price difference of AH shares will affect the fairness and efficiency of the market. In order to reduce the impact of the AH share price difference, the Shanghai-Hong Kong Stock Connect was established in 2014, through which investors of AH shares have been allowed to buy shares with each other. The Shanghai-Hong Kong Stock Connect strengthens the relationship between the two markets. However, it does not alleviate the premium difference of AH shares.

To further study the reasons for the difference in AH share prices, this paper will select companies listed on both A and H shares from 2019 to 2021 as samples. According to the market segmentation theory and the four market segmentation assumptions put forward by scholars, this paper will make corresponding assumptions. A fixed-utility model is applied to verify these assumptions. The results show that liquidity, risk, exchange rate, index, and Shanghai-Hong Kong Stock Connect will increase the premium of AH shares. Demand, information, and capital costs are inversely proportional to the premium of AH shares. The Shanghai-Hong Kong Stock Connect has not narrowed the premium difference due to strengthened linkages. On the contrary, the Shanghai-Hong Kong Stock Connect has intensified the premium of AH shares.

The substantial reason for the difference in the premium of AH shares is the difference between investors and the system. Investor differences in product risk assessment, access to information, and needs lead to various investment strategies. Individual investors account for a large proportion of A-share investors. Individual investors' investment strategies are more easily affected by emotions than institutional investors, have higher expectations for short-term returns, and therefore have higher risk tolerance. Investors in H shares are less risk-tolerant and therefore more cautious. Recommendations for reducing the spread are presented at the end of this paper.

Key words: Chinese stock; stock premium; AH shares; dual listed

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1. Introduction

1.1.Background

Shenzhen Stock Exchange was established in Shenzhen in December 1990. However, in the early 1990s, China's foreign exchange reserves were weak, and China's economic development policies tended to open up the capital market indirectly. In order to enable the connection between the country and the world and to promote the economic development of Hong Kong, China allows mainland companies to list in Hong Kong. Tsingtao Brewery was the first company to be listed in Hong Kong on July 15, 1993, under the code 0618 (Zhang, 2018). The total trading volume of listed transactions ranked first on the Hong Kong Stock Exchange in just one day. A month later, Tsingtao Brewery was listed on the Shenzhen Stock Exchange. Since 1993, companies have successively opted for AH dual listing. As of April 1, 2022, 149 companies have dual-listed AH shares. Dual listing not only expands the financing channels of Chinese companies and enriches the company's capital but also helps to improve the degree of international operation of the company and its popularity in overseas markets.

An investor who buys shares in a dual-listed company, whether through A-share or H-share purchases, is buying shares of the same company. Such investors have duplicate voting and dividend rights. From the nature of business, a company should have only one share price. The stock price reflects the amount the company discounts on future cash flows. Therefore, in theory, shares of the same company should not have different prices. The phenomenon of market segmentation has led to differences in the share prices of the same company in A-shares and H-shares. Figure 1.1 represents HANG SENG CHINA AH PREMIUM INDEX (HSCAHPI) in the last decade. HSCAHPI is the difference between the stock premiums of AH dual-listed companies launched by HSI Service Company.

Figure 1.1 Hang Seng AH Premium Index Records from 2018, to 2022.

It is not difficult to see from the diagram that the valuation levels of dual-listed stocks fluctuate significantly. Over the past decade, the maximum of HSCAHPI index has doubled its minimum. Because of market segmentation, the same company shows different prices in different markets. AH shares have the same voting rights and dividend rights. Therefore, the difference in premium is contrary to the principle of the same price for the same stock.

Due to the increase in the number of dual-listed companies, more and more scholars and investors have begun to pay attention to the premium difference of dual-listed companies in the two places. Many scholars have researched dual-listed companies and found that the price of these stocks in H shares is usually lower than that of A-shares. There is usually a premium on foreign shares in dual-listed stocks. Bailey's research (1999) found that the stock premium rate of general dual-listed stocks in foreign stocks is generally between 1.4% and 32.9%. However, the dual-listed stocks in AH have discounts in the share price.

The securities mket in mainland China is enormous, but there are few investment methods and types of financial products that can be invested other than the stock investment. Therefore, more investors focus their funds on investing A shares, which leads to a giant market bubble. The Chinese securities market started relatively late. Compared with the mature securities market in Hong Kong, individual investors in the mainland lack ability of

professional judgment. In addition, a considerable number of individual investors in the mainland pursue short-term investment return and thus the bid-ask spread has a distinctive style. Studying the factors that affect the AH stock price difference can provide a reference for formulating policies. The AH stock price difference can be alleviated through the release of targeted policies, thereby improving the pricing efficiency of the market.

Although there are differences in AH share prices, the prices are also correlated with each other. The research on the influencing factors of AH share premium also benefits investors. Understanding the difference in the premium of AH shares is also a factor in understanding the investment choices of the two securities markets. The research on the AH share premium can provide reference suggestions for investors in mainland China and Hong Kong and will help to optimise the investor structure.

1.2 Research Questions

- Why is there a price difference between A and H shares?

This problem has been existing since the companies started to be dual-listed in AH shares. Generally speaking, the price of stocks in the region where the company is located will be lower than the stock premium of foreign stocks. However, H-shares are at a discount compared to A-shares, and it means that most A-shares are priced higher than H-shares.

- What are the factors that affect the price difference of AH shares?

Although many scholars have researched the factors of AH stock price difference, many research findings have proved that market segmentation was the main reason for the price difference before the launch of Shanghai-Hong Kong Stock Connect (Li, Yan & Greco, 2006). Whether the impact has changed since the launch of Shanghai-Hong Kong Stock Connect and whether the impact of various factors on the AH share premium has changed require further research.

1.3 Structure

This paper will be divided into five parts. The first chapter is the introduction. Firstly, the background of the development history of AH-share dual-listed companies is introduced. After that, the difference between AH shares' discount and other dual listing premiums is introduced. From the perspective of the government and investors, this paper expounds on the significance of studying the discount phenomenon of AH shares.

The literature review is conducted in Chapter 2. The first part are the definition of dual listing and the characteristics and differences between A shares and H shares. The second chapter mainly reviews and analyses scholars' literature on the stock difference under market segmentation. The chapter comprehensively analyses the previous research of different scholars on the AH stock price difference mainly from the macro and micro directions of the market, together with the traditional four market segmentation theories and the differences in the policy environment.

The third chapter is the methodology. This part mainly describes the design and hypotheses of the study. Based on the literature review in the previous section, the assumptions affecting the difference in the premium of AH shares are summarised. The selection criteria and time period of the samples analysed will then be determined.

The fourth chapter is the empirical analysis on the sample data. This chapter will process and analyse the data through descriptive statistics, correlation analysis, and multiple regression analysis. Furthermore, the analyses are followed by analysing the reasons for the price difference according to the results.

The fifth chapter is the conclusion and recommendations. The research of this paper is summarized and concluded, and suggestions are made based on the results and limitations and suggestions for future research directions.

2 Literature Review

2.1 Introduction

In the previous chapter, it was described that the cross-listed shares of the same company in different markets have premium differences. Bailey et al. (1999) conducted a study on the cross-listed stocks in ten countries and regions and found that stock prices of foreign stocks are usually higher than those of domestic stocks. However, there has been an unusual premium spread in the Chinese stock market, with foreign stocks trading at a discount relative to domestic stocks. In this chapter, the relevant literature will be sorted out and the relevant theories summarized around the issue of the premium spread in the Chinese stock market. In the initial research, research papers put forward the market segmentation theory, and then scholars classified market segmentation. The theories are mainly divided into hard segmentation and soft segmentation (Liang, 2010). In addition, the differences between A-share and H-share transactions will also be denoted.

2.2 Market Segmentation

Market segmentation refers to the existence of barriers between different securities markets. The stock prices of the same company in the two securities markets will differ. There are many reasons for market segmentation, which are mainly divided into "hard segmentation" and "soft segmentation" (Errunza et al., 1985). Hard segmentation refers to market segmentation caused by government intervention or geographical reasons. Through a series of studies, the causes of market segmentation are mainly divided into liquidity difference, information difference, demand elasticity difference, and risk difference.

Market segmentation refers to specific barriers in different markets, resulting in barriers and differences in communication between markets. Solnik first proposed this concept in 1977. Market segmentation is applied in the securities market. Because of the market segmentation, the stocks of the same company reflect different stock prices in different securities markets. Stehle's research (1977) confirmed the existence of market segmentation in the U.S. securities market. Froot et al. (1999) studied the stocks of Unilever N.V. and Unilever PLC and found that the trading location of cross-listed companies affects stock prices. Chan et al. (2003) studied Jardine Group stock when the Jardine Group moved from the Hong Kong stock market to Singapore in 1994. After transferring to the Singapore securities market, Jardine Group remained its main business in mainland China and Hong Kong. Chan et al. (2003) concluded that the trading location

affects the company's share price because the share price can be affected by other stocks in the securities market.

Mark (2017) further divides market segmentation into hard and soft segmentation. Objectively quantifiable factors such as physical, geographical, and product-related factors belong to hard segmentation. There are three main types of division: 1. Capital flow division; 2. Ownership division. For instance, in order to prevent foreign investors from taking too much of the investment, the government deprives the company of its own public office. Therefore, there are usually fixed proportion restrictions on foreign investors' shareholding; 3, Internal segmentation of the securities market. The Chinese securities market divides stocks into A shares, B shares, and H shares according to their listing location and trading currency. In addition, some segmentation factors are not caused by objective factors such as laws, systems, policies, and other physical obstacles, while human subjective factors cause “soft” market segmentation. Below are four main assumptions about soft market segmentation.

Investors in the A-share market can choose from fewer investment varieties, with a small proportion of institutional investors. Most of them do not have professional knowledge in investment studies. Individual investors tend to be impulsive when faced with investment decisions, resulting in a high turnover rate of A-shares. The enormous number of individual investors also causes the stock to be highly liquid, and investors can easily switch investment varieties with lower costs in time and money. The H-share market, on the contrary, is different. Investors not only have a variety of investment options but also are dominant by institutional investors that are more rational in investment decisions and will not easily switch investment varieties. Institutions focus on medium and long-term investments, and the stock turnover rate is descending, resulting in a reduction in liquidity. Considering the difference in liquidity, investors demand higher compensation due to the lower liquidity of H shares relative to A-shares. They are only willing to accept lower stock prices, resulting in a discount of H shares relative to A-shares. The more significant the liquidity difference there is between the two stock markets, the larger discrepancy there will be in the premium of AH shares.

2.3 Differential Risk Hypothesis

The differential risk hypothesis, which was first proposed by Hietala (1989), refers to the assumption that investors have different risk preferences when investing. Because different investors get different investment return in amounts, investment ratios and rate of return preferences, these differences will lead to different preferences for risk among investors. The higher rate of return also indicates higher risk. Investors have to bear the uncertainty brought about by changes in stock prices while enjoying the high rate of return. There are apparent differences in the investment styles of investors in the securities markets of A-shares and H-shares, which also lead to different risk preferences for investment in the two markets.

Hietala (1989) attributed return expected by investors to the difference in premiums in the research. The data of companies cross-listed in Finland from January 1984 to June 1985 using the Capital Asset Pricing Model proved that the stock price of foreign stocks in Finland was higher than that of domestic stocks because of different investor factors including different preferences for stocks.

Differences in risk appetite (Mossin, 1966) is also a factor causing the difference in such premiums. Ma (1996) obtained the beta risk coefficient by studying A shares and B shares in China's securities market and proposed that A-share investors and B-share investors have different preferences for risk. Chinese domestic investors can only hold A shares, and foreign investors are only allowed to hold B shares. There is a perfect split between A and B shares. He believes that investors in A-shares prefer speculation, and short-term retail investors mainly dominate the market. B-share investors who invest differently from A-shares have apparent differences in risk appetite. The considerable premium difference between AB shares is caused by the difference in risk appetite.

Zhang et al.'s research (2003) found significant differences in the investment styles of Chinese and foreign investors because the Chinese securities market was still an emerging market, and investors in this market had a low tolerance for risk. By studying the ratio of the return variance of A and H shares, Chen et al. (2001) found that the higher return expected was caused by the greater volatility return. In addition, he found that unlike foreign investors' preference for high-net-worth companies, domestic Chinese investors ignored this indicator. He further found that the factors of company fundamentals significantly impacted the difference in AH share premium.

2.4 Differential Demand Hypothesis

The Differential demand hypothesis states that due to the different needs from different investors, companies manipulate stock prices by increasing or decreasing the number of shares they hold (Chan & Kwok, 1996). Stulz and Wasserfallen (1995) studied the stocks of a global multinational company. They found that the needs of domestic and foreign investors are significantly different because mature foreign markets can provide a wider variety of investment products. Because domestic investors have fewer choices than foreigners, the investor demand is less elastic. Dual-listed companies generate higher premiums for foreign shares by limiting investment opportunities for investors. Domowitz et al. (1997) used a panel data model to study the premium difference between domestic and foreign stocks in the Mexican securities market. He found that the primary reason for the price difference between domestic and foreign stocks in Mexico was the low liquidity rate of foreign stocks, which caused the price to increase. By studying 11 stock markets, Bailey et al. (1999) concluded that in contrast to the discount phenomenon of foreign shares in Chinses securities market, foreign shares in the other ten countries have the premium phenomenon. By comparing the discount phenomenon of A shares and B shares, Bailey et al. (1999) believed that the abnormal discount of foreign shares was due to fewer product choices for A-share investors to invest. Domestic investors had a more splendid demand for any available investment than foreign investors. The most direct manifestation was that the investment demand for A-shares was greater than that for B-shares invested by foreign investors, so there was a discount for B-shares.

Sun et al. (2000) also studied the discount phenomenon of Chinese B shares. There is a distinct difference in the expected growth rates for domestic and foreign investors, and domestic investors tend to have a positive attitude towards product growth. In addition, because domestic investors can choose from fewer investment products, investors have a high demand for A-shares. Foreign investors' demand for B shares is not high compared to domestic investors. In addition to B shares, they also have other investment options such as H-shares and stocks in other countries. When the elasticity of demand for substitutes increases, it will affect investors' demand for B shares. Sun's findings (2000) further support the differential demand hypothesis.

2.5 Differential Liquidity Hypothesis

The difference in the market value of the same commodity is due to the difference in liquidity (Fang et al., 2009). Higher liquidity of the stock represents higher trading frequency of the stock and lower transaction costs. Trading volume and turnover are often used to measure the liquidity of a stock.

Amihud et al. (1986) proposed the liquidity premium theory. They believed that the structure and trading mechanism of different trading markets resulted in different liquidity of these markets. The less liquidity a stock has, the more expensive it is to trade. When stocks have less liquidity, investors will expect compensation gains.

Bailey (1994), for instance, believes that the liquidity difference is one of the primary factors affecting the premium difference between A-shares and B-shares in China. Because of the insufficient liquidity of B-shares, investors in B-shares will demand liquidity compensation, resulting in a premium for B shares. Poon et al. (1998) also studied the impact of liquidity differences on AB. shares. The study confirmed that liquidity explained the difference in the A.B. share premium. Chen et al. (2001) further found that the highchair cost of B shares can explain the AB share price difference. They believe that the price of A-shares is too high, and the price of B shares can reflect the company's importance.

2.6 Information Differential Hypothesis

According to Elfakhani & Zaher (1998), different investors have different perceptions of the same stock, mainly reflected in the ability and speed of obtaining stock-related information. In addition, differences in geographical location and environment of the participants will also cause information differences. Brennan et al. (1997) found that compared with foreign investors, domestic investors are more convenient and quicker to obtain information on domestic listed companies. Due to differences in geographic regions and cultures, foreign investors are at disadvantage in communication, and it is not easy for them to obtain complete information accurately and quickly. The main reason for the premium spread of AB shares in the Chinese stock market is the information difference (Chakravarty et al., 1998). B-share listings are mainland companies that are also listed on the Chinese stock market but traded in U.S. dollars or Hong Kong dollars. Foreign investors are significantly weaker than domestic investors in their ability to obtain information.

Further research found that the degree of discount of B-shares was negatively correlated with the degree of company information disclosure in English media. For instance, Moel (1999) used data from foreign companies that cross-listed in the U.S. between 1988 and 1997 by building two independent stock equilibrium pricing models to verify stock price changes for companies that were cross-listed in two markets with varying disclosure requirements. The study found that under the premise of incomplete information, the stock price has a significant positive correlation with the information disclosure requirements of the listing location. The stock price will have a certain premium in areas with a high information disclosure level. Chen et al. (2001) used total market capitalization of the company as a proxy variable to measure the degree of information asymmetry to study the phenomenon of B-share discounts in AB-share-listed companies. Their theoretical analysis holds that the degree of perfection of corporate information disclosure is positively related to the company's size. However, the empirical analysis showed no significant correlation between them. Doukas & Wang (2013) concluded that foreign investors have more advantages than domestic investors, especially when comparing A and H shares. They found that because the A-share market strictly controls the speech of the news media, some meaningful economic news can only be released after being reviewed by government agencies, and this means that the information is not timely. In contrast, foreign media are relatively free and can more easily break through information barriers and promptly conduct professional and comprehensive reports. The information disclosure mechanism of the A-share market is not perfect. Insider trading is prevalent, gossip will hide valuable information, and individual investors have limited professional ability, so the cost of identifying valuable information is relatively high. On the other hand, foreign investors have relatively formal channels for obtaining information and have a solid ability to screen valuable information.

2.7 Other Market Factors

Systematic risk is a market risk, which refers to the risk affecting all participants in the market (Bodie et al., 2021). Investors cannot eliminate it by diversifying their investments. Systemic risks include force majeure disasters, policy, macro, global market, and other further risks. The systemic risk of different markets is different and can be represented by beta values. In order to offset the impact of systemic risk, investors will demand compensation, which is reflected in the market capital cost and market rate of return. According to Zhang & Zhao (2003), usually for foreign investors, the systemic risk of the A-share market is higher than that of H-shares, and the mainland also has higher capital

costs and market returns than Hong Kong. Investors demand higher risk compensation, so they can only accept lower prices, and A shares will be discounted relative to H shares. Different factors in systematic risk can be analyzed as below:

(1) Institutional Differences

Due to fact that Hong Kong has a longer duration for development in capital markets and highly mature market development of the stock market, the Hong Kong Securities and Futures Commission is the institution reviewing corporate issuance and listing, and such a review adopts a registration system (Hu et al., 2016). The registration system requires the issuer to fully disclose the relevant information of the securities issued following laws and regulations. Regulators only review the compliance of issuers' submissions. The issuer itself and various intermediaries such as underwriters and accounting firms are responsible for the accuracy and completeness of the submitted materials. In order to control risks and protect investors, the approval authority for the issuance and listing of A-share companies is the China Securities Regulatory Commission, which adopts an approval system. Companies listing and issuing stocks on A-shares not only need to make complete and accurate information disclosure but also need to meet some local specific requirements, such as the stability of the leading business and sustainable profitability.

Hence, based on Liu's (2017) paper, in the mainland stock market, due to the strict issuance review, the issuance pricing is affected by external factors. The artificial market control leads to the weakening of the market mechanism, which will restrain price fluctuations. At the same time, the approval system determines the scarcity and preciousness of listed companies' "shell" resources, leading to a certain degree of stock price rise. Compared with the approval system, the registration system simplifies the approval process for listing and issuance and strengthens the role of the market mechanism in stock issuance. Under the registration system, supply and demand in the stock market are more balanced, and the pricing mechanism is more reasonable, which can make the stock price return to value. On the one hand, the performance of the stock price is more stable; and on the other hand, it also avoids the problem of excessive stock price due to insufficient supply.

(2) Differences in Transaction Operation

First of all, the trading hours of the two places are different. The time of each trading day for A shares is from 9:30 am to 11:30 am, and from 1:00 pm to 3:00 pm. The Hong Kong stock market closes half an hour later in the morning and one hour later in the afternoon.

Therefore, Hong Kong will have an extra an hour and a half of trading time on each trading day. In addition, the transaction dates in the two places are also different due to the different bank holidays.

According to MSCI Inc. (2010), A-shares adopt the T+1 settlement mechanism, and stocks bought on the same day can only be sold on the second day. However, the investor can re-buy on the day they sell. H-shares can be traded on the same day without time constraints. At the same time, the settlement and settlement of funds for H-shares will be completed on T+2. The funds sold will be transferred to the investor's account after T+2; the funds used to buy stocks will be frozen on T+2 to be transferred from the account.
In order to protect small and medium investors and optimize risk management, the A-share market has a daily limit of 10% for stock trading, while the Hong Kong market does not set a limit on the limit.

(3) Investor Differences

Investors in A-shares are mainly individual investors. According to the report of West China Securities, in 2020, individual investors hold about 39% of the A-share market value, while institutional investors account for 12.22% of the market value. According to Bloomberg data, individual investors in Hong Kong stocks accounted for about 8%, and institutional investors accounted for 51.8%. There is a big difference between individual and institutional investors' investment strategies. Individual investors lack professionalism and are easily influenced by emotions. Individual investors have a significant herd effect (Li et al., 2017). Since individual investors account for a large proportion among A-share investors, they will directly affect the volatility of stock prices. As institutional investors dominate the Hong Kong securities market, institutional investors pay more attention to long-term returns. The table below summarizes the trading differences between A shares and H shares.

	A share	H share
IPO	Mainly based on approval certificates (except the Science and Technology Innovation Board)	Registration system
Trading venue	Shanghai Stock Exchange, Shenzhen Stock Exchange	Hong Kong Stock Exchange
Transaction Currency	CNY	HKD
Investor Requirements	Domestic natural persons, legal persons and other organizations	No restrictions on investor entities, but before the opening of Shanghai-Hong Kong Stock Connect and Shenzhen-Hong Kong Stock Connect, domestic investors cannot freely participate in H-share investment
Trading Hours	9:30-11:30 3:00-15:00	9:30-12:00 3:00-16:00
Transaction Fees	Commission + stamp duty (0.1%) + others	Commission + government charges + transaction levy
Short-Selling Restrictions	Restricted to a certain extent and not restricted Up and down restrictions Normal stocks 10% up and down restrictions, ST stocks 5%	No specific restriction
Main Type of Investor	Individual	Institution

Table 2.1 The difference between A share and H share

3 Methodology

3.1 Work Flow

According to the market segmentation theory and the factors that may affect the fluctuation of AH stock price mentioned in the previous Chapter, this chapter will demonstrate the research step by step by analyzing the factors of AH share premium. The first part is the source of the data and the criteria for data selection. The second part will list the assumptions that may affect the premium. The following part is a list of formulas that can quantify these assumptions. As the combination of these quantitative formulas, the multiple linear regression model will be used for the detailed analysis of the difference in the premium of AH shares. The last part of the third chapter is the analysis method of the multiple linear regression model.

3.2 Data Sources

In response to the difference in the premium of AH shares, the sample selects companies with dual listings in mainland China and Hong Kong within a certain time period. The period chosen is from January 2019 to December 2021. The data are obtained mainly from Bloomberg.

Sample selection criteria include:

(1) The sample contain companies listed before July 1, 2018. In the initial stage of a company's listing, there will be strong fluctuations in the stock price, affecting the accuracy of the results. Therefore, the listing date of the sample company should be earlier than the sample time.

(2) To ensure the data's integrity, companies with missing data due to suspension or other reasons during the sample monitoring period will not be selected.

(3) Companies that were treated with special risk alerts within the sample period will not be selected because their data would affect the accuracy of the results.

(4) Because the trading dates of the two trading markets may be different, the time series of the sample chosen include two dates with trading for both markets; if there is no trading in one of the markets on that day, the data will be excluded.

(5) Since the research object of this empirical model is the cross-listed companies of A shares and H shares, companies that have been listed in the United States or other stock markets at the same time will not be selected. This is because the stock price in other regions will affect the data of A shares and H shares, which will lead to biased results.

3.3 Hypothesis

The difference in AH share premium is affected by various factors, including information difference, liquidity difference, demand difference, risk difference, exchange fluctuation, and capital difference, which significantly impact the AH share premium rate. A comprehensive analysis of many influencing factors shows that the root cause of the premium rate of AH shares is the difference in investor structure and investment philosophy caused by market segmentation between the Hong Kong and Mainland markets. The difference in investor structure is mainly reflected in the higher proportion of individual investors in the A-share market, while institutional investors in the Hong Kong market dominate. The difference in investor philosophies is mainly reflected in the fact that most investors in the A-share market are risk-seekers and have more speculative transactions. In contrast, investors in the Hong Kong market are more focused on value investment concepts.

(1) Information Differential Hypothesis

The Information differential hypothesis indicates that one party in a transaction has more information than the other. Due to the different information sources of investors and the unstable market environment, the information they obtain is very different. Mastering more comprehensive information is an advantage and this will affect the stock price of dual-listed companies. Differences in information can lead to unfair transactions that benefit one party. In addition, the differences in accounting systems also make investors in the two places have different judgments on the performance of the same company. A-share investors rely on their geographical, language and cultural advantages to have more comprehensive information on AH-share dual-listed companies. It means that the information disadvantage of H-share investors will make them require a higher expected return on the stock, that is, a lower stock price to make up for the risks they take, thus leading to a discount of H-shares relative to A-shares. Therefore, the difference in information is one of the main reasons for the difference in premium between A shares and H shares.

(2) Liquidity Differential Hypothesis

Liquidity is a measurement of how easy a market is to trade. Liquid stocks have shorter trading hours and lower transaction costs. For illiquid stocks, higher transaction costs have to be paid for trading and it takes more time to close the deal. Illiquid stocks can cause

investors to suffer losses due to illiquidity for being unable to complete transactions. Therefore, the stock will generate a corresponding premium due to the liquidity strength. The liquidity differential hypothesis suggests that the level of liquidity of capital has an impact on asset pricing.

In the case of AH share markets, since investors in H-shares pay less attention to cross-listed companies than those in A-shares, the trading volume and turnover rate of some non-popular companies are remarkably inadequate in H-shares. Investors in the A-share market can choose from fewer investment types, with a small proportion of institutional investors and most retail investors having no professional knowledge. A-share investors are more impulsive when faced with investment decisions, resulting in a high turnover rate of A-shares. It also causes the stock to be highly liquid, and investors can efficiently switch investment varieties with lower time and money costs. However, the H-share market is different: investors have a variety of investment options to choose from, and most of them are institutions. They are more rational in making investment decisions and will be more cautious when switching investment types. Institutions focus on medium and long-term investments, and the stock turnover rate is low, resulting in a decrease in liquidity. Considering the difference in liquidity, investors have more expectations for the yield due to the low liquidity of H shares relative to A-shares. They are only willing to accept lower stock prices, resulting in a discount of H shares relative to A-shares. The more significant the liquidity difference there is between the two A.H. stock markets, the larger the premium of A.H. shares there will be. In order to compensate for the opportunity cost caused by the lack of liquidity, the price of H shares will be discounted to a certain extent.

(3) Risk Differential Hypothesis

Because of the large number of individual investors in A-shares, these investors usually expect short-term gains from rising stock prices and have greater risk tolerance. On the contrary, H-share investors are more rational, so they have a weaker tolerance for risks but do not have high expectations for price increases. For this reason, it can be assumed that the difference in risk will affect the difference in the premium of AH shares.

(4) Demand Differential Hypothesis

Supply and demand in the securities market can significantly impact stock prices. Differences in demand can be analyzed from investment products. In two relatively independent markets, investors' demand elasticity for the same product is different because

of the different types and quantities of investment products. When the elasticity of demand is low because the change in demand caused by the price change is small, the increase in costs will not cause investors to look for other substitutes, so the product price is relatively high. When demand is very elastic, investors will immediately consider buying other products when prices rise, causing prices to fall and being unable to maintain long-term peaks. Therefore, the smaller the relative elasticity of demand is, the larger the premium will be. Hong Kong market investors can invest in a wide variety of financial products. At the same time, companies listed in the Hong Kong market are more diversified. Investing in stocks in the Hong Kong market makes it easier to realize the global allocation of assets and diversify the investments. Therefore, the price elasticity of demand in the H-share market is higher, and its supply-demand relationship will remain balanced.

For the A-share market, investors have limited choices. Due to the short development time and immature mechanism of the mainland capital market, there are fewer product types to choose from in the market as a whole. At the same time, because mainland China is a financial system dominated by the banking industry, the funds of mainland residents are primarily in the form of bank deposits. Compared with the interest income from bank savings, the investment risk and investment income in the stock market are higher, so residents are more willing to invest in stocks. This imbalance between supply and demand has caused A-share prices to be artificially pushed up. According to this factor, the following hypothesis can be put forward: the difference in demand elasticity is related to the difference in the premium of A and H shares.

(5) Exchange Rate Hypothesis

The trading currencies of A shares and H shares are different, so the exchange rate factor cannot be ignored when comparing the prices of AH shares. Due to the different exchange rate systems of CNY and HKD, exchange rate fluctuations have been exacerbated. The picture shows the HKD to CNY currency Chart for the last five years. The exchange rate between them is between 0.8 and 0.93. There was a definite upward trend in the first half of 2018 and a rapid decline in the second half of 2020. As shown in Figure 3.1, the AH-share premium spread also experienced sharp fluctuations in the same trend during the same period.

Figure 3.1 HKD to CNY currency Chart in the last five years.

Foreign investors must consider the impact of exchange rate fluctuations on investment returns when conducting investment activities. Large fluctuations in exchange rates in the short term will directly affect returns. Therefore, when investors have confidence in the growth of the RMB exchange rate, they will also be optimistic about RMB investment products (such as A shares). When foreign investors are short on the RMB exchange rate, they will be very cautious about investing. On the contrary, domestic investors pay little attention to the exchange rate, and the correlation between exchange rate and investment strategy is insignificant. The increase in the exchange of HKD/CNY will directly reduce the premium level of A shares to H shares after exchange rate conversion and cause investors to tend to invest in the H share market, which will indirectly drive the share price of H shares.

(6) Assumptions on Shanghai-Hong Kong Stock Connect Policy

The launch of the Shanghai-Hong Kong Stock Connect in 2014 has promoted economic exchanges between the two places. The Shanghai-Hong Kong Stock Connect effectively connects the capital markets of mainland China and Hong Kong. This policy has made trading in the two markets more active, the connection between the markets more closely linked and the two markets become more open. In theory, when there is a premium difference in the same company's stock of AH shares, there will be room for arbitrage, and investors will profit from arbitrage through the Shanghai-Hong Kong Stock Connect mechanism. Furthermore, this arbitrage behaviour will reduce the premium difference of AH shares.

(7) Industry Hypothesis

The industry structure of AH shares is different. H shares are mainly in the financial industry, while A shares are more in the manufacturing and chemical industries. When the primary industries in the securities market change, the change will affect the volatility of the entire stock market. For example, during the financial crisis in 2008, H-shares were more heavily discounted due to the large proportion of the shares from the financial industry.

(8) Hypothesis on Structure of Investor Difference

Investors are mainly divided into professional investors and individual investors. The structure of investors refers to the proportion of the total number of individual or professional investors. Institutional investors have more rational investment strategies. They have an in-depth analysis of companies, industries, policies, and the macro environment and will pay more attention to long-term returns when making decisions. Individual investors have a strong herd effect and tend to chase up and downs when investing, resulting in irrational stock fluctuations. Because the proportion of individual investors in the A-share market is higher than that of H-shares, the speculative nature is more significant, which affects the premium difference of AH shares.

(9) Capital Cost Differential Hypothesis

In additional to risky investments such as stocks, investors also have various risk-free investment options. When the risk-free rate of return rises, the opportunity cost of investing in stock assets will increase, and investors will reduce the proportion of risky assets such as stocks and improve their investment in risk-free assets, which will lead to a decline in the price of stock assets. The yields of risk-free products in mainland China are higher than those in Hong Kong. Therefore, when the yield difference of risk-free products decreases, the demand for A-shares will increase, the price of A-shares will increase, and the premium difference of AH shares will also increase.

3.4 Variables for the Multiple Regression Model

In order to test the hypotheses on the AH share premium, the following variables are chosen to build a multiple regression model.

3.4.1 Dependent Variable

The difference in the premium between AH shares can be indicated by the rate of premium of A-shares relative to H shares when they are calculated in the same currency. It will be denoted as:

$$Premium_{i,t} = \frac{Premium_{i,t}^{A}}{Premium_{i,t}^{H} \times e^{t}}$$

$Premium_{i,t}$ represents the premium rate of AH shares of the company i at time t. $Premium_{i,t}^{A}$and $Premium_{i,t}^{H}$denotes the stock prices of company i's A shares and H shares at time t, respectively. The stock price is the closing price of the day. e_t represents the exchange rate between RMB and HKD at time t.

3.4.2 Independent Variables

• Information Differential Hypothesis

A company's market capitalization can represent the difference in information. When a company's market capitalization is more significant, it becomes more difficult to obtain information. Investors tend to expect higher returns when they are given less information. Because the market value of listed companies is relatively large, the logarithm of the total market value is used to represent the information difference.

$$lnvalue_{i,t} = \ln\left(P_{i,t}^{A} \times N_{i,t}^{A} + P_{i,t}^{H} \times N_{i,t}^{H} \times e_t\right)$$

It refers to the logarithm of the sum of the market capitalization of A shares and H shares of the company i on the t trading day. $P_{i,t}^{A}$ and $N_{i,t}^{A}$ represents the stock price and the number of outstanding shares of the company i in A-shares on the t trading day. $P_{i,t}^{H}$ and $N_{i,t}^{H}$represent the stock price and the number of outstanding shares of the company i in H shares on the t trading day. e_t represents the exchange rate between RMB and HKD at time t.

• Liquidity differential hypothesis

Turnover is chosen as the variable to measure liquidity variance. Turnover can be calculated as the ratio of the number of shares traded to the number of shares outstanding. The liquidity of a stock is directly proportional to its turnover rate. The relative turnover rate of A shares and H shares can be expressed as:

$$turnover_{i,t} = \frac{turnover_{i,t}^{A}}{turnover_{i,t}^{H}}$$

$turnover_{i,t}$ represents the ratio of the turnover rate of AH shares of the company I at time t. $turnover_{i,t}^{A}$ and $turnover_{i,t}^{H}$ represent the turnover ratios of A shares and H shares respectively of the company i at time t.

• Risk Differential Hypothesis

The relative price-earnings ratio can express investors' attitudes toward a stock's risk. A higher price-earnings ratio means that investors are more optimistic about the company's future earnings and are willing to accept higher stock prices. The relative price-earnings ratio can be expressed by

$$PE_{i,t} = PE_{i,t}^{A} / PE_{i,t}^{H}$$

$PE_{i,t}$ represents the relative price-earnings ratio of AH shares of the company i at time t, and $E_{i,t}^{A}$ and $PE_{i,t}^{H}$ represent the price-earnings ratios of A shares and H shares of the company i at time t.

• Demand Differential Hypothesis

In the transaction, when the supply exceeds the demand, the price that investors can accept will be lower. When the supply is lower than the demand, the investor is willing to pay a higher price to buy. It is generally considered that the number of outstanding shares of a stock is determined by market supply and demand. Therefore, the more outstanding shares there are, the higher the market demand will be.

$$SO_{i,t} = \frac{SO_{i,t}^{A}}{SO_{i,t}^{H}}$$

$SO_{i,t}$ represents the number of outstanding shares of the company i at time t. $SO_{i,t}^{A}$ and $SO_{i,t}^{H}$ denote the numbers of outstanding shares of A-shares and H shares respectively of the company i at time t.

• Exchange Rate Hypothesis

Since A shares and H shares are traded in different currencies, the exchange rate fluctuates on each trading day. Although H shares are traded in Hong Kong dollars, dividends remain in RMB. Changes in the exchange rate between Hong Kong dollars and Renminbi will not only lead to changes in the premium difference between A-shares and H shares after exchange rate conversion but also cause investors to change their investment strategies. The HKD/CNY exchange rate will be used in the following text. The exchange rate is expressed as "exchange".

• Assumptions on Shanghai-Hong Kong Stock Connect Policy

Shanghai-Hong Kong Stock Connect will select the ratio of the quota balance of northbound funds and the quota balance of southbound funds. To be specific, the data include the northbound investment of foreign investors in A-shares and the southbound investment of H shares by domestic investors. SH-HK will be used to represent the volume of Shanghai-Hong Kong Stock Connect.

• Industry Hypothesis

Selecting the representative indices in the two markets can only reflect the overall environment of the two markets. The Shanghai Composite Index represents the market environment for A-shares. The Hang Seng Composite Index reflects the market environment of H shares. The index's rate of return will be used when applying the index.

$$Return_{i,t} = \frac{Return_{i,t}^{A}}{Return_{i,t}^{H}}$$

$Return_{i,t}$ represents the ratio of the return of the Shanghai Stock Exchange and of Hang Seng Index. $Return_{i,t}^{A}$ and $Return_{i,t}^{H}$represent the return of the Shanghai Stock Exchange and the return of the Hang Seng Index.

• Capital Cost Differential Hypothesis

For risk-free rates, the Shanghai Interbank Offered Rate (SHIBOR) and the Hong Kong Interbank Offered Rate (HIBOR) are used to represent the risk-free rate in the mainland China and Hong Kong markets. $R_{riskfree}$ denotes the ratio of risk-free interest rates in the Mainland and Hong Kong.

$$R_{riskfree} = \frac{shibor}{hibor}$$

The following table summarizes the definition and denotation of each variable.

Type	Variable	Definition	Formula
Dependent	Premium	AH shares premium	$Premium_{i,t} = \frac{Premium_{i,t}^{A}}{Premium_{i,t}^{H} \times e^{t}}$
Independent	Information Difference	Companies market capitalization	$lnvalue_{i,t} = \ln(P_{i,t}^{A} \times N_{i,t}^{A} + P_{i,t}^{H} \times N_{i,t}^{H} \times e_{t})$
	Liquidity Difference	Turnover ratio	$turnover_{i,t} = \frac{turnover_{i,t}^{A}}{turnover_{i,t}^{H}}$
	Risk Difference	PE ratio	$PE_{i,t} = PE_{i,t}^{A} / PE_{i,t}^{H}$
	Demand Difference	Shares outstanding ratio	$SO_{i,t} = \frac{SO_{i,t}^{A}}{SO_{i,t}^{H}}$
	Exchange	Exchange rate ratio	CNY/HKD
	Shanghai-Hong Kong Stock Connect Policy	Shanghai-Hong Kong Stock connect volume ratio	SH-HK
	Industry Difference	Index ratio	$Return_{i,t} = \frac{Return_{i,t}^{A}}{Return_{i,t}^{H}}$
	Capital Cost Difference	Interbank Offered Rate ratio	$R_{riskfree} = \frac{shibor}{hibor}$

Table 3.1 Variables and Definitions

3.4.3 Empirical Model

After selecting the above variables, we can build the following multiple regression model to study the impact of different variables on the AH share premium.

$$Premium_{i,t} = x_1 + x_2 turnover_{i,t} + x_3 lnvalue_{i,t} + x_4 PE_{i,t} + x_5 SO_{i,t} + x_6 exchange + x_7 SHIBOR/HIBOR + x_8 SH - HK + x_9\, Index$$

This paper outlines the research results of other research, and based on the results, a total of 8 variables are considered and included in the formula. Where $Premium_{i,t}$ is a constant term, $turnover_{i,t}$ is the ratio of the turnover rate, $lnvalue_{i,t}$ the ratio of the logarithm of

the number of shares in circulation, $PE_{i,t}$ the relative price-earnings ratio, $SO_{i,t}$ the market value of the company, $exchange$ the exchange rate between RMB and Hong Kong dollars, $SHIBOR/HIBOR$ the ratio of the interbank offered rate, $Return_{i,t}$ the index ratio, SH-HK the ratio of the daily trading volume of Shanghai-Hong Kong Stock Connect and $Index$ the index ratio of Hang Seng and Shanghai Composite Index.

3.5 Analytical Method

Descriptive statistics, correlation analysis, and linear regression analysis will be used to analyze the relationship between each hypothesis and the difference in AH share premium. Descriptive statistics include maximum, minimum, mean and standard deviation. Because of the enormous data size, descriptive statistics can effectively and quickly understand the data's degree of dispersion and central tendency.

Correlation analysis is used to determine whether there is a relationship between independent hypotheses and measure the degree of correlation. The Pearson correlation coefficient will be used in the next section. The value is between -1 and 1. The correlation coefficient approaches 1 or -1 as the linear relationship between the two variables increases. If one variable increases, the other variable also increases, indicating that the two variables are positively correlated, and that the correlation coefficient will be greater than 0. If one variable increases and the other decreases, the two variables are negatively correlated. If the correlation coefficient equals 0, they have no linear relationship.

Another role of correlation analysis is to avoid the multicollinearity problem in regression analysis. When serious collinearity problems occur, the analysis results will be unstable. Through correlation analysis, when the correlation coefficient of the two explanatory variables approaches 1, the independence of the two explanatory variables is weak. At this point, re-modification of the explanatory variables will be considered.
For the multiple regression analysis, the adjusted R-squared is used to determine the fitness of the overall model. The value range of adjusted R-squared is [0,1]. R-squared can only be used in simple linear regression models with only one explanatory variable, and it will be too high when there is more than one explanatory variable. Adjusted R-squared can fix this problem. An adjusted R-squared greater than 0.7 indicates that the model's fitness is good (Salcedo & McCormick, 2020).

Judging the significance of each variable in the regression model is expected to use t-distribution to determine P-values. According to Allison (1998), the p-value in the multiple regression model means whether the coefficients can satisfy certain distributions in assumptions. Usually, the smaller the P-value, the more accurate the coefficient. The level of significance alpha is usually 0.05. If the p-value exceeds 0.05, the coefficient is not statistically significant. If the P-value is less than 0.05, the coefficient is significant by the T-test.

The F-test is similar to the T-test. It is also used to judge the significance of the model. Unlike the P-value applied to each coefficient, the significance F applied to the test of the entire model. The value range of the significance F is [0, infinite]. Similarly, the model is significant when the significance F is less than 0.05.

4 Case Study

The results of the data analysis will be discussed in this chapter. In the previous chapters, the factors and assumptions that may affect the difference in the premium of AH shares were identified and quantifiable variables were selected based on the assumptions. In Chapter four, an empirical analysis will be conducted. Descriptive statistics will be analyzed first; the degree of dispersion and trend for each variable will be demonstrated in this part. Next, is the Pearson correlation analysis, from which we can know whether there is a collinearity problem between the variables in hypotheses. The last part is regression analysis, through which the relationship between each variable can be obtained.

4.1 Descriptive Statistics

In order to more intuitively reflect the data characteristics of each variable, before applying the linear regression model, the mean, variance, minimum and maximum values of each variable will be calculated. Each variable in the research has a sample size of 34741. As can be seen from the data in the table 4.1 at below, the premium difference of AH shares is larger than 0, which means that companies with cross-listed AH shares generally show a premium for A shares and a discount for H shares. However, some companies with H shares are also priced higher than A-shares. From the maximum value of the premium difference, it can be seen that for the company with the highest premium, A-shares is 6.28 times the price of H shares. The average turnover ratio is 1.4849, meaning that A-shares are more liquid than H shares. The average ratio of the logarithm of the number of shares outstanding is 9.95. In other words, the companies under study have issued significantly more shares in A-shares than in H-shares. Since the standard deviation of the logarithm of the number of outstanding shares is greater than 10, it shows a considerable difference in the number of outstanding shares among different companies. The average relative price-earnings ratio, which reflects the difference in risk, is approximately 4, and the A-share price-earnings ratio of cross-listed companies is generally higher than that of H-shares. At the same time, the standard deviation of the price-earnings ratio is small, indicating that the price-earnings ratio between A shares and H shares fluctuates smoothly. The standard deviation of the exchange rate of RMB and Hong Kong dollar is tiny, which shows that the exchange rate fluctuations during the sample time period is small and relatively stable. The maximum value of the interbank offered rate ratio is ten times as high as its minimum value, and the value of the standard deviation is 2.59. The ratio of interest rates fluctuates to a large extent. The fluctuation of the index ratio is minimal, and its standard deviation

value is only 0.02. The standard deviation values of most variables are relatively small, which indicates that the selected sample data have a relatively dense distribution and a low degree of dispersion.

	MAX	MIN	AVG	SD
Premium	6.277044	0.876181	1.745309	0.585524
Turnover	5.909914	0.197724	1.484824	0.755339
Exchange	1.2288	1.0816	1.154541	0.042854
Shibor/Hibor	8.798154	0.858673	3.512324	2.593263
Index	0.202617	0.113437	0.145843	0.020501
Shares Outstanding	12.67371	5.393173	9.954186	10.87973
P/E Ratio	6.6324	0.0139	4.2842	0.0238
Lnvalue	10.3857	0.039904	3.241354	1.889624
SH-HK Connect	11.5693	10.0648	10.9571	0.2463

Table 4.1 Descriptive Statistics Table

In order to gain an in-depth understanding of each company's premium, the premium difference will be divided into three different groups as shown in table 4.2: less than 1, greater than 1 and less than 2, and greater than 2.

Range	Count	Percentage
premium rate < 1	481	1.3845%
1 < premium rate < 2	26057	75.0036%
premium rate > 2	8203	23.6112%

Table 4.2 Premium Rate Table

The table shows that the premiums for all companies mainly concentrate in the range of less than 2 and greater than 1. Only 481 samples show that A-shares are at a discount to H shares. 75% of the stock prices in all sample data show that the price of A-shares is 1-2 times as much as that of H shares. In addition, 23.6% of all samples show a massive difference in the performance of AH shares, and the stock prices of A-shares for this group are more than twice as much as that of H shares.

4.2 Correlation Analysis

Correlation analysis can be used to check whether there is a collinearity problem between variables. From the test results in the table 4.3 below, it can be concluded that each variable has passed the significance test. At the same time, the correlation between each variable and the premium is basically in line with expectations. The relationships between AH shares premium difference, relative turnover rate, market capitalization, relative number of shares outstanding, relative price-earnings ratio, exchange rate ratio, interbank lending rate ratio, index ratio, and Shanghai-Hong Kong Stock Connect ratio are very significant. Among them, the premium is negatively correlated with the number of outstanding shares, the logarithm of the relative market value, and the Shanghai-Hong Kong Stock Connect ratio.

	premium	turnover	shares outstanding	P/E ratio	Lnvalue	Exchange rate	Shibor/Hibor	Index	SH-HK connect
premium	1								
turnover	***	1							
	0.376								
shares outstanding	***	***	1						
	-0.2883	0.023							
P/E ratio	**	***	***	1					
	0.2579	0.0823	0.0959						
Lnvalue	***	***	***	***	1				
	-0.5282	-0.2798	0.326	-0.0915					
Exchange rate	***	***	***	***	***	1			
	0.1399	0.0038	-0.0648	0.1938	-0.0317				
Shibor/Hibor	***	***	***	***	***	***	1		
	-0.0192	-0.0027	0.0039	-0.0299	0.4919	-0.2984			
Index	***	***	***	***	***	***	***	1	
	0.284	0.0813	-0.1602	0.4982	-0.2545	0.0482	-0.0846		
SH-HK connect	***	***	***	***	***	***	***	***	1
	0.1717	0.035	0.1388	0.1135	-0.2823	0.1245	-0.4482	0.3421	

*P<0.1, **P<0.05, ***P<0.001

Table 4.3 Correlation Analysis Result

Table 4.4 below is the test result of the variance inflation factor (VIF) for each variable. The VIF test can be used to test whether a multicollinearity problem between variables will affect the regression results. The results of the VIF test show that the VIF value does not exceed 5, so the multicollinearity among the variables is not considered as existing. In addition, this value further shows that the variable design is reasonable, and that sample regression analysis could be performed.

Variables	VIF	1/VIF
Lnvalue	2.34	0.4274
Turnover	1.87	0.5348
P/E ratio	1.23	0.813
Shares Outstanding	1.02	0.9804
exchange	1.94	0.5155
SH-HK connect	2.15	0.4651
SHIBOR/HIBOR	1.76	0.5682
Index	1.28	0.7813

Table 4.4 Variance Inflation Factor VIF Test

4.3 Multiple Regression Analysis

Table 4.5 shows the result of the multiple regression model on panel data. Details will be discussed in next section.

	FE	
turnover	0.0125	**
	-1.6862	
shares outstanding	-0.3598	***
	(-2.1183)	
P/E Ratio	0.252	***
	-5.1103	
Market Cap	-0.0503	***
	(-2.9643)	
Exchange Rate	0.0119	***
	-9.7474	
Shibor/Hibor	-0.0209	***
	(-2.1698)	
Index	0.1209	***
	(-3.9597)	
SH-HK Connect	0.0161	***
	(-2.8535)	
N	46794	
R Square	0.6279	
F Test Prob> F = 0.0000		
Hausman Test Prob>χ2=0.0000		

*P<0.1, **P<0.05, ***P<0.001

Table 4.5 Panel Data

4.3.1 The Fitness of the Multiple Regression Model

The results of the F test can determine whether to use a mixed-effects model or a fixed-effects model. A fixed-effects model is used because the P-value of the F test was 0. In addition, since the P-value of the Hausman test is less than 0.01, the null hypothesis is rejected. In other words, using the fixed effects model is efficient.

The value of R^2 judges the goodness of fit of the model. The closer it is to 1, the better the regression model fits. After carrying out the regression model, it can be seen that R^2 is 0.63, indicating that the goodness of fit is relatively high and that the data are valid.

4.3.2 Coefficient of Each Variable

It can be seen from the p-values from the tables that all coefficients on independent variables are significant because p-values are smaller than 0.01 or 0.05. Each coefficient of variables will be discussed below.

(1) Turnover rate. The coefficient of the relative turnover rate is shown as 0.0125 within the 95% confidence interval. The relative turnover rate and the AH share premium difference show a significant positive correlation. Keeping all other variables constant, when the difference between A-shares and H shares' turnover rate is more considerable, the premium difference of AH shares will also be more significant; when the value of the turnover rate of AH shares is closer, the premium difference of AH shares will be relatively smaller.

(2) Shares outstanding. The liquidity of AH shares is positively correlated with the premium. The coefficient relative to the number of tradable shares is significantly negative at 1%, which means that keeping all other variables constant, the greater the difference in the number of AH shares of the same company circulating in the market, the smaller the premium difference of AH shares will be. Because the coefficient relative to the number of tradable shares is -0.3598, the more significant the difference in investor demand is, the smaller the difference in the premium of AH shares will be. When the demand difference of AH stock investors is close, the premium difference of AH stock is enormous. The demand difference of AH shares is negatively correlated with the premium.

(3) Price-earning ratio. The relative price-earnings ratio is 0.2520 at the 1% level. It shows a significant positive correlation between the P/E ratio and the premium. Keeping all other variables constant, the more significant difference in investors'

risk appetite will affect the larger difference in the premium of AH shares. When investors' appetite for risk is almost the same, the difference in premium for AH shares is more negligible. The risk difference of AH shares is positively correlated with the premium.

(4) Market capitalization. The standardized coefficient of market capitalization can be used to evaluate the relationship between information variance and AH stock premium variance. From the coefficient of the market value of -0.0503, it can be known that the change in the company's market value and the difference in AH share premium are negatively correlated. Keeping all other variables constant, the larger the company's market capitalization is, the smaller the premium differential for AH shares will be. There is a negative correlation between the information difference and the premium of AH shares.

(5) Exchange rate. From the data in the table, the exchange rate coefficient is positive at the 1% significance level, so there is a significant positive correlation between exchange rate and the premium rate of AH shares. The larger the value of the CNYHKD exchange rate is, the more considerable the premium difference of AH shares will be. It shows that when the RMB appreciates, the spread of AH shares will be widened; when the RMB depreciates, the premium difference of AH shares will be narrowed.

(6) Index ratio. For index ratio, the coefficient is also positive and significant at the 1% level. The difference between the ratio of the A-share index and the H-share index will affect more differences in the premium of AH shares.

(7) Shanghai-Hong Kong Stock Connect. It aims to effectively connect the trading markets of Shanghai and Hong Kong to reduce fragmentation between the markets. According to the data in the table, the ratio between Hong Kong Stock Connect and Shanghai Stock Connect at the 1% level is 0.0161. It shows that the larger the gap there is between the trading volume of Shanghai Stock Connect and Hong Kong Stock Connect, the more investors there are using Hong Kong Stock Connect. In addition, it also affects the greater difference in the premium of AH shares. In other words, when foreign investors pay more attention to A-shares, it will narrow the premium difference of AH shares. However, when the number of domestic investors who choose to invest in H shares increases, the premium difference of AH shares will increase.

4.4 Possible Reason for the Spread of AH Shares

The reason for the premium in AH shares is due to differences in the issuance system of AH shares. The stocks listed and issued in the A-share market are mainly based on the approval system, and the stocks listed and issued in the H-share market are mainly based on the registration system. For companies that adopt the approval system for listing and issuing stocks, the approval system for stock issuance has higher requirements, requiring them to completely disclose the company's financial status and other company business situations, and to go through layers of review by the China Securities Regulatory Commission and other relevant departments. The process for the approval system is more cumbersome, and the registration system is relatively simplified: companies only need to submit materials to the Hong Kong Stock Exchange, and they can go public after approval. Therefore, listing in Hong Kong is simpler and more efficient. Because of differences in issuance systems, cross-listed companies will choose to list on H-shares first to ensure faster access to financing. In order to ensure that the original shareholders' rights and interests are not diluted when the A-shares are listed, the price of the A-shares issued subsequently will also be at a premium.

Another possible reason is that the exchange of CNY is not completely free, and the flow of funds is strictly supervised and restricted by the government. This has led to low liquidity between funds in mainland China and those in overseas markets. The budgets of A-share investors cannot be used to invest in overseas products, therefore the price of A-shares is further pushed up.

5 Conclusion

The previous chapter empirically analyzed the spread of AH shares by drawing on different scholars' issues on the premium of cross-listing and connecting the situation of stocks price listed in mainland China and Hong Kong. The issue of the difference in AH share premium has been widely concerned and discussed by scholars. Scholars conduct research through behavioural science, finance, economics, and other subjects. This chapter will summarise the conclusions drawn in the previous chapters, and some suggestions will be provided for improving the results. Limitations and direction for future research will be presented at the end.

5.1 Achievement

The overall content of this paper is based on the questions in Chapter 1. Accordingly, the previous questions will be answered in the paper's last chapter.

Why are there differences in the stock prices of A and H shares?
Due to market segmentation between the two market, the system of A and H shares differs. Since A-shares and H-shares are relatively independent, domestic and foreign investors have differences in product risk assessment, ability to obtain information, and demand for products. It makes investors use different investment strategies. Domestic investors are typically considered as short-term investors who focus on short-term benefits and are prone to herd effects. Foreign investors have more financial products to choose from in addition to H-shares. Consequently, their engagement with H-shares is far less than that of domestic investors with A-shares.

What factors affect the difference in the premium of AH shares?
This paper selects a total of 67 AH-share cross-listed companies as samples. The fixed effects model verifies the changes in liquidity, demand, risk, information, market capital costs, exchange rates, Shanghai-Hong Kong Stock Connect, and others that effect the difference in premiums. Based on the results, it is found that the stock price of A-shares is at a premium to most of the H-shares. Most of these figures show a slight premium, with about 23% of A-shares priced at two or more times as much as H share price.

The regression analysis of the whole sample found that the increase in turnover ratio, PE ratio, exchange rate, index ratio, and Hong Kong-Shanghai Connection quota balance will increase the premium of AH shares. On the other hand, the growth in shares outstanding

ratio, market capitalization, and interbank offered rate ratio will restrain the premium difference of AH shares. Shanghai-Hong Kong Stock Connect desires to strengthen the connection between investors in the Hong Kong and Shanghai markets and reduce market segmentation. However, the fact is the opposite. The Shanghai-Hong Kong Stock Connect policy further increases the premium difference of AH shares.

The four traditional market segmentation factors significantly impact the difference in the premium of AH shares. Liquidity difference and risk difference have a positive correlation with AH share premium difference and investors' expectation of stock return due to the difference in AH share liquidity. Individual investors are the prominent investors among A-share investors, and individual investors have far more significant risk tolerance than institutional investors. Because individual investors have higher expectations for short-term yields, they can afford higher risks. On the contrary, many institutional investors in H-shares have a weaker risk tolerance, so their behaviour of buying and selling stocks will be more cautious and cause more losses.

5.2 Suggestions for Reducing the Premium Spread

1. The difference in the attitudes of A-share investors and H-share investors towards risk is a critical factor causing the price difference between A-shares and H-shares. Individual investors account for a large proportion of the A-share stock market, and the irrational characteristics are relatively prominent. Individual investors are more inclined to speculative rather than investment stocks, which will raise the premium difference of AH shares and affect the healthy development of China's capital market. In response to such problems, the government should strengthen investment education and guide individual investors to establish a mature and rational investment perspective. At the same time, the government should strengthen supervision and crack down various illegal activities to protect the interests of individual investors. The government is required to pay more attention to encouraging institutional investors. Currently, institutional investors account for a relatively small proportion of the A-share securities market. Institutional investors cannot control the pricing power of the secondary stock market, and they cannot play the role of rational investors in stabilizing the market. The government can lift market entry constraints and thereby increase the number of institutional investors in the market. On the other hand, strengthening supervision and avoiding irregularities by institutional investors makes the market more active and stable.

2. The empirical results prove that there is a severe information asymmetry problem in the A-share and H-share markets, which leads to the premium of A-shares relative to H-shares. This problem can be solved mainly from two aspects. Firstly, the government should require listed companies to establish a sound information disclosure mechanism, to clarify the information disclosure process, standards and the information disclosure responsibilities of each department, and to ensure the authenticity, integrity and timeliness of information disclosure. Enterprises that spread rumours should be penalised and the cost of illegal enterprises should be increased. Secondly, the government should relax restrictions on financial media, encouraging financial media to improve their professional skills and professionalism continuously, maintain a high degree of professional enthusiasm, and provide investors with high-quality information services.

3. The demand difference between the A-share and H-share markets impacts the AH-share premium rate. The AH-share premium can be reduced by reducing the difference in demand elasticity between the two markets. The narrow investment channels for domestic residents and the lack of investment products are the fundamental reasons for the difference in the elasticity of investor demand. In addition to government bonds, funds, and bank wealth management products in the domestic financial market, investors' primary choice is the A-share market. Compared with the A-share market, investors in the H-share market are global investors and can diversify risks by investing in different markets and products. Therefore, on the one hand, it is necessary to strengthen financial innovation, to develop more financial products, to increase market breadth and depth, to enrich investors' choices, and to reduce investors' dependence on the A-share market. On the other hand, the restrictions on domestic residents investing in overseas markets are relaxed, and the overseas asset allocation of residents is increased to diversify market risks.

4. There is still a shortage of supply in the A-share market. Investors who are enthusiastic about the market can effectively promote the development of the market. Relevant institutions need a complete IPO system to improve the listing efficiency of A-shares and ease investors' enthusiasm for investment. In addition, there are fewer types of investments in mainland China. Compared with mature overseas markets, there is a significant gap in the variety of varieties and the number of funds. Accordingly, to improve domestic investors' demand elasticity, it is necessary to strengthen financial

innovation, enrich investment varieties, and effectively expand investment channels for investors.

5. Market segmentation is the fundamental reason for the AH premium difference. Hong Kong Stock Connect has realized the interconnection of the stock markets of the two places, which not only realizes the flow of funds in the two markets but also brings about the mutual transmission of risks. Shanghai-Hong Kong Stock Connect currently restricts domestic individual investors' capital threshold and daily trading quota. The fundamental reason for these restrictions is to avoid risks. The capital market development in mainland China is still immature, and the system is not perfect. Blindly increasing the degree of the market opening may severely impact the financial market and affect the financial system's stability. Therefore, the relevant departments of the two places need to cooperate closely to improve the supporting system and enhance the effectiveness of supervision.

5.3 Limitations and Further Studies

Although this paper has tried to consider all the essential influencing factors as detailed as possible when making assumptions, there is still room for improvement due to the limitations of objective conditions.

(1) Selection of Variables

This paper considers the impact of different factors on the price of dual-listed AH stock as comprehensively as possible through references. In addition, the theoretical considerations mainly focus on objective factors such as stock liquidity, yield, investor sentiment, institutional changes and other factors that affect the premium spread of AH shares, but these factors are difficult to quantify. For instance, political factors are what investors will consider. Investors will adopt different investment strategies based on changes in policies. However, since this metric is difficult to quantify, it was not used in this paper and could be considered in future research.

(2) Selection of Data

Because SH-HK connect is used as a variable, the data of 2019-2021 is selected for the sample period. The data within two years inevitably affects the accuracy of the final regression results. Future studies should try to expand the number of samples and compare the results of different samples to obtain more accurate results.

Moreover, the sample selection period falls within the beginning of 2019 and the end of December 2021, during which the covid-19 pandemic and the trade war between China and the United States will impact the accuracy of the data. As of 2022, there will be more than 100 AH cross-listed companies, and less than 100 companies will remain after excluding companies with missing data and companies that have been suspended from trading. As a regression model, a small number of samples are prone to bias. In the future, when a more significant number of companies are cross listed, the regression model results will be more accurate and objective.

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