Chinese cross-listed firms

A study about the relations between cross-listed A & B shares and A & H shares

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Abstract:

This paper investigates the hidden relations between the Chinese cross-listed firms in the Shanghai and Hong Kong stock exchanges. In China, stocks are classified into four categories: A shares, B shares, H shares and ADR shares. A and B shares are traded on China’s two stock exchanges, namely Shanghai and Shenzhen Stock Exchanges while H and ADR shares are traded in Hong Kong and the USA respectively. A shareholders consist of mainly domestic investors with a fraction of foreign investors; B shareholders are however, a mixture of Chinese and international shareholders; H and ADR shares are targeted only towards international investors. A firm can only choose to cross-list A and B shares or A and H shares. 21 companies that have cross-listed A and H shares and 44 companies that have cross-listed A and B shares during the timeframe between July, 2001 and June, 2006 have been studied. We have retrieved closing prices on the 20th of every month and using the general mathematical approach involving log-returns, the expected monthly returns, variances and covariances have been estimated. Our results for A and B cross-listed firms show that the monthly returns are in the same and have reasonably high correlations. The results for A and H cross-listed firms however, show that the expected returns of the H shares are of higher magnitude than the A shares and that they show significantly lower correlations. The reason behind these results seems to be a consequence of the deviant behaviour of the B share market in comparison to the international market, together with the hypothesis that B shares lead A shares.

Keywords: Chinese stock market, Shanghai stock exchange, Hong Kong stock market, Cross-listing, A shares, B shares, H shares, log-return, correlation, expected monthly return.

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1. Introduction

1.1 Objective

Since China started its stock trading for State Owned enterprises in the beginning of 1990’s, its equity market has been growing immensely. Chinese firms may choose to attract national investors, international investors or both by listing their stocks on different stock categories: A shares, domestic investors; B shares or H shares, mainly foreign investors. The number of cross-listed firms has been stable (though less than ten percent of the total listed firms choose this option). A special feature for the Chinese cross-listed firms is that their shareholders are segmented although they may trade on the same stock exchanges.

The purpose of this paper is to conduct statistical studies between the different types of shares in order to examine any hidden relations between them. We will retrieve closing prices on the 20th of every month over a five-year period of time for a number of companies on the Shanghai stock market which are cross-listed, which means they issue both A and B shares or A and H shares, the latter on the Hong Kong stock exchange. A series of tests will be conducted regarding their investment returns such as the expected return, their variances, correlations and a confidence interval for the correlations between the different shares.

1.2 Problem discussion

As mentioned, many companies choose to issue both A and B shares or A and H shares. We will examine these companies in order to answer these two questions:

- Which type of share generally has a higher expected investment return?
- How are the different types of shares correlated?

As will be mentioned elsewhere in the paper, there are arguments supporting the fact that the Shanghai and Shenzhen stock exchange operate differently regarding their information flows. To eliminate the possible effect that this can have on our experiment, we have chosen to observe only Shanghai shares.
2. Background of the China’s equity market

China’s economical development since the end of the 70-century is unique. There is no other comparison in modern economic history regarding the improved living standard in the country. Yet its economic output is expected to triple over the next 15 years, overtaking Japan in 2015 and the US by 2039. However, is it really worthwhile for investors to cast their money into the giant market?

The Chinese equity market is unique in the world compared to its foreign counterparts because of the various regulations imposed by the government. As such, many experts consider the development of the stock market to be irregular because of these regulations, and to this date different reforms are continuously being put into effect with the aim of reducing these restraining policies. China Securities Regulatory Commission (CSRC) is the sole national security regulatory authority. It was mandated in October 1992 to regulate all of China’s security and futures markets.

Traditionally, Chinese investors have their money saved in a bank account which tends to give lower interest rates than the world market. It is almost impossible for normal Chinese to invest their money overseas due to different barriers. Compared to other countries China’s equity market is still at a very young age. It only provides a limited range of financial instruments: stocks, bonds, funds and warrants. Warrants is the only financial derivative instrument available. The lack of investment alternatives makes prices of stocks that are in scarce supply bid up by the small investors who are poorly informed and have limited understanding of the stock fundamentals.

To understand the current state of China’s stock market we need to get familiar with its history and its development.

2.1 History of the Chinese stock market

The history of the first stock trading in mainland China can be traced back to Shanghai in the 1860s. In 1891 the Broker Association was created, and in 1920 and 1921 the Shanghai Securities & Commodities Exchange and Shanghai Merchant Exchange opened. Shanghai became the financial centre of Eastern Asia, where various products such as Chinese and foreign stocks, corporate bonds and futures could be traded. In 1946 the Shanghai Stock Exchange Co., Ltd was established but no more than three years later it ceased operations.

From 1949 to 1978 there were only two types of firms in China: state-owned and collective-owned. China was a socialistic society under Mao Zedong command. At the end of 1970’s the political changes opened up China to the world and market economical changes began. During 1980’s the market developed according to the Deng Xiaoping theory. As financial aids

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1 “China” in this article refers to the mainland of P.R. of China, excluding Hongkong, Macao and Taiwan.
2 Zakaria, F. “Does the Future Belong to China?”
3 Fernald, Rogers, “Puzzles of the Chinese Stock Markets”, page 2
4 Kowk, page 2
to the stated owned enterprises (SOE) the Chinese government started issuing stocks on the public stock markets less than twenty years ago.

Gradually the trading of different types of bonds and stocks resumed and the Shanghai Stock Exchange (SHSE) was established on the 26th November, 1990. A great number of the listed firms are still controlled by the Chinese government. An ongoing reform launched in April 2005 tends to make more firms to be market capitalized, This will be discussed in section 2.3.

The Shenzhen Stock Exchange (SZSE) was established on the 1st of December 1990, shortly after its counterpart. Officially the trading didn’t start until the 3rd July 1991 after an initial trial period. On May 27, 2004, the Small and Medium Enterprises (SME) Segment was launched on the SZSE, the SME Segment provides a direct financing platform for hi-tech or rapidly growing small and medium enterprises with competitive core businesses.5

<table>
<thead>
<tr>
<th>Table 2-1: Number of listed companies (2001-2005)</th>
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<tbody>
<tr>
<td>Issuing A shares only</td>
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<tr>
<td>Issuing A and H shares</td>
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<tr>
<td>Issuing A and B shares</td>
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<tr>
<td>Issuing B shares only</td>
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<td>Total 1160</td>
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Source: CSRC

Currently, both Shanghai and Shenzhen Stock Exchange offers trading with both A and B shares. Listed firms are located in different parts of the country and across various industrial sectors such as machinery, metallurgy, chemicals, electronics, infrastructure, etc. The number of listed firms has been growing rapidly. There were only 10 listed firms in 1990. However, by the end of 2005, there were 1381 firms listed on the two stock exchanges. A total of 762.95 billion shares were issued with an aggregate market capitalization of RMB6 3,243 billion (among which the capitalization for tradable stocks amounted to RMB 1,063.1 billion).7 Although there are more than 1,300 listed companies in the A share market, only 6% of the listed companies have market cap more than US$1bn. However, these companies account for more than half of total market cap.8

No company is listed across both exchanges. Statistic data from 2005 shows that SHSE is much bigger than SZSE in terms of total share capital of the listed firms. See figure 2-1, Listed Companies by Share Capital in 2005.

As widely known, Hong Kong had been a British colony up to July, 1997. As such, compared to China mainland it has a more sophisticated financial security market and more restricted accounting laws9. On July 15th, 1993, Tsingtao Brewery became the first Chinese company listed in Hong Kong. As of the end of 2005, 122 domestic companies had issued H-shares and got listed on the international capital markets, raising a total capital of US$ 55.54 billion.10

5 China's Securities and Futures Markets 2006, page 36
6 RMB is short for Ren Min Bi, it is counted in yuan, also regarded as CNY (Chinese Yuan).
7 China's Securities and Futures Markets 2006, page 3
8 Liu, Jerry, “Morgan Stanly Research”, 2006-08-14, page 10
9 Appendix 1
10 China's Securities and Futures Markets 2006, page 4
2.2 Stock classifications and listing requirements

The Chinese stocks are classified into four categories: A shares, B shares, H shares and ADR shares. See Fig 2-2, *Overview of the Chinese stock market*.

**A shares**: Issued by Chinese firms listed on Shanghai and Shenzhen exchanges. A shares are traded in Chinese RMB mainly for the Chinese citizens. However, from 2002 foreign institutions were allowed to invest directly into the A share market via the Qualified Foreign Institutional Investor (QFII) scheme. According to CSRC, eligible foreign companies can offer and list A shares in China’s market since 2001. Foreign companies are also allowed to take over Chinese listed companies since 2002. The A-share market is one of the most active stock markets in the world with turnover of US$ 379.3 bn in 2005.11

**B Shares**: First introduced in 1991, B shares are also traded on Shanghai and Shenzhen exchanges. Initially B shares were only meant for foreign investors, but since 19th February 2001 B shares are also tradable for Chinese citizens with USD on Shanghai Stock Exchange and with HK dollar on Shenzhen Stock Exchange. Therefore, the B share market enables Chinese companies to raise foreign currencies from both Chinese and international investors.

**H-shares**: Issued by China’s domestic listed firms, traded on Hong Kong stock exchange. The firms are registered in Chinese RMB while the shares are traded in HK dollars. These shares are reserved for foreign investors, although Chinese citizens can trade with a quoted amount.

Firms are not allowed to issue both B and H shares, but they are allowed to issue both A and B or A and H shares. Apart from the imposed regulations, A-, B- and H-shares are legally identical with the same voting rights and dividends.12

**ADR-shares**: American Depository Receipts(ADRs), listed in New York. ADR-shares will not be studied in this paper.

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11 Liu, Jerry, “Morgan Stanly Research”, 2006-08-14, page 7
12 Fernald, Rogers, "Puzzles of the Chinese Stock Markets", page 1
Regulations for stock segmentation make it impossible to have order flows across different stock categories, which exclude arbitrage possibilities.

Firms have different choices when issuing shares. As seen above, there are different types of shares, they have the option to cross-list and they have two stock exchanges to choose from.

There are different listing requirements for issuing A, B and H shares. More specified requirements for listing the different shares are available under Appendix 4.

There are also speculated reasons behind why firms choose not to register on the Hong Kong Stock Exchange. These include 1) higher requirement for the accounting regulations, 2) longer waiting time, and 3) various regulations from the Mainland side.

2.3 Non-tradable shares and its reform

Up to this date, A shares are divided into tradable and non-tradable shares based on their tradability at stock exchanges: tradable shares – held by public investors in the stock market;

13 Appendix 1
non-tradable shares – mainly state-owned shares, but may also be Legal person shares or Employee shares, the value of which are not affected by the stock market movements. An ongoing reform in an effort to better protect investors was launched in April 2005, with the purpose to reduce the number of state-owned shares. Since the A-share reform, US investors have become more interested in China’s stock market, with equity investment from the US hitting historical highs in 2005.

State-owned shares: Owned by the government at local or central level or government-owned institutions. These shares are not publicly traded, but can be transferred to another domestic institution with the approval of the CSRC.

Legal person shares (Faren gu): Held by the domestic institutions. A legal person is a non-individual legal entity. Legal person shares are not tradable, but can be transferred into other domestic institutions upon approval from the CSRC.

Employee shares: Offered to employees, usually at the discount to market value. Employees can sell their shares with the approval of the CSRC, although the management cannot sell shares during their term of office.

By the end of 2004, the non-tradable shares accounted for 64% of the total shares in Chinese capital market (among which the state owned 74%). By the end of March 2006, 768 listed companies had completed or engaged in the reform, accounting for 57% of the 1,349 listed companies eligible for the non-tradable shares reform, or 63% of the whole market capitalization. The non-tradable shares reform is expected to be completed, by and large, at the end of 2006.

2.4 Impacts on China’s WTO accession

In July of 1986, China applied for admission to the WTO's predecessor, the General Agreement on Tariffs and Trade (GATT). After 15 years of exhausting negotiations, China became the 143rd member of the WTO on December 11, 2001, since which many laws have been being amended to meet China's WTO obligations to further liberalize industries such as telecommunication, legal services, real estate, advertising, management consulting and so on. As mentioned previously, foreign companies may now own sizable minorities of various enterprises previously foreclosed to them, such as logistics, warehousing, retailing, wholesale distribution, insurance and banking.
3. Previous Studies

3.1 Cross-listing

When a company issues different type of shares on the same or several different stock exchanges, the company is cross-listing its shares. There are obvious benefits with cross-listing. A firm that chooses to cross-list its shares broadens its shareholder base and raises capital. Furthermore, it is widely known that individual investors are more comfortable investing in securities that they are more familiar with. This means that cross-listing can provide an advertisement effect for lesser-known companies\textsuperscript{20}.

On the other hand, previous studies indicate that cross-listing can have a negative effect on liquidity and volume in the domestic market.

A study by Domowitz, Glen and Madhavan show that when there is a high market transparency between two markets, cross-listing encourages foreign investors to trade.\textsuperscript{21} The idea is easy to understand, since when a firm chooses to cross-list on a foreign stock exchange, the investors in the foreign country can more easily obtain information about the firm. For instance, it is easier for a Swiss investor to find information about a US firm if the firm has issued shares on the Swiss stock exchange, assuming that information flows freely between the two exchanges. However, if the information linkages are of imperfect nature, it is unclear if the effects of cross-listing are positive or not.

Cross-listing can also have an effect on order flow migration since a shareholder of a firm now has the opportunity to invest in different types of stocks issued by the firm. The effects of cross-listing on the domestic market liquidity and trading volume are examined by Hargis and Ramanlal\textsuperscript{22}. Their results indicate that cross-listing has a negative impact, meaning that a certain amount of domestic shareholders choose to invest on foreign exchanges instead. This has only recently become a factor in the Chinese stock market since, as previously mentioned, the A and B shares were completely segmented. The situation is different in recent times since the restriction on B shares has been removed since 2001. Therefore, the order flow migration from A shares to B shares for individual investors has become possible. Moreover, in the future this might have a higher importance since the restrictions on buying foreign currencies have lately been reduced for Chinese citizens.

Studies examining the impact on variance as a consequence of cross-listing have showed different results. A previous study by Freedman showed that the variance of a security is increased when cross-listed\textsuperscript{23}. This result was confirmed by Makhija and Nachtmann when studying US shares cross-listed on the Tokyo stock exchange.\textsuperscript{24} However, a study by Barclay, Litzenberger and Warner shows that the variance of US shares cross-listed on the Tokyo stock exchange maintained its overall level, while the variance of the Tokyo shares cross-listed on the New York stock exchange increased.

\textsuperscript{20} Kwok, page 50
\textsuperscript{21} Ibid, page 36
\textsuperscript{22} Ibid, page 37
\textsuperscript{23} Ibid, page 44
\textsuperscript{24} Ibid, page 44
As mentioned, previously the markets available for the domestic and foreign investors were completely segmented; a unique version of cross-listing since no order flow migration was possible. Since B shares became accessible to domestic investors the dynamics relations between the markets have changed.25

### 3.2 Previous Studies on the Chinese Market

An unusual phenomenon in the Chinese stock market is that cross-listed firms with A and B shares carry different price levels; a company’s A shares tends to be more expensive than its B shares. This is one of the many interesting features of the Chinese stock market since it is not clear why the stock development of the shares have resulted in different price levels for A and B shares.

This relation has in fact been a mystery since cross-listing B shares became allowed. Several studies have been made in order to illuminate this subject and numerous theories regarding the Chinese market and investment behaviour have evolved. Since our study deals with relations between shares with restricted availability for domestic or foreign investors, the theories are highly relevant and should be taken into account. We will give an overview of the different theories and their state of significance.

#### 3.3 The differential risk hypothesis

One school of thought is that since there are limited alternative investments available for Chinese citizens, the domestic investors are inclined to accept a lower return on investment and pay a higher price. One viewpoint is that “Chinese stock market is characterised as a casino and the domestic investors are highly speculative”26, meaning that Chinese investors follow trends and word of mouth in a higher degree than foreigners. It also creates distrust towards the Chinese stock market among foreign investors since they are used to a less speculative market behaviour.27 Researchers argue that this speculative trading contributes to the higher prices of A-shares. Chen, Lee and Rui28 show that B share prices are more affected by market fundamentals than A share prices. Another study by Mei, Scheinkman and Xiong29 shows the same result. This means that A share prices are affected by non-fundamental factors to a greater extent, thus strengthening the idea that Chinese investors are more speculative.

#### 3.4 The differential demand hypothesis

Another theory is that restriction imposed on foreign investments is an effect of differential demands between foreign and domestic investors. Sun and Tong30 claim that the H share market in Hong Kong provides an adequate substitute for the B share market in China, leading to an elastic foreign demand for B shares. The discount on B shares become larger

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25 B. Grip, page 30  
26 Kowk, page 26  
27 Appendix 1  
28 Chen, Lee and Rui, page 133-155  
29 Mei, Scheinkman and Xiong  
30 Q. Sun and W.H.S Tong, page 1875-1902
when foreign investors move away from the market and into the H share market as more and more companies become listed on Hong Kong.

### 3.5 The liquidity hypothesis

A more acknowledged theory is that the price difference between A- and B-shares is caused by the illiquid B share market. The lower prices and the higher expected rate of return are a direct consequence of the higher trading costs of the B share market. This is the most widely known explanation to the regarding the difference between A and B shares. The findings of Chen, Lee and Rui\(^{31}\) support this hypothesis. They claim that the primary reason behind the price differences and different expected rate of return is the illiquidity of the B share market.

### 3.6 The informational asymmetry hypothesis

The title of this paragraph might as well be called “informational asymmetry hypotheses” since numerous such exist. For example, one general hypothesis posed by Bailey and Jagtiani, is that foreign investors can obtain information about larger firms much easier than smaller firms, and as such they are willing to pay a higher premium to invest in them.\(^{32}\) Chui and Kwok state that this is the case in the Chinese market. They argue that foreign investors obtain information about Chinese firms faster than domestic investors due to the information barriers.\(^{33}\) Moreover, the hypothesis states that since foreign investors obtain information about the Chinese market faster than domestic investors, returns on B shares lead the returns on A shares.

However, a contrary hypothesis claims that in general it is harder for foreign investors to acquire information about Chinese stocks than for domestic investors. Chakravarty, Sarkar and Wu\(^{34}\) argue that this is the reason behind the discount on B-shares.

Another hypothesis stated by Sjoo and Zhang\(^{35}\) is a combination of the previous two. The hypothesis claims that information flows between the Shanghai and the Shenzhen stock markets differ since the Shenzhen stock market is significantly smaller and less liquid. In the Shanghai market information flows from foreigners to domestic investors and in the Shenzhen market the information flow is reversed.

Lastly, Li, Greco and Chavis claim that investors in Hong Kong receive information faster than investors from the Mainland. This causes returns on H shares to lead returns on A shares.\(^{36}\)

\(^{31}\) Chen, Lee and Rui, page 133-155  
\(^{32}\) W. Baily and J Jagtiani, page 57-87  
\(^{33}\) A.C.W Chui and C.Y. Kwok, page 333-353  
\(^{34}\) S. Chakravarty, A. Sarkar and L. Wu, page 325-355  
\(^{35}\) B. Sjoo, and J. Zhang, page 421-438  
\(^{36}\) Y. Li, J. F. Greco and B. Chavis,
3.7 Deviant B share behaviour

Whether the development of the B share market follows the international market has been studied by Bailey. Bailey considered the short history of the Chinese stock markets since B shares were targeted to non-Chinese investors. Their results showed that the B-share returns exhibit little or even no correlation with international stock index returns or returns on China-related stocks traded in Hong Kong and the US. This inconsistency between the B share market and the international market is of fundamental importance when studying the Chinese stock market.

4. Methods

Our assumption is that Chinese firms have the same basic conditions since they are restrained by the same laws, cultural environment and available work force etc. However, as mentioned above, there are different regulations regarding the investments options on these firms based on the type of shares they choose to issue. We will examine and compare historical data from firms that have both A- and B-share or have both A- and H-shares and investigate whether they have followed a similar stock development. The mathematical approach will be discussed in detail in section 5.3.

We will also conduct interviews to verify the practical problems with trading Chinese shares. Our candidates for the interviews are Chinese funds experts.

4.1 Quantitative vs Qualitative method

Our primary objective, and the main part of this study, is to investigate companies which cross-list A and B shares or A and H shares, and investigate the relations between the different shares. To this end, a quantitative study serves our purpose best, since we aim to examine and discover how the shares relate using acknowledged mathematical methods on empiric material.

As an extension, the second stage of our study revolves around examining why the shares behave in the discovered manner. To this end we have interviewed a handful of Chinese fund experts who have thorough experience dealing with the Chinese stock market and interpreted their answers. Since the number of respondents were few, together with the fact that the interpretations are not numerically measurable and we have, when necessary, been forced to re-establish contact with our respondents and asked them to clarify their answers, our interviews are of a more qualitative character.

4.2 Data collection and sources

Up to June, 2006, the B-share list consists of 54 firms of which 44 firms have also A shares on the Shanghai Stock Exchange (SHSE). In this thesis we sample stock prices from all the 44 Chinese firms that have both A- and B-shares on SHSE and all the 21 firms that have both A- and H-shares on the SHSE and Hongkong Stock Exchange (HKSE). The collected share data was absent from five of the examined firms on the A and H since they were registered at a later date than July, 2001.
prices cover the period from July 2001 to June 2006 from which one stock price is sampled for every month. We used the closing price on the 20th of each month. Thus, we have a total of 60 price observations for each stock or data series. The data are extracted from the websites of Shanghai Stock Exchange\(^{39}\) and MarketWatch\(^{40}\).

On Shenzhen Stock Exchange (SZSE), there are 56 firms under the B-share list of which 42 have also issued A shares. We exclude these data in our thesis since, as mentioned in section 2.4.4, there is reason to believe that the information flow in SHSE differ from SZSE.

Due to the fact that A, B and H shares are traded in different currencies, we have converted the B and H share prices into one single currency which is RMB. The historical exchange rates are extracted from the website: www.x-rates.com.

### 4.3 Interviews

The interviews were made through the internet with e-mail. Our chosen questions were constructed after our quantitative study was finished and fashioned in a way to answer the findings that in our opinion were relevant. The respondents were free to write as much as they wanted and in several cases, as mentioned, it was required to ask them to illuminate or answer more comprehensively through e-mail and telephone.

### 4.4 Quantitative Study

#### 4.4.1 Validity

External validity deals with whether the study can be generalized beyond the selected objects of study, i.e. if the study applies to other objects as well.\(^{41}\)

Since we have in our quantitative study chosen all available Chinese companies who have cross-listed A and B shares on the Shanghai stock exchange or A and H shares on Shanghai and Hong Kong stock exchanges during our chosen period, no selection has been made. The entire population has been included in the study and therefore no discussion regarding the external validity is appropriate.

Internal validity deals with causal conclusions made in a study.\(^{42}\) A discussion regarding internal validity is not appropriate in our quantitative study since the study only examines correlations between the different shares and no conclusions about causality are made.

#### 4.4.2 Reliability

Reliability deals with whether the results from a study are affected by random events, i.e. if the results will be the same if the study is redone.\(^{43}\) Since the quantitative study consists of

\(^{39}\) http://www.sse.com.cn/

\(^{40}\) http://bigcharts.marketwatch.com/

\(^{41}\) A. Bryman, page 44

\(^{42}\) Ibid, sid 44

\(^{43}\) Ibid, sid 43
applying mathematical analysis on historical data, the reliability of the study is impeccable assuming that the historical data is accurate.

4.5 Qualitative Study

4.5.1 Credibility

In order for a result in a study to be credible, the results are “reported to the people who are a part of the social reality and have been studied so that they may confirm that the researcher has understood the reality in a correct way”\(^{44}\). In our qualitative study we have informed the respondents of our interpretations of their answers in order to prevent eventual misunderstandings.

4.5.2 Transferability

In accordance with standard qualitative studies, we have aimed to interview only a handful of people and asked them to answer our questions freely in order to obtain “thick descriptions”\(^{45}\) about their views of the details of the Chinese stock market and its mechanisms. These descriptions make the basis for us to judge whether the results are transferable,\(^ {46}\) i.e. if employees in other types of companies share their view.

4.6 Source Criticism

As mentioned in 3.2, we used each stock’s closing price on the 20\(^{th}\) of each month. However, in some cases several stocks were not traded on the 20\(^{th}\) due to various reasons, for instance, when our chosen date coincided with a weekend day or a national holiday. In these cases we choose the closest trading day to the 20\(^{th}\) instead.

In some other cases, A-share prices were not available at all for the entire month on the website source which causes discontinuity for the respective data series. Possible reasons could be that individual firms had a temporary trading cease on ordinary trading days. In such cases, it may distort the result of our calculations of the respective data series to some degrees.

5. Theories and concepts

5.1 Elementary Probability Theory

5.1.1 One-dimensional stochastic variables

Stochastic variables are of substantial importance to probability theory. A stochastic variable (SV) is not deterministic. A random experiment gives rise to a number that is decided by the

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\(^{44}\) Ibid, page 258  
\(^{45}\) Ibid, page 260  
\(^{46}\) Ibid, page 260
result of the experiment, and as such the SV is created. The SV is thus unknown before the experiment. It is important to understand that a SV is not really a variable, but a function. We will give a formal definition:

**Definition:** A stochastic variable is a measurable function $X$ from a probability space to a value space.

### 5.1.2 Distribution function

There are numerous ways one can describe how a SV varies. The most common method is to examine the variable’s distribution function. A distribution function is defined as follows:

**Definition:** $F_X(x) = P(X \leq x)$, $-\infty < x < \infty$ is called the *distribution function* for the stochastic variable $X$.

Thus for every possible $x$ the probability $P(X \leq x)$ is calculated which gives rise to a function $F_X(x)$ in the interval $-\infty < x < \infty$.

### 5.1.3 Discrete stochastic variable and probability function

A stochastic variable is discrete if it can take on a finite or a countable infinite numbers of values. For this kind of stochastic variable it is comfortable to introduce the following definition:

**Definition:** The quantities $p_X(k)$, $k = 0, 1, ...$ are jointly called *probability function* for the stochastic variable $X$.

1) **Theorem:** For a discrete stochastic variable $X$, its distribution function obeys

$$F_X(x) = \sum_{j \leq x} p_X(j)$$

### 5.1.4 Continuous stochastic variable and frequency function

A continuous stochastic variable can assume all values within an interval. The interval itself can have an infinite extent (for example it can consist of the negative part of the x-axel). Since the results are “infinitely close” to each other, it can not take on a single value with a positive probability. As such there can not exist a probability function as in the previous case. Since $X$ can now take on an infinitely amount of values, one constructs the distribution function in the following manner:

2) **Theorem:** For a continuous stochastic variable $X$, its distribution function

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47 G. Blom, page 52
48 Ibid, page 58
obeys \( F_X(x) = \int_{-\infty}^{x} f_X(t) \, dt \) where \( f_X \) is called the frequency function.

The sum in the discrete case is replaced by an integral. Thus when this construction is possible, the stochastic variable \( X \) is continuous.

Since in our experiment our SV can take on infinitely many values, the proceeding passages will handle only continuous cases.

### 5.1.5 Multi-dimensional stochastic variables

In many cases more than one quantity is examined with each random event. If one studies two or more randomly varied quantities, one gets a multidimensional stochastic variable. For the sake of our experiment we will undertake the two-dimensional case.

**Definition:** A two-dimensional stochastic variable is a measurable function \((X,Y)\) from a probability space to a value space.

As before, the distribution function and (for the continuous case) the frequency function are of significant importance:

**Definition:** The function \( F_{X,Y}(x,y) = P(X \leq x, Y \leq y) \) is called the distribution function for the stochastic variable \((X,Y)\).

3) **Theorem:** For a continuous stochastic variable \((X,Y)\), its distribution function obeys

\[
F_{X,Y}(x,y) = \int_{-\infty}^{x} \int_{-\infty}^{y} f_{X,Y}(t,u) \, dt \, du
\]

### 5.1.6 Expectancy

The frequency function gives complete information about a stochastic variable but often there is a need to describe the SV with simple measures instead. The expectation is such a measure. An expectation of a stochastic variable is the value it takes on on average, its mean value. A mathematical definition is as follows:

4) **Theorem:** For a continuous stochastic variable \(X\), the expected value obeys

\[
E(X) = \int_{-\infty}^{\infty} x f_X(x) \, dx
\]

Often there is a need to study the expectation value of a function of a stochastic variable. Then we have the following theorem:

5) **Theorem:** If the stochastic variable \(Y\) is a function of the continuous stochastic variable \(X\)
such that $Y = g(X)$, the expected value obeys $E(Y) = \int g(x)f_X(x)dx$

For the two-dimensional case we have:

6) **Theorem:** If the stochastic variable $Z$ is a function of the continuous stochastic variables $X$ and $Y$ such that $Z = g(X, Y)$, the expected value obeys $E(Z) = \int \int g(x, y)f_{X,Y}(x, y)dxdy$

### 5.1.7 Variance

Besides the expected value there is also a need to describe how a stochastic variable varies. A common measure is the variance:

**Definition:** The variance $V(X)$ for a stochastic variable $X$ is defined as $V(X) = E[(X - E(X))^2]$.

Given that $E(X) = m$ we see that the variance is the expectation of the stochastic variable $Y = (X - m)^2$, and theorem 5 thus gives:

7) **Theorem:** For a continuous stochastic variable, the variance obeys $V(X) = \int (x - m)^2 f_X(x)dx$

### 5.1.8 Covariance

The frequency function $f_{X,Y}(x, y)$ gives complete information about the stochastic variable $(X, Y)$ but, as in the one-dimensional case, there is often a need to describe connection between $X$ and $Y$ with simple measures. The most common is the covariance:

**Definition:** The covariance is defined as $C(X, Y) = E[(X - E(X))(Y - E(Y))]$

Given that $E(X) = m$ and that $E(Y) = n$ theorem 6 gives us:

8) **Theorem:** $C(X, Y) = \int \int (x - m)(y - n)f_{X,Y}(x, y)dxdy$

It is obvious that the covariance is positive if there is a dependent behavior between $X$ and $Y$ such that they both tend to deviate towards the same side of their respective expected values since in that case the product between $(x - m)(y - n)$ will be positive more often than negative.

### 5.1.9 Coefficient of correlation
**Definition:** The coefficient of correlation for X and Y is defined as

$$\rho(X,Y) = \frac{C(X,Y)}{\sqrt{V(X)V(Y)}}$$

Obviously if you divide the covariance with the square root of the respective variances you will get a dimensionless quantity. The coefficient of correlation is never larger than 1 and never smaller than -1.

### 5.2 Elementary statistical theory

#### 5.2.1 Estimated mean value

Normally when one conducts a series of measurements, called a sample, the measurements are independent of each other and identically distributed (IID). When these independent measurements are available, it is often useful to examine some kind of average value. There are two common measures, the arithmetic mean value and the median. We will only use the first of these:

**Definition:** The arithmetic mean value for the obtained data $x_1, x_2, ..., x_n$ is estimated as

$$\bar{x} = \frac{1}{n} \sum_{j=1}^{n} x_j$$

#### 5.2.2 Estimated variance

A measure of the discrepancy of the different obtained sample is the variance:

**Definition:** The variance for the obtained data $x_1, x_2, ..., x_n$ is estimated as

$$\sigma^2 = s^2 = \frac{1}{n-1} \sum_{j=1}^{n} (x_j - \bar{x})$$

where $s$ is called the standard deviation.

The other alternative is to normalize with the factor $\frac{1}{\sqrt{n}}$ instead but we will choose the former approach consistently throughout the experiments. It is commonly known that if $x$ is a random sample of data from a normal distribution, $s^2$ is the best unbiased estimate of its variance. The bearing will be made clear when our choice of investment returns are discussed below.

#### 5.2.3 Estimated covariance

By analogy with the two-dimensional extension in probability theory, the variance formula for two sets of acquired data takes on the following form:

**Definition:** The covariance for the obtained data $x_1, x_2, ..., x_n$ and $y_1, y_2, ..., y_n$ is estimated as

$$\rho_{X,Y} = \frac{1}{n-1} \sum_{j=1}^{n} (x_j - \bar{x})(y_j - \bar{y})$$
5.2.4 Time series analysis and interdependent measurements

Definition: A time series model for the observed data \( \{x_t\} \) is a specification of the joint distributions (or possibly only the means and covariances) of a sequence of random variables \( \{X_t\} \) of which \( \{x_t\} \) is postulated to be a realization.\(^{49}\)

A time series is a series of observations made over a period of time. The analysis of time series entails the fitting of stochastic processes to time series and is normally not a straightforward application of statistical analysis. The fundamental difference between a time series and sampled data is that a sample consists of stochastic variables that are assumed to be IID. The measurements of several time series such as stock prices are however interdependent. Stock price processes are not deterministic and have different volatilities, but over time they tend to move upwards. It is possible that a time series is IID in which case statistical analysis will suffice but more often – and particularly in financial applications – there are correlations between components of two terms lagged a certain period of time apart. Other dependencies are also possible, for instance trends or seasons.

A time series is said to be stationary if its mean and covariance are time-independent and non-stationary otherwise.

Definition: For a stochastic process \( \{X_t, t \in T\} \) with an index set \( T \) and \( \text{Var}(X_t) < \infty \),

- the mean function is defined as \( \mu_X(t) = E(X_t), \ t \notin T \)
- the covariance function is then \( \gamma_X(t, s) = \text{Cov}(X_t, X_s) \)
- the autocovariance function is \( \gamma_X(h) = \text{Cov}(X_{t+h}, X_t) \)

Definition: The time series \( \{X_t, t \in Z\} \) is said to be weakly stationary if

(i) \( \text{Var}(X_t) < \infty \) for all \( t \in Z \)
(ii) \( \mu_X(t) = \mu \) for all \( t \in Z \)
(iii) \( \gamma_X(t, s) = \gamma_X(t-s) \) for all \( s, t \in Z \)

Property: \( \gamma_X(h) = \gamma_X(-h) \) for all \( h \in Z \)

Obviously it is easier to deal with a stationary time series. The common method when dealing with a complicated non-stationary time series is to simplify it into a stationary series by differencing or converting into some kind of return (see below).

We now need an estimation for the mean value and the variance, which is the autocovariance in the case where \( h=0 \).

5.2.5 Estimation of the mean and the autocovariance

The estimation of the mean is the same natural unbiased estimate as in the basic statistical case, namely:

\(^{49}\) J. Grandell, page 1
Definition: the arithmetic mean value $\mu$ is estimated by $\bar{X} = \frac{1}{n} \sum_{j=1}^{n} X_j$.

However, we will differ from conventional method regarding the estimate of the autocovariance. Most textbooks regarding time series define the autocovariance in the following way:

**Alternative definition:** the autocovariance is defined as $\gamma(h) = \frac{1}{n} \sum_{j=1}^{n} (X_j - \bar{X})(X_{j+h} - \bar{X})$ 

$0 \leq h \leq n - 1$.

The normalizing factor is usually chosen to be $\sqrt{n}$ for the simple reason that the matrix

$$
\begin{pmatrix}
\gamma(0) & \ldots & \gamma(n-1) \\
\vdots & \ddots & \vdots \\
\gamma(n-1) & \ldots & \gamma(0)
\end{pmatrix}
$$

is non-negative definite, which is not the case if the normalizing factor is chosen to be $\frac{1}{n - h - 1}$.

Since we are only concerned with the variance, this is not important to us and therefore we will define the variance in the following convenient way:

**Definition:** The variance of a time series is estimated as $\gamma(0) = \frac{1}{n-1} \sum_{t=1}^{n} (X_t - \bar{X})^2$.

Thus the variance is the same as in the statistical case. The only computational difference from conventional method is the normalizing factor, which is of minor concern.

### 5.2.6 Return on investment

A return is a measure of the change in an asset’s or portfolio’s accumulated value over some period of time. There are three standard measures of return. Letting $x_t$ denote an asset’s or portfolio’s accumulated value at time $t$, the different returns are defined as:

**Definition:** Gross return, also called total return

$$R_t = \frac{x_t}{x_{t-1}}$$

Simple return, also called rate of return

$$R_t = \frac{x_t - x_{t-1}}{x_{t-1}}$$

Log return

$$R_t = \ln \left(\frac{x_t}{x_{t-1}}\right)$$

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50 Ibid page 21
51 D.G. Luenberger, page 138
Note that simple return is equal to gross return minus 1. The simple return is the kind of return that one uses to compare shares, since it is a procentual return. We will use all of these definitions at one time or another, starting with the third approach which is sometimes called continuous compounding. It is commonly known that distributions of stock processes behave very closely to lognormal distributions and this will be one of the main assumptions of our experiment. Even if the values in our resulting time series are not IID, the time series will be stationary and since the estimates for the arithmetic mean value, variance and covariance are the same as in the statistical case, our assumption is not limiting regarding the correlation between the shares.

5.2.7 Lognormal stochastic variables

Since we assume that the distribution of stock processes is (approximately) lognormal, it is important to study the properties of lognormal stochastic variables. Let \( A \) be a normally distributed stochastic variable and let \( B = e^A \). If \( A \) has an expected value \( E[A] = \bar{A} \) and variance \( V[A] = \sigma^2 \), it is known that the expected value of \( B \) is \( \bar{B} = e^{\bar{A} + \frac{1}{2} \sigma^2} \) and that its variance is the same.

5.3 Mathematical approach

We now have the tools to construct a technique to reach our objectives. We will replace our time series,

\[ x_1, x_2, x_3, x_4, \ldots, x_n, \]

with a series of gross returns,

\[ u_1 = \left( \frac{x_2}{x_1} \right), u_2 = \left( \frac{x_3}{x_2} \right), u_3 = \left( \frac{x_4}{x_3} \right), u_4 = \left( \frac{x_5}{x_4} \right), \ldots, u_{n-1} = \left( \frac{x_n}{x_{n-1}} \right), \]

and finally log returns of the original series,

\[ w_1 = \ln(u_1), w_2 = \ln(u_2), w_3 = \ln(u_3), w_4 = \ln(u_4), \ldots, w_{n-1} = \ln(u_{n-1}), \]

after which we have a series that is (approximately) IID and normally distributed. We then estimate the mean value, variance and covariance of our new series. Through this we can calculate the correlation between the A and B shares and the A and H shares, and in addition we learn the expected value and variance of our gross return series, since \( u = e^w \). Next we want to calculate the expected value of a simple return series. Since simple return equals gross return minus 1, the expected value of the simple return will be the expected value of the gross series minus 1 and the variance will be the same. Thus we have calculated the time independent correlation between our shares, as well as their time independent simple returns and variances.

\[ ^{52} \text{Ibid, page 302} \]
\[ ^{53} \text{Ibid, page 304} \]
\[ ^{54} \text{For an instructive proof, see Arbitrage Theory in Continuous Time by Björk, pages 67-105} \]
6. Empirical Results and Analysis

From the gathered data the following calculations were made:

- monthly return of shares in different categories
- monthly variance of shares in different categories
- Coefficient of correlation of A and B shares or A and H shares
- Ranges of Coefficient of correlation of A and B shares or A and H shares

The results are shown in Table 6-1 (Firms of A & B shares) and Table 6-2 (Firms of A & H shares).

6.1 Firms that have issued A- and B shares

For these firms we see that in all cases except two, the expected monthly return is negative. Moreover, the expected return of a company’s A and B share is generally in the same magnitude regarding the second decimal, with the B share having a slightly higher value. Regarding the correlations we see that, apart from Shanghai Jinqiao Export which is close to zero, most of them are in the range between 0.6 and 0.8 which is to say that generally the stock returns follow each other fairly well.

6.2 Firms that have issued A and H shares

For these firms we see that all of the expected returns for the H shares are positive, while for 13 of the 21 companies the expected returns for the A shares are negative. This means that for these companies, the expected return on their H share is positive while the expected return on their A share is negative. We also see that the returns on H shares are of higher magnitude than the A shares, ranging between a difference from 0.01 to 0.03 in the higher cases. Lastly, we see that the correlations are between 0.1 and 0.5 with the exception of Tianjin Capital, whose correlation is close to zero.

6.3 Comparisons

Comparing the calculations made for these firms, we can see that there are two striking features with the results. Firstly, we can see that generally there is a much higher correlation between a company’s A and B shares than a company’s A and H share. In some cases the lower bound of confidence interval is negative, arguing that there might not be a correlation at all. This is a surprising result, since we are dealing with the same company and one would expect the shares to be highly correlated.

Another surprising feature is the differences in expected monthly return. The expected return is negative or close to zero for the companies which issue both A and B shares, and generally they are of the same magnitude. For companies which issue A and H shares however, the expected monthly return of the H share is distinctly higher. In some cases the expected return on the A share is negative while the expected return on the H share is positive even though their correlation is positive. This means that the A share drops faster and rises slower than its corresponding H share.
6.4 Interviews based on empirical findings

As mentioned above, the most important features are the differences of correlations and the larger differences in expected return between A and H shares. Furthermore, the calculated results raise other questions as well. It seems odd that out of the 44 companies that issue both A and B shares on the Shanghai Stock Market, only two have positive expected returns. The previous results form the basis behind the questions asked to a Chinese funds expert, who answered and referred our questions further to his colleagues in Asia. The following questions were posed in order to shed light on our obtained results.

1) Why is there a higher correlation between A and B shares compared to A and H shares?

2) Several companies have a positive expected return on their H shares but a negative expected return on their A shares. What is the reason behind this?

3) The companies that are listed on both A and B shares show negative expected returns based on the past 5 years. What is the reason behind this?

The answers to these questions were basically that the dynamics of the B and H share markets differ. Firstly, as already mentioned, well-performed firms choose to issue H shares rather than B shares. Secondly, it is easier for foreign investors to access information about H shares than B shares, and more importantly it is less complicated for them to trade H shares. This is, according to the Chinese funds experts, an indication that the Chinese stock market is ineffective. They state that in an effective market with non regulated cash flows, the behaviour of the cross-listed shares should reflect the company’s performance. Since our results of the A and H shares generally did not show strong correlations and significantly different expected returns, the dissimilar development of shares is an indication that the market is affected by other factors.

6.5 Analysis

As seen above, our calculations show that firms that cross-list A and B shares have generally had negative monthly expected returns, which is understandable since these shares demonstrate negative trends over the monitored period. One possible reason could be that the A share market used to be traded at unreasonably high P/E (after declining for nearly 5 years, the valuation of the market is reasonable now as an emerging market). The negative trend might be an indication that the Chinese investors have become more knowledgeable on stock fundamentals and less speculative than they used to be.

An interesting aspect to analyze is the Chinese stock markets development in comparison to the international stock market. Most of the big stock indices on the world stock market have shown more or less the same pattern during the last five years: the stock prices reached the peak and started to decline in March, 2001 from the previous economic cycle and hit the bottom in 2002. Ever since then, the positive trend continued throughout 2003, 2004 and 2005.

55 Liu, Jerry, “Morgan Stanley Research”, 2006-08-14, page 12
56 See http://www.avaanza.se/aza/aktieroptioner/indikatorer/indikatorer.jsp
As we know, historically the H and B share markets have exclusively targeted foreign investors and it is only during the recent years that the B share market has been opened for domestic investors. This means that the H and B shares’ development logically should have followed the pattern of the international market, if the majority of the B shareholders are still non-Chinese investors.

However, as described earlier, the results of Bailey’s study showed an inconsistency between the B share market and the international stock market. The study does not mention any agreement or discrepancy between the A share market and the international market however. As our results show, A shares and B shares are correlated in a rather high degree, meaning that the corresponding A shares do not follow the international market either.

A number of explanations are possible for this behaviour, one being that there exists a lead-lag behaviour between the shares. Since the A shares of the A and H cross-listed firms generally have a higher expected value than the A shares of the A and B cross-listed firms, it is natural to assume that the A shares are the followers and the B shares are the leading shares. This intuitive reasoning is in accordance with the information asymmetry hypothesis described under 3.6, stating that returns on B shares lead the returns on A shares due to information flows.

The H shares however have followed the International market development to a higher extent. Although B and H shares are both targeting mainly overseas investors, B share suffers more from illiquidity due to its high trading costs, as outlined in the differential illiquidity hypothesis under 3.5. H share investors therefore are more liberalized from entering or leaving the market. As such, there is reason to believe that H share prices reflect more the market fundamentals, compared to the B share and especially to the A share market. This is in accordance with the differential risk hypothesis described under 3.3. This can explain why the expected returns on H shares follow the international trend while its parallel A share fails, since the A share market is targeted mainly to domestic investors who generally are more speculative.

57 www.hkex.com.hk/data/chidimen/CD_TO.htm
Table 6-1: Firms of A & B shares.

<table>
<thead>
<tr>
<th>Company name</th>
<th>Stock</th>
<th>Monthly Return</th>
<th>Monthly Variance</th>
<th>Coefficient of correlation</th>
<th>Upper bound</th>
<th>Lower bound</th>
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<td>China First Pencil Co.Ltd</td>
<td>A</td>
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<td>0.0126</td>
<td>0.4753</td>
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<td></td>
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<tr>
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7. Conclusion

In this paper we have studied all the companies that have cross-listed A and B shares or A and H shares during the last five years in the Shanghai and Hong Kong stock exchanges. The major conclusions are outlined below:

- Firms that cross-list A and B shares on the Shanghai stock exchange show the same magnitude regarding expected monthly returns.
- Firms that cross-list A and B shares on the Shanghai stock exchange have a reasonably high coefficient of correlation.
- Firms that cross-list A and H shares on the Shanghai and Hong Kong stock exchanges have significantly different expected monthly returns.
- Firms that cross-list A and H shares on the Shanghai and Hong Kong stock exchanges have a considerably low coefficient of correlation.
- Even though B shares and H shares are targeted towards the same investment group, the dynamics of the two share markets differ regarding investment alternatives, the degree of trading difficulties and their relation to the international market development.

However, our study doesn’t lead to any firm conclusion regarding the lead-lag behaviour of the different type of shares. The indication of the results is in agreement with the hypothesis that B shares lead A shares and that B shares do not follow the international market. As such cross-listed A and B shares have high correlation and inconsistent with international market development. Our suggested reasoning behind the low correlation between the A and H shares is mainly speculative. We propose that the reason why H shares follow the international market while the others don’t is because trading on the Hong Kong stock exchange is determined more by market fundamentals, while trading on the B share market involves high trading costs, a high degree of trading difficulties and lastly that both the A and B share market consists of more speculative investors.
8. Proposition for future studies

With the information of each share’s returns, one can calculate a minimum variance portfolio on the efficient frontier using the Markowitz model.\textsuperscript{58} Assuming there are \( n \) assets, let \( \bar{r}_1, \bar{r}_2, \ldots, \bar{r}_n \) be their rates of return and \( \sigma_{ij} \) for \( i, j = 1, 2, \ldots, n \) be their covariances. Let a portfolio be defined by a set of \( n \) weights \( w_i, \ i = 1, 2, \ldots, n \) with their sum equal to 1. Assume now that we are interested in finding a portfolio with an arbitrary return \( \bar{r} \) with as small variance as possible. The mathematical formulation will be as follows:

\begin{equation}
\textbf{The Markowitz model:} \quad \text{minimize} \quad \frac{1}{2} \sum_{i,j=1}^{n} w_i w_j \sigma_{ij} \\
\text{subject to} \quad \sum_{i=1}^{n} w_i \bar{r}_i = \bar{r} \\
\sum_{i=1}^{n} w_i = 1
\end{equation}

The factor \( \frac{1}{2} \) in front of the variance are for aesthetic purposes only, since when written in matrix form and derivated a factor 2 will cancel it out. This version of the Markowitz model is a linear optimization problem and it can be solved using Lagrange multipliers. However, in our case shortselling is not allowed with A and B shares and as such we will need an additional constraint. Letting \( m \) of the \( n \) weights represent the weights the A and B shares, we will have an additional constraint:

\[ w_j \geq 0 \quad \text{for} \quad i = 1, 2, \ldots, m \]

This version of the Markowitz optimization problem is now a quadratic problem since the objective is quadratic and we now have inequality constraints. Solving this system requires more effort than in the case where shortselling is allowed.

The Markowitz problem is said to be formulated to this period\textsuperscript{59} but the model has its flaws. First of all the inherent mathematical errors with historical data makes it difficult to obtain accurate estimates of expected returns of stocks.\textsuperscript{60} Secondly, the Markowitz model is known to be very sensitive to its input variables\textsuperscript{61}. Therefore, great care must be taken when estimating the returns and variances. Gathering the required data and solving this optimization model is unfortunately out of the scope of this paper and therefore it is a proposition for future studies.

\[ \text{References:} \]
\textsuperscript{58} D.G. Luenberger, page 157
\textsuperscript{59} D.G. Luenberger, page 222
\textsuperscript{60} D.G. Luenberger, page 303
\textsuperscript{61} D.G. Luenberger, page 218
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Anonymous Chinese funds experts
Appendix 1: Interview with G. Pålsson


The discussion was based on the following questions:

- As known, the A and B shares are identical concerning voting rights, dividends etc. Are the A and H shares also identical?
- Which are the rules to issue A, B and H shares?
- What kind of company chooses to register on the A, B or H list? Why do some companies prefer a certain list, when there are two available for foreign investors?

H list versus B list:
It has always been less liquidity in the B shares compared to the H shares. There is also a lack of supply of companies on the B list and most of the large, liquid, well-performed firms choose the H list. Besides that, foreign investors face a lot of problems trading in China. The law in China requires a local depot account in China. Starting a back office in China is often related with a long process of paper work and ineffectiveness.

During the last years, the government has gradually deregulated the A and B market. By now, there is an available growing quota on the A list for foreign investors.

A common belief is that the Chinese are careful by their nature. Stability is essential to the Chinese government. The first goal is stability in everything they do, which makes the government control a “must”. The idea is to be careful with disturbing the balance and there is a suspicion against foreign interests. This is why it is important for the Chinese to keep control even at the lever of board directors. Even today, there are many government employees.

Why would a company not register on the H list?

- Higher demands for registration on the H list. The accounting laws are stricter in Hong Kong than they are in China.
- Longer waiting time for listing on the Hong Kong stock exchange. (an unofficial number suggests about 200 companies)
- Regulations from the mainland that complicates registrations abroad.
- Regulations on in and out flows of capital. All cash flows from or to China are being carefully inspected, which is to keep control over the currency movement. The currency is allowed to a maximum decrease or increase of 0,3% /day since it’s pegged to the US-dollar. This means that the Chinese can’t freely transfer money to and from China, and that's why the H list is regulated for the Chinese.

When Shanghai stock exchange first opened, most of the firms were state owned. There are more private firms listed on the Shenzhen stock exchange. There were both Chinese and foreign interests, but since the Chinese didn’t have any money, (joint venture) the B-shares became a complete flop. Even today there is not enough liquid and turnover on the B shares.
It is important to understand that China is centrally controlled and therefore hard to predict. China has during a short time period industrialized – the economy went from state owned to private owned very fast.

China’s growth speed has to be about 8% annually. Here in Sweden, 4% is considered a lot. Many companies choose to move their activity to China’s mainland where the lowest production costs can be found.

The first goal in China is stability and to create job opportunities. The industrialisation which is taking place at this moment, have taken about 20 years. (Compare the development in Sweden, Britain or in the rest of Europe, where it took about 100 years.) This is why the goal in China isn’t profit, but stability. The situation in China can be compared to a grand logical puzzle. The main goal is low inflation, which is controlled through the pegged currency.

The market development:
More than 20 years ago, there were no private companies in China. Those are the steps that have been done/are being done to make the Chinese market go from SOE to a market economy.
1) The employees were transferred to the private section, which was built up by both Chinese and foreign investors.
2) Surplus in the budget because of the increased exports, created opportunities for the government to write off old credit losses at the state owned banks.
3) The Chinese were able to register the banks on the stock market in 2005. This is the basic condition to receive foreign capital.
4) Next step in the process is to figure out a solution for the pegged currency.

<table>
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<tr>
<th></th>
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<th>2003</th>
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<tr>
<td>No. Of B share firms</td>
<td>112</td>
<td>111</td>
<td>111</td>
<td>110</td>
<td>109</td>
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<tr>
<td>Market cap. Of B share firms (RMB 100 mil. Yuan)</td>
<td>1276.65</td>
<td>802.57</td>
<td>937.23</td>
<td>746.22</td>
<td>619.73</td>
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<tr>
<td>Market cap. Of tradable B shares (RMB 100 mil. Yuan)</td>
<td>1118.28</td>
<td>765.81</td>
<td>872.6</td>
<td>690.17</td>
<td>602.08</td>
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<td>Trading volume of B shares (100 mil. Shares)</td>
<td>688.88</td>
<td>156.7</td>
<td>170.8</td>
<td>154.82</td>
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<td>Turnover of B shares (RMB 100 mil. Yuan)</td>
<td>5053.13</td>
<td>848.42</td>
<td>845.3</td>
<td>642.64</td>
<td>564.94</td>
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Source: Shanghai and Shenzhen Stock Exchanges
## Appendix 3: Summary of Chinese stocks

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<th>Indicator:</th>
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<tr>
<td>No. of domestic listed companies (A,B shares)</td>
<td></td>
<td>1088</td>
<td>1160</td>
<td>1224</td>
<td>1287</td>
<td>1377</td>
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<tr>
<td>No. of B share companies</td>
<td></td>
<td>114</td>
<td>112</td>
<td>111</td>
<td>111</td>
<td>110</td>
<td>109</td>
</tr>
<tr>
<td>No. of H share companies</td>
<td></td>
<td>52</td>
<td>60</td>
<td>75</td>
<td>93</td>
<td>111</td>
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<tr>
<td>Total shares issued (100 million shares)</td>
<td></td>
<td>3 791,71</td>
<td>5 218,01</td>
<td>5 875,55</td>
<td>6 428,46</td>
<td>7 149,43</td>
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<td>Tradable shares (100 million shares)</td>
<td></td>
<td>1 354,26</td>
<td>1 813,17</td>
<td>2 036,9</td>
<td>2 269,92</td>
<td>2 577,18</td>
<td>2 914,77</td>
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<tr>
<td>Total stock market cap. (RMB 100 million yuan)</td>
<td></td>
<td>48 090,94</td>
<td>43 522,2</td>
<td>38 329,12</td>
<td>42 457,72</td>
<td>37 055,57</td>
<td>32 430,28</td>
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<td>Market cap. of tradable shares (RMB 100 million yuan)</td>
<td></td>
<td>16 087,52</td>
<td>14 463,17</td>
<td>12 484,55</td>
<td>13 178,52</td>
<td>11 688,64</td>
<td>10 630,53</td>
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<tr>
<td>Total stock trading volume (100 million shares)</td>
<td></td>
<td>475 840</td>
<td>315 228,8</td>
<td>301 619,5</td>
<td>416 308,4</td>
<td>582 773,3</td>
<td>662 354</td>
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<tr>
<td>Total stock turnover (RMB 100 million yuan)</td>
<td></td>
<td>60 826,65</td>
<td>38 305,18</td>
<td>27 990,46</td>
<td>32 115,27</td>
<td>42 333,95</td>
<td>31 663,16</td>
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<tr>
<td>Shanghai Stock Exchange Composite Index (close price)</td>
<td></td>
<td>2 073,48</td>
<td>1 645,97</td>
<td>1 357,65</td>
<td>1 497,04</td>
<td>1 266,5</td>
<td>1 161,06</td>
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<tr>
<td>Shenzhen Stock Exchange Composite Index (close price)</td>
<td></td>
<td>635,73</td>
<td>475,94</td>
<td>388,76</td>
<td>378,62</td>
<td>315,81</td>
<td>278,74</td>
</tr>
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</table>

Source: CSRC
Appendix 4: Requirements for listing

Requirements for applying to A list
According to CSRC, a company applying for a public offering of A shares has to submit its application to the CSRC and meet the requirements stipulated in the *Company Law, Securities Law, Provisional Regulations on the Administration of Issuing and Trading of Stocks*, and other relevant laws and regulations. In accordance with Article 13 of the *Securities Law*, an IPO of a company shall meet the following requirements:62

- Have a complete and well-functioning organizational structure;
- Capable of making profits continuously in a sound financial condition;
- No record of false financial statements over the past 3 years, no record of other wrongdoings;
- Meeting other requirements as prescribed by the CSRC.

Requirements for applying to A list
In accordance with the *Company Law*, the *Securities Law*, the *Provisional Regulations on the Administration of Issuing and Trading of Stocks* and the *State Council Rules Regarding the Domestic Listing of Foreign Owned Shares*, B share issuers shall meet the following requirements:

- the capital raised by issuing B shares shall be used in a manner consistent with state industrial policy;
- to comply with regulations regarding fixed-asset investments;
- to comply with regulations on foreign investments;
- the promoters must hold at least 35% of the issued shares at the time when the company is set up; the capital contributions by promoters shall be no less than RMB 150 million yuan;
- the company must float at least 25% of the company's total shares; in the case of a company's total share capital exceeding RMB 400 million yuan, the public floating requirement may be reduced to no less than 15% of its total shares;
- Neither (a) any predecessor entity (entities) of which the joint-stock company is a part of; nor (b) any major promoter who is a state-owned enterprise, have committed any significant breaches against laws over the past three years.

Requirements for applying to list in overseas main boards
Where a domestic enterprise directly or indirectly issues or lists any securities abroad, it is subject to the CSRC’s approval according to the Article 238 of *Securities Law*. After restructuring into joint-stock companies, all state-owned companies, collectively-owned companies and enterprises of other ownership that have met the specific requirements are entitled to apply for overseas listing.

A listing at overseas main boards shall meet the following requirements:

- The capital raised shall be used in a manner consistent with the state industrial policy and compliant with regulations regarding fixed-asset investments as well as foreign investment policies;
- The company must own a net capital of no less than RMB 400 million yuan; with no less than RMB 60 million yuan of post-tax profits. Meanwhile, it shall have great potentials for

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62 China's Securities and Futures Markets 2006, page 8
growth based on reasonable P/E ratio, and the capital raised shall be no less than US$ 50 million;
• The company has a sound corporate governance and internal control regime, sufficient senior executives with acceptable management skills;
• The company has reliable foreign exchange resources for dividends distribution.

More information regarding requirements for listing, de-listing, stock issuing, trading and so on is available on the report *China's Securities and Futures Markets 2006*, published by CSRC.