An Empirical Analysis of Information Efficiency of the Chinese Stock Market

Are There Indicators of Insider Trading in A and H –shares?

.

Author: Martin Martinsson and Gustaf Tegell
Bachelor thesis
Department of Economics, School of Economics and Management
Supervisor: Hossein Asgharian
Co supervisor: Sonja Opper

ABSTRACT

Title:	An empirical analysis of information efficiency of the Chinese stock market. Are there indicators of insider trading in A and H – shares?
Authors:	Martin Martinsson Gustaf Tegell
Supervisor:	Hossein Asgharian, Associate Professor, Department of Economics, Lund University and Sonja Opper, Professor, Department of Economics, Lund University.
Research purpose:	To empirically establish if the behaviour of different shares types deviates.
Methodology:	Initially we focused on research papers and literature within our specific field trying to get a deeper knowledge in related theories. Further we had meetings with our supervisor to discuss how to approach the problems. This helped us to formulate the direction of our thesis. After further discussions with our supervisor we decided to do an event study. We decided to use the annual report dates as the event day. At this day we study the stock behaviours in our data sample. We investigate if there are deviations in the motions of the different stocks. Our null hypothesis is that A and H shares should behave similar. We create a series of the difference between A and H shares. Since the difference of each stock should equal zero we perform a confidence test of the absolute values in the series to see if the interval covers zero. We use the absolute values as the differences are normal distributed around zero. If we do not use the absolute values the mean of the differences will be zero.

Conclusions: We have concluded with an event study that there are differences in information interpretation. The results are that the different types of shares behave differently. Our interpretation is that insiders act prior to the public releases of crucial information. We argue that this indicates insider trading.

Keywords: Chinese Stock Market, Insider Trading, Market Efficiency

OUTLINE:

Chapter 1: In this chapter we clarify the background which explains the purpose of the bachelor thesis

Chapter 2: The purpose of this chapter is to inform the reader of the background situation of the Chinese economy and stock market. The chapter gives the reader an understanding of the characteristics of a stock market. Further it describes the efficient market hypothesis.

Chapter 3: The purpose of this chapter is to give the reader an insight in the scientific and practical approach of the thesis.

Chapter 4: The data used in our study is described in this chapter. Further statistics stock characteristics are presented.

Chapter 5: The data used in our study is described in this chapter. Further stock characteristics and owner structures are presented.

Chapter 6: In this chapter we compare the behaviour of the different stock markets. The purpose is to give the reader an overview of the markets. Additionally we construct a GARCH model to illustrate the changing variance in the markets.

Chapter 7: The results of the hypothesis and regression tests are in this chapter presented and discussed.

Chapter 8: How well the research purpose is fulfilled is concluded in the following chapter.

TABLE OF CONTENTS

1. INTRODUCTION

In this chapter we clarify the background which explains the purpose of the thesis

1.1 Background

The founding of The People's Republic of China 1949 resulted in an introvert economy with very little contact with other economies and with a purpose to be self supplying. The economic reform following the revolution in 1949 did not succeed and therefore in 1979 the economic policy was reformed once again. When the reform was made there were great problems with poverty, which is still an issue even though the reform in the end managed to improve the life quality for many people. Today China is, as many other developing countries, struggling with a large population, growing rural-urban wage gaps, insufficient financial systems and corruption. The government believes that one solution is a development towards a market economy with efficient capital markets and privatisation of government owned corporations.

The Chinese economy is today one of the fastest growing economies after years of regulations and laws preventing companies to grow. As the growth continues, there are many factors that are essential for a continuous growth. One vital part is a well functioning financial market.

The stock markets were established in the beginning of the 1990s and experienced a rapid growth until the Asian Financial Crisis in 1997. A new period for the Chinese economy started in 2001 as they joined the World Trade Organisation (WTO) and since then the Chinese economy has had a rapid growth even without a well functioning financial market[1].

1.2 Problem discussion

A well-functioning financial system is an important characteristic of a market economy. The stock market is an essential part of the system and it is therefore of great interest and importance to establish a trustable and liquid market.

[1] Cho, *Kinesisk Kapitalmarknad*, p. 42

As a fairly new founded stock market the Chinese stock market suffers from several obstacles that have negative effects on transparency and efficiency of the market. It is well known that the market is manipulated and insiders use their status to make profit[2]. Even though insider trade is illegal, the China Security Regulatory Commission (CSRC) has in the past failed to prevent these behaviours. In the last decade several reforms have been implemented trying to improve the stock market and to gain investor's trust. No doubt these have had a positive effect but we are not convinced that the market is efficient, meaning that insiders have no advantage. Insiders have superior knowledge about the firms' future relative to the public investors, although it is illegal to act on such information

The structure of the Chinese stock market is one of the reasons why the market is inefficient. A company can issue several types of stocks. Most companies decide to issue stocks that by law are only available to domestic investors. These shares are denoted A-shares and are quoted on the Shanghai or Shenzhen stock market. The same company can also issue stocks quoted on the same market but available only for foreign investors, denoted B-shares. To make the stock market even more complex the same company can choose to issue stocks on a foreign stock market, e.g. H-shares if they are issued on the Hong Kong stock market[3]. Hong Kong is not a foreign market in the sense that it is part of China but the stock market has different laws and regulations and is therefore in this part seen as a foreign market.

Insider trading and market efficiency is widely debated but not many theoretical or empirical researches have tried to establish that insider trading still occurs. There are some researches in the field, e.g. Kwan and Yu (2005) who tried to explain stock manipulation by investor's share concentration. This study was done on data from 2001 and there have been dramatic changes since then. Our aim is to investigate empirically, if there is any evidence verifying our beliefs that the stock market is still not efficient.

Our expectations are to find out if there are indicators, in stock movements, of insider trading. The results will consequently be of interest for any investor active on the Chinese stock market.

[2] Cho, *Kinesisk Kapitalmarknad*, p. 43
[3] Green, *China's Stockmarket,* p. 46

1.3 Purpose

The purpose of the essay is to describe the Chinese stock market and make an analysis of the efficiency. The research will focus on an event study of the stock price movements to determine how the market responds to information.

1.4 Methodology

The study will be a quantitative research. We will use a quantitative research utilizing historical data available in the DataStream database to investigate if the same stock behaves differently on the domestic and foreign stock markets. Focus of the analyses will be an event study examining trading prior to and following after public information releases (i.e. annual reports).

Supply of information has its peak during annual, half year and quarterly reports therefore we will study the market's reaction for Shanghai and Hong Kong to see if there are indicators of insider information trading. The results will enable us to establish the efficiency of the market.

We will analyse if the information is responded different on the stock markets. Investors speculate in future information to make an excess return. By comparing companies which have issued both A- and H-shares, see chapter 2.3, we will be able to determine if there are significant behaviour dissimilarity between the stock markets, indicating insider trading.

1.5 Limitations

Our main interest will be directed to the impact of the efficiency of the Chinese stock market. Because of the enormous magnitude of a complete research in the field our essay will only focus on a few variables and indicators. There are many variables that affect the movement of stocks, such as macro influences, corporate specific incidents, the common knowledge of investing and many more. We have chosen to ignore the effects of these variables on the outcomes of our event study.

2. THE CHINESE STOCK MARKET

The purpose of this chapter is to inform the reader of the background situation of the Chinese economy and stock market. The chapter gives the reader an understanding of the characteristics of a stock market. Further it describes the efficient market hypothesis.

2.1 The Chinese economy

For the last twenty years China has had a steady growth of their GDP. Twenty years ago Chinas GDP was approximately at the same level as the Swedish. In 2003 it had grown to five times larger with an average annual growth of 9.7 %[4] which makes it the sixth largest economy in the world. The fast growth has mainly occurred in the coast area and in the cities while the inland has been left behind which has resulted in a Gini index of 0.45[5]. The index shows how well the wealth is distributed between the populations, a value of zero represent total equality and a value of one represent perfect inequality. As a comparison Sweden has a value of 0.25.
Therefore the earlier uncontrolled growth can not continue because then China might have the enormous income gap South America is experiencing today. But since the reform in 1978 there have been changes that have decreased the wage gap. As an example; in the 1980s the agricultural industry allowed farmers to lease land and sell their products on local markets and this resulted in a rapid increase in the farming output. This also helped local governments who received larger revenues from taxation which they reinvested in local industries.

Since the reform in 1979 there have been considerable changes with privatisation of a large number of companies. The government's ambition is to further privatise companies but also to keep control of companies in strategic industries such as automotive, energy, commodities and shipbuilding industry.

Further the financial market and the bank sector have seen severe changes. The four largest banks have been listed on the stock market and are freer to act as financial institutes. Foreign banks are nowadays allowed to act in China, even though their actions are still restricted.

[4] Cho, Kinesisk Kapitalmarknad, p. 25
[5] Cho, Kinesisk Kapitalmarknad, p. 27

Before the reform in 1979 financial accounting was not at all important which made the creation of an efficient financial market an obstacle. The Organisation for Economic Co-operation and Development (OECD) and international accounting firms have assisted China in developing a trustworthy standard. Today all listed companies must follow the International Accounting Standard (IAS).

The Chinese currency, Renminbi (RMB), is since 1996 open for trade business but is still not allowed for capital transactions. The currency is fixed to other currencies and their surplus in the current account has led to a rapid growth of the Chinese currency reserve and is today the largest in the world[6]. This is mostly from their trade with the USA another reason is that the currency is valued too low compared to the fixed rate. In the future China must let their currency float free to other currencies in order to prevent an even larger currency reserve. The Chinese government and the central bank, People's Bank of China (P.B.O.C.), are planning for a future with a fully convertible currency but their plan is to do this reform in slow motion.

The Chinese economy reflects a high growth and a government that will not rush their reform due to their angst of large income gaps and dependency of other countries.

2.2 Why is the stock market important for further growth?

A stock market can help a developing country to grow in several ways. Venture capital that is raised through a stock market will help companies with future investments and help them to stabilise their growth. It will also help the country to build up a welfare system with pension funds and a functioning financial system. A stock market reflects supply and demand of capital to be allocated in an efficient form which is important for a sufficient growth. Public issuance of shares can provide investment resources for companies that do not have enough investment capital to improve the development. Many governments round the world today don't offer their inhabitants a safe enough welfare system. Therefore people must be responsible for their own investments in pension funds and private insurances to secure their

[6] Svenska Dagbladet, 2006-04-01, Näringsliv, p 11

health and future pension. A functioning stock market can offer a large population many different ways of investments to be able to secure these life important issues.

Even though a stock market is a way to secure future growth and establish a working welfare system it does not solve all these problems at once. For a developing country and especially for China an efficient banking system is far more crucial than a well working stock market. Before the stock market will be able to secure future growth their banking system has to work smoother. The banking system does not have to rely on a free press, an efficient legal system, lawyers and accountants; therefore the stock market is much more dependent. Consequently a banking system that works is easier to build than a stock market. For example a stock is valued from their assets as well as rumours and news, which implies the importance of a well working press. The thesis will however only focus on the stock market.

2.3 The Chinese stock market

The Chinese stock market is complex with regulations that are not standard on western stock markets. There are two stock exchanges one in Shanghai and one in Shenzhen. These were founded in 1990 and 1991 respectively. They were opened by the Chinese government after years of over the counter (OTC) stock trading in different banks in Shanghai. The China Securities Regulatory Commission (CSRC) controls the stock market and has lately cleared the market from some of their problems but there are still lots of work to do. The Chinese government has lately made efforts to make the market more trustable and liquid as they are planning to sell out the state owned companies. Therefore the stock market has a key role in the future growth of the Chinese economy. The combination of a fast growth and a weak central government has lead to the problems that the market is facing today. Some problems that the market is facing are:

- Insider business
- High volatility
- Corruption
- Share price manipulation
- Different valuation

The Chinese market also has a different way to divide their shares in different names. They are mainly divided into three different types of stock. There are A, B, H –stocks, all with different purposes. The A-stock is for Chinese private people and institutions but there is a possibility to buy these with the Qualified Foreign Institutional Investor-method (QFII). But this method is regulated and it is still very hard for a foreign person to speculate in Chinese A-stocks. B-stocks are quoted on the Shanghai or the Shenzhen stock exchange in US dollars and are designated for foreign investors. H-stocks are quoted on the Hong Kong stock exchange in Hong Kong dollars. These stocks are for foreign investors and Chinese inhabitants are not allowed to buy these. There are similar Chinese companies quoted in London and New York which are called L and N-shares respectively.

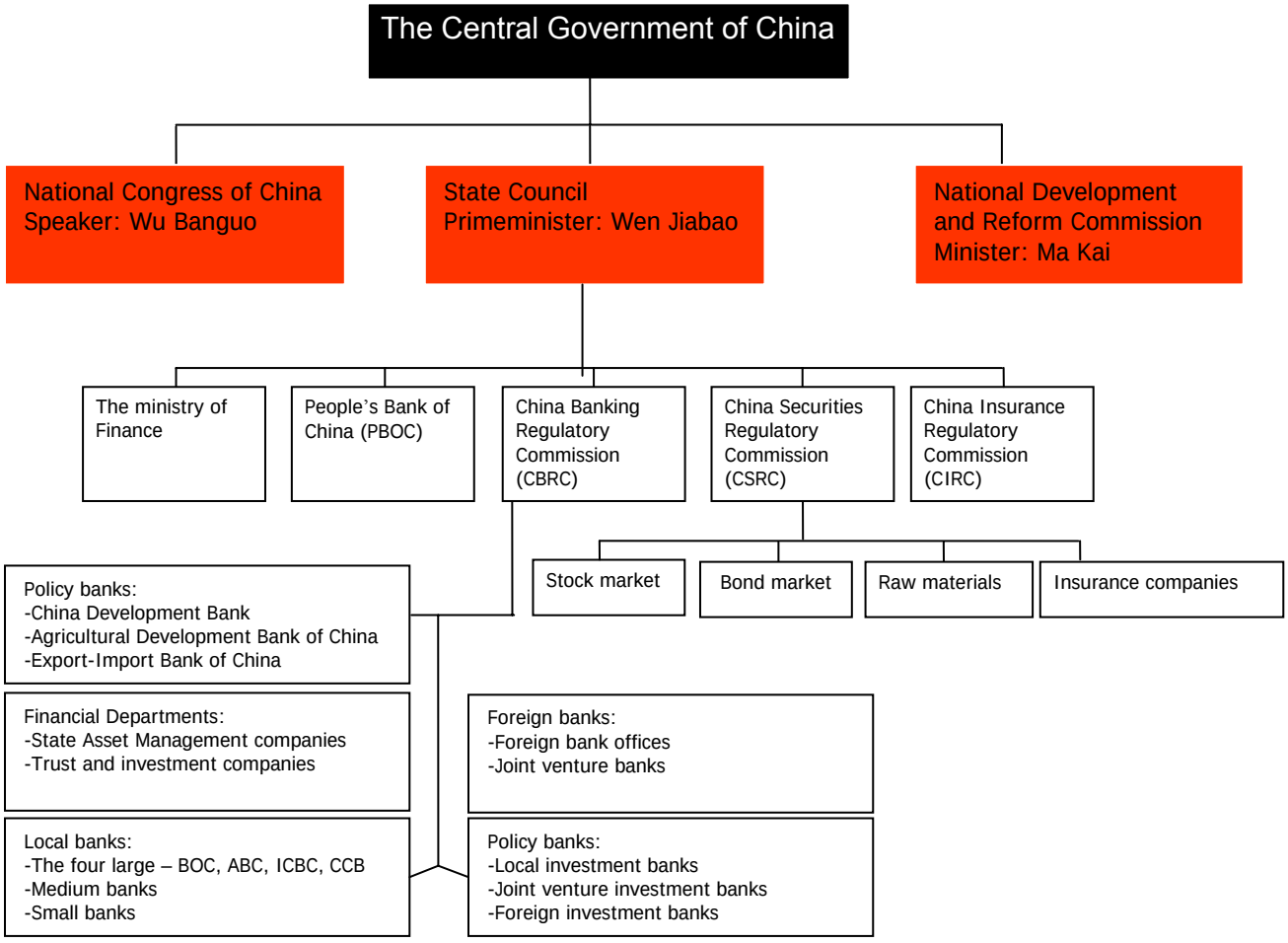

Figure 1 Commissions and banks regulating the Chinese stock market[7]

[7] Cho, *Kinesisk Kapitalmarknad*, p. 50

2.4 Efficient market hypothesis

The research in this essay is based on how information is received on different stock markets and if the different behaviour of stocks can be explained from inefficiency on the Chinese market. Fama[8] published his research on efficient markets which discussed the influence of information on stock prices. The theory is based on several assumptions. The most important are:

- Perfect information
- Instantaneous receipt of news
- Only small actors on the market unable to influence prices

Fama's theory is a necessary condition in numerous important economic theories.
The framework of the theory is stated in the efficient market hypothesis which states that the prices of traded assets incorporate all available information and therefore reflect the beliefs of all investors about future performance. The prices are as a result accurate. The hypothesis implies that it is not possible to outperform the market by using available information except through pure luck or inside information trading. Furthermore future assets prices are determined by news flows which are unpredictable, random and unknown. Investors trading in an efficient market do not have to be rational as long as the irrationalities are unpredictable.
The hypothesis divides efficient markets into three states, resulting in very different opportunities on the market:

1. Weak efficiency

In a weak efficient market all historic information and data are incorporated in the asset price resulting in no time series or technical analysis strategy that will generate excess return.
Fundamental analysis by researching public information, e.g. financial statements, can however determine undervalued and overvalued assets and generate profit.

[8] http://en.wikipedia.org/wiki/Efficient_market_hypothesis

2. Semi-strong efficiency

In a semi-strong market all historic and public information is incorporated in the asset price resulting in no possible excess return by historic data and fundamental analyses.

3. Strong efficiency

In a strong efficient market all information is incorporated in the asset price. Not even insiders will gain excess return.

3. METHODOLOGY

The purpose of this chapter is to give the reader an insight in the scientific and practical approach of the thesis.

3.1 Introduction

When doing a scientific research it is important to have a structure in the investigations. Several methods how to target the project are available. Numerous important circumstances have to be addressed before choosing which method to use. Additionally the purpose or problems investigated in the survey are important factors for which method to use. The choice of method is very dependent on which knowledge is available[9].

3.2 Different scientific approaches

3.2.1 Problem identifying

The first issue when investigating an unknown field is to explore the theoretical framework. When a first knowledge is developed in the subject a framework of the problem can be stipulated. The first examination of the subject often results in a deeper research to fully describe the issues[10]. Often the purpose of this investigation is to identify a problem from previous premonitions. From this investigation a hypothesis is formulated.

3.2.2 Descriptive, explanatory, diagnostic and normative studies

When the theoretical framework is well known a purpose for the study is to describe rather than understand the problem. The description of the problem varies depending on the utilization of the study. A description of past events as well as present events may be of

[9] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 7-16
[10] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 55

interest. Further the reasons and relationship between occurrences may be the prime identification target[11].

Besides describing the issues an additional purpose may be to explain these. The depth of the explanation study can vary. An overview of the issues is sometimes sufficient as well as an in depth analyse may be required. The purpose is to identify and analyse the factors that affect the occurrences of interest. Often these studies evaluate previous theories. Frequently this information is used to determine strategies in situations where the factors identified are in use[12].

A diagnostic investigation uses occurrences to establish the driving factors behind the results. The method starts with the results and tries to find solutions to these occurrences. Often a negative outcome of a strategy results in a diagnostic investigation[13].

A normative investigation makes statements that describe how outcome for certain actions are[14]. The investigation is similar to making case recommendations and what the outcome for each action is. The purpose is to be able to make a recommendation on what action to take.

3.2.3 Our scientific approach

The approach in our thesis is a combination of describing the phenomenon insider trading and to establish the occurrence. We will explain the market situation and how insider trading can be detected.

The theory is today widely discussed but no straight forwards evidence exists. As a result our approach is to in depth describe and explain the issue with the purpose of finding empiric evidence.

[11] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 48
[12] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 47
[13] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 48
[14] http://en.wikipedia.org/wiki/Normative

3.3 Data gathering

3.3.1 Written sources, interviews, surveys and questionnaires

Written sources are articles, books and research papers which all are examples of secondary data[15]. An interview with experienced people is a central method of the qualitative study to gather primary data. A survey[16] is a way of collecting primary data that could be used to describe a current situation. Surveys can be done market researches, voter surveys, and attitude researches. Data that is collected in a survey is of quantitative character. Parts of a population are examined and used to represent the rest of the population. When a large number of people are asked a questionnaire is an easier approach to receive al large number of data.

3.3.2 Our approach of data gathering

Data are gathered from different sources; initially we read different research papers and books to get a better knowledge in the subject. We then gather quantitative data from a data base comprising daily notation of listed stocks and additional information from various internet sites.

3.4 Data types

3.4.1 Primary or secondary and quantitative or qualitative data

Data that is collected by the researchers for a specific purpose is referred as primary data[17]. Data that already exists and collected by other researches is secondary data.

[15] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 52
[16] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 168-182
[17] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 145

In research there is a difference between quantitative and qualitative method. In a qualitative study the vital part is verbal whereas a quantitative study is from measurable data and is used to evaluate specific models. Qualitative data is often from a personal interview and quantitative is measures from nature[18].

3.4.2 Our data types

We have used only existing secondary data in our study. Further we have chosen to do a quantitative research.

3.5 Reliance of research

3.5.1 Validity, reliability and objectivity

The level that the researchers have been able to investigate their research problem is often referred as validity. Further the validity is a measurement of how well the intended measurement is measured. Additionally validity is said to be the correlation of the theoretic definition and the real life definition[19].

Reliability refers to the precision and exactness of a measuring tool. The result of the measurement tool should give the same result regardless of whom and under which circumstances it is executed. The measurement tool should not have a random measurement deviation and should decrease the stochastic deviation[20].

It is important that a scientific study is objective and personal values of the authors do not influence and affect the real data and the questions asked. The level of objectivity of the research means the involvement of the authors[21].

[18] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 183
[19] http://sv.wikipedia.org/wiki/Validitet
[20] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 152
[21] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 74-75

3.5.2 Reliance of our research

The theoretic definition of market efficiency is that all actors have supply of the same information at the same time. Thus the level of efficiency is hard to measure. Our research is tries to quantitative determine if the market is efficient and if insider trading is a phenomenon. Since our hypothesis will give us a yes or no answer the validity is easy to examine. However there are several factors affecting stock movements not incorporated in our theory resulting in a weaker validity in the study.

A model can not fully describe real life occurrences, especially when measuring a subjective measurement as acting on information, thus our result of insider trading will deviate from the true in the market. However we use public data and straight forward calculations thus the results will be the same independent of by whom and when it calculated.

The choice of a quantitative study will result in an objective and well measurable end result. Since our expectations are to find evidence of insider trading a qualitative research may be affected by the actor's personal agenda.

3.6 Investigation approaches

3.6.1 Induction, deduction, verification and verification approaches

An inductive approach explores the environment to create a model or theory[22].
A deductive approach uses an already existing theory or model to draw certain conclusions for specific events[23]. Verification is used to confirm the result of an investigation[24].

3.6.2 Our investigative approach

In our thesis we use a deductive approach. We have collected our empirical data from an already existing database. Models we use have their background in already existing theory

[22] *Utredningsmetodik för samhällsvetare och ekonomer*. Lundahl, Ulf and Skärvad, Per-Hugo, p. 41
[23] Ibid.
[24] Ibid.

from scientific papers and literature. From data and theory we have been able to draw certain conclusions.

3.7 Practical approach

Initially we focused on research papers and literature within our specific field trying to get a deeper knowledge in related theories. Further we had meetings with our supervisor to discuss how to approach the problems. This helped us to formulate the direction of our thesis.

After broad theoretical studies we started to evaluate different models that are used to quantify insider trading and market efficiency. We understood that there is not a general model that is used to quantify these values. After further discussions with our supervisor we decided to do an event study.

We decided to use the annual report dates as the event day. At this day we study the stock behaviours in our data sample. We investigate if there are deviations in the motions of the different stocks. Our null hypothesis is that A and H shares should move in similarity. We create a series of the difference between each A and H share. Since the difference of each stock should equal zero we perform a confidence test of the absolute values in the series to see if the interval covers zero. We use the absolute values as the differences are normal distributed around zero. If we do not use the absolute values the mean of the differences will be zero. A regression analysis is carried out to measure the dependence between the share types.

A further analyse of different markets indices is done to evaluate the difference between the markets.

4. THEORETICAL BACKGROUND

In this chapter the theoretic hypothesis are specified. These are in forthcoming chapters evaluated.

4.1 Event study

The choice of an event study enables us to avoid explaining variables of stock movements and merely focus if there are deviations in the movements. Further we will not try to interpret the annual reports (the information at the event day) since we assume that the stock movements reflects the general opinion of the companies and the reports.

The hypothesis is that the H-stock will move more than A-shares post an event. Reasons are that we assume that the A-shares a possessed by insiders who prior report release have acted on inside information thus do not need to act when the information is released to the market. H-shares are assumed to be possessed by non insiders, i.e. international institutional investors, who will act on information released at report date. This implies that the A-shares will have smooth movements while the H-share will make jumps on the event day.

To investigate our theory we will study the daily returns of the stocks. We assume that the stocks we have chosen to study are a correct sample of the stock market.

The return difference between the A and H-shares is calculated. We believe that the differences should equal zero if no insider trading occurs. Investors in both A and H shares will interpret the information similar thus resulting in comparable movements in the different shares. The result should be that in average the A and H shares in each stock move similar.

We construct a confident test with a significant level of 95% to compare the populations.
Our hypotheses are:

$$H_0 : \mu_{A-shares} - \mu_{H-shares} = 0$$
$$H_1 : \mu_{A-shares} - \mu_{H-shares} \neq 0$$

If the daily return of the A shares are similar to the H share after the event we interpret this as there are no insider trading. If we can reject the null hypothesis we interpret this as an indication of insider trading.

We chose not to include any additional explaining variables, except for insider trading, in our hypothesis. Several macro variables can affect the stock movements e.g. business cycles, political happenings et cetera. These occurrences have a very significant influence on stock movements but as these activities are not possible to forecast by any trader, insider or non insider, we assume they affect A and H shares similar. Further the information on a report day is usually much stronger than any non company specific information that may be released on the same day. Thus the information in the reports are the driving factor on the event day.

Additionally a regression test is carried out. The test gives further information of the relationship between A- and H-shares. The test is as follows;

$$A_i = \alpha + \beta H_i + \varepsilon_i$$
$$\varepsilon_i \in N(0, \sigma)$$

We estimate the constants alpha and beta to se if there is a similar behaviour of the stocks in our sample. Our intuition is that a normal relationship would result in alpha value close to zero and beta value close to one[25]. If so the stocks behave similar on the report day.

To get a god overview of the different stock market we compare indexes representing the A-shares on the domestic Shanghai and Shenzhen market as well as the international Hong Kong and New York markets. To illustrate the different volatility of the markets we construct a GARCH model. GARCH-models are acknowledged in financial modelling for the ability to capture changing volatility.

[25] Asgharian, Hossein, Lund, 12-01-2007

5. DESCRIPTION OF DATA

The data used in our study is described in this chapter. Further stock characteristics and owner structures are presented.

5.1 Data analysis

The original data are time series of Chinese stocks listed both at the domestic markets and the Hong Kong market. The time series contain daily notation for each stock, two different series for the A- and H-shares, stretching from June 2001 until June 2006.

From daily prices daily returns are computed:

$$DR_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

where P_t is stock price at time t

and P_{t-1} is stock price at t - 1

Our survey will focus on the timeframe around the annual reports in 2006 but certain lengths are needed for the series in order to understand the behaviour of the stock. Several stocks are excluded from the survey due to lack of length in the series, small stock turn over and difficulty finding the annual report dates. From the initial sample of forty stocks a filtered sample of eighteen stocks is collected.

All data was downloaded from DataStream database. The dates for the annual reports (the events) were downloaded from http://companies.scmp.com/

A- and H-shares are quoted in different currencies, this does not affect our study as we study stock behaviours and not arbitrage opportunities. Further the daily returns are percentages of previous day's price, thus not affected by the value of the stock.

Unfortunately the volume traded and by whom was impossible to find. Identifying the traders acting prior and post the event would be of great interest to further strengthen our assumptions that insiders act prior the information release.

The stocks in our sample and their statistics are presented in table 1.

	A- Shares			H-Shares				
Stock	**Return 060101-060601**	**Mean daily return**	**Daily volatility**	**Return 060101-060601**	**Mean daily return**	**Daily volatility**	**Correlation of daily return**	**Report date**
ANGANG NEW STEEL	153%	0,42%	2,90%	151%	0,43%	3,50%	0,40	06-04-06
ANHUI EXPRESSWAY	97%	0,01%	2,80%	153%	0,42%	2,50%	-0,12	06-04-24
ANHUI CONCH CMT.	140%	0,36%	3,40%	148%	0,40%	3,20%	0,42	06-04-26
BEIREN PRINT.MCH.	105%	0,11%	3,60%	112%	0,12%	1,90%	0,19	06-04-20
CHINA EASTERN AIRL.	122%	0,20%	2,10%	94%	2,00%	-0,03%	0,16	06-04-10
CHINA SOUTHERN AIRL.	109%	0,10%	2,30%	84%	-0,14%	1,90%	0,26	06-04-19
CHINA TELECOM	128%	0,26%	2,70%	90%	-0,08%	1,50%	0,00	06-03-22
DONGFANG ELECT.MCH.	137%	0,33%	2,90%	193%	0,65%	3,30%	0,19	06-04-20
GUANGZHOU PHARM.	112%	0,13%	2,50%	142%	0,36%	2,90%	0,26	06-03-31
GUANGZHOU SHIPYARD	202%	0,68%	3,00%	360%	1,26%	4,60%	0,30	06-03-23
HUADIAN POWER INTL.	130%	0,26%	1,80%	101%	0,04%	2,70%	0,02	06-03-24
HUANENG POWER INTL.	91%	-0,05%	2,60%	97%	-0,01%	1,80%	0,23	06-03-28
JIANGSU EXPRESSWAY	88%	-0,10%	1,80%	103%	0,05%	1,90%	-0,08	06-04-09
JIAODA KUNJI HI-TECH	193%	0,63%	2,80%	237%	0,84%	3,70%	0,41	06-04-12
JINGWEI TEXTILE MCH.	169%	0,50%	2,20%	105%	0,07%	2,20%	0,04	06-04-18
LUOYANG GLASS	133%	0,28%	2,00%	111%	0,15%	3,20%	0,48	06-04-25
MAANSHAN IRON & STL.	117%	0,22%	3,70%	110%	0,12%	2,50%	0,16	06-04-12
YANZHOU COAL MINING	104%	0,08%	2,90%	111%	0,12%	2,50%	0,74	06-04-24
Mean	**129%**	**0,25%**	**2,67%**	**139%**	**0,38%**	**2,54%**	**0,23**	

Table 1 Stocks used in our research and corresponding characteristics

The return over the half year period, which the annual reports we use as events lies within, varies widely between stocks. An interesting observation is that the A-shares have a mean return of 129% and the H-shares have a mean of 139%. This is a very high mean return compared to other stock markets.

More interesting for our study is the mean daily returns, 0.25% for A- shares and 0.38% for H-shares. The corresponding volatilities are 2.67% and 2.54%. These are relative normal values of daily volatility in an emerging market.

The daily return correlations between A- and H-shares have a mean value of 0.23. A value of one is coherent with the daily returns are exactly equal every day. The relative low correlation could be explained by different behaviour of domestic and international investors.

5.2 Owner structure of public companies

To verify our assumptions that A-shares are owned by domestic investors and H-shares by international investors we chose four random companies in the sample. We investigate the owner structure of these stocks.

Our research finds that A-shares are in general owned by Chinese investor and the Chinese government while the H-shares are owned by international institutional firms. In table 2 the owner structure of China Telecom is presented. The largest possessors are asset management firms, investment companies and government controlled institutions. This verifies our assumptions of insider intense A-shares.

China Telecom:	Number of shares as at 31 December 2005	Percentage of the total number of shares in issue as 31 December 2005	Share class
China Telecommunications Corporation	57 377 053 317	70.89	A-shares
Guangdong Rising Assets Management Co. Ltd.	5 614 082 653	6.94	A-shares
Jiangsu Guoxin Investment Group Co Ltd.	957 031 543	1.18	A-shares
Zhejiang Financial Development Company	2 137 473 626	2.64	A-shares
JPMorgan Chase & Co.	1 080 661 621	1.34	H-shares
Fujian State-owned Assets Investment Holding Co Ltd	969 317 182	1.20	A-shares
The total number of shares of the company was 80 932 368 32, out of which there were 82.85% A shares and 17.15% H shares			

Table 2 Owner structure of China Telecom[26]

Anhui is owned mostly through A-shares which are possessed by Chinese institutional owners and the state.

As seen in table 3 the second largest owner of Anhui is HKSCC Nominess Limited. HKSCC is an institutional owner who possesses large positions of H-shares in several Chinese companies. HKSCC offers international investors to invest in funds of H-shares.

[26] China Telecom Corporation Limited Annual Report 2005

Anhui Expressway	Number of shares as at 31 December 2005	Percentage of the total number of shares in issue as 31 December 2005	Nature of shareholder	Share class
Anhui Expressway Holding Corporation*	538 740 000	32.48	State owned	A-shares
HKSCC NOMINEES LIMITED	486 133 898	29.31	Overseas	H-Shares
Huajian Transportation Economic Development Center*	376 860 000	22.72	State owned	A-shares
Jiashi Service Growth Industry Securities Investment Fund	26 861 471	1.62	Other	A-shares
National Social Insurance Fund-108 Composition	14 702 104	0.89	Other	A-shares
Boshi Theme Industry Stock Securities Investment Fund	11 655 648	0.70	Other	A-shares
Jiashi Growth and Gaining Securities Investment Fund	9 974 589	0.60	Other	A-shares
Boshi Selective Stock Securities Investment Fund	9 744 839	0.59	Other	A-shares
Jinghunchangcheng-Selective Stock Securities Investment Fund	6 400 609	0.39	Other	A-shares
National Social Insurance Fund-102 Composition	6 261 880	0.38	Other	A-shares
The total number of shareholders of the company was 25 097, out of which there were one state-owned shareholder, *100% Non circulating shares one state-owned legal person shareholer 25 020 A shareholers and 75 H shareholders				

Table 3 Owner structure of Anhui Expressway[27]

Additional companies are scrutinised and presented in appendix 2. Our assumptions of the owner structure are by these investigations verified.

[27] Anhui Expressway Corporation Annual Report 2005

6. COMPARISON OF THE STOCK MARKETS

In this chapter we compare the behaviour of the different stock markets. The purpose is to give the reader an overview of the markets. Additionally we construct a GARCH model to illustrate the changing variance in the markets.

6.1 Introduction

The behaviours of China's stock markets differ widely. As discussed in chapter 2 all markets are not available to every investor. During the six months that are evaluated the markets have increased enormously in value. The two domestic markets at Shanghai and Shenzhen have increased with almost 50 percent. The more international markets in Hong Kong and New York have over the same period only changed a few percent. The S&P 100 is the US comparison index that is used to illustrate blue chip companies' development compared to the emerging markets in China.

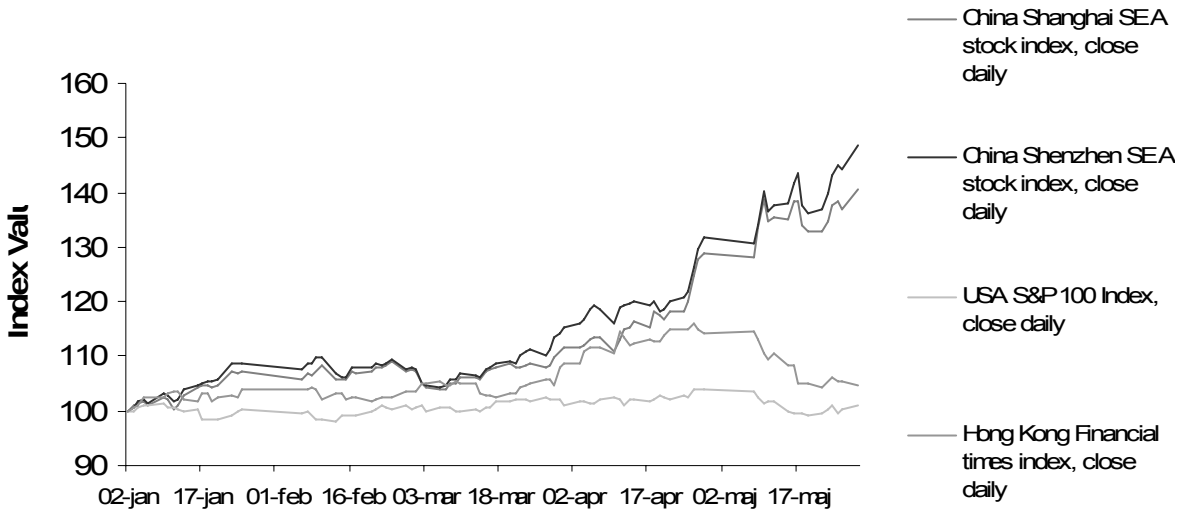

Figure 2 Comparison of stock markets

6.2 GARCH estimation

To capture the changing variances in the market a generalized auto regressive conditional heteroskedasticity model (GARCH)[28] is constructed. These are an extension of the ARCH models which uses the error terms to estimate the variance. The GARCH models additionally use the conditional variance, earlier sample variance.

$$GARCH(p,q)$$
$$\varepsilon_t = y_t - \mu$$
$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i \varepsilon_{t-1}^2 + \sum_{i=1}^{p} \beta_i \sigma_{t-1}^2$$

The values of p and q are the number of earlier observations used in the variance estimation. Epsilon is the error term at each observation time calculated as the difference between observed value and the mean of the process. Alpha and beta are constants specific for each process needed to be estimated. Thus the estimated variance is a function of both previous error terms and estimated variance.

To estimate the constants alpha and beta the maximum likelihood method is used. The method is used to estimate the parameters of a known density function. If $x_1,...,x_n$ are observed as random variables from a distribution with the parameters $\theta_1,\ldots,\theta_k$ the method provides the parameters with values that the probability of the observed variables are maximized. The practical approach is that the likelihood, L, should be maximized. L is defined as:

$$L(\theta_1,...,\theta_r | x_1,...,x_n) = \prod_{i=1}^{n} f(x_i, \theta_1,...,\theta_r)$$

We use these methods to calculate the parameters of GARCH (1,1) models for the different indices, se appendix 1 for MATLAB codes.

[28] http://en.wikipedia.org/wiki/GARCH

Parameter	China Shanghai SE A stock index	China Shenzhen SE A stock index	USA S&P 100 Index, close daily	Hong Kong Financial times index, close daily
α_0	0.1298	0.1224	10.0107	0.1449
α_1	0.2464	0.2981	0.8879	0.2639
β	0.7581	0.7037	0.1764	0.7396

Table 4 Parameter estimates of GARCH(1,1) models

6.3 Index development and volatility

As seen in figure 2 the two domestic markets increase extensively during the six month period. The two markets follow the same pattern and value development. As a result the volatility of the markets varies extensively but in the same pattern during the period. Both markets experience a decrease in volatility roughly after 3 months (sample time 50) followed by an enormous increase.

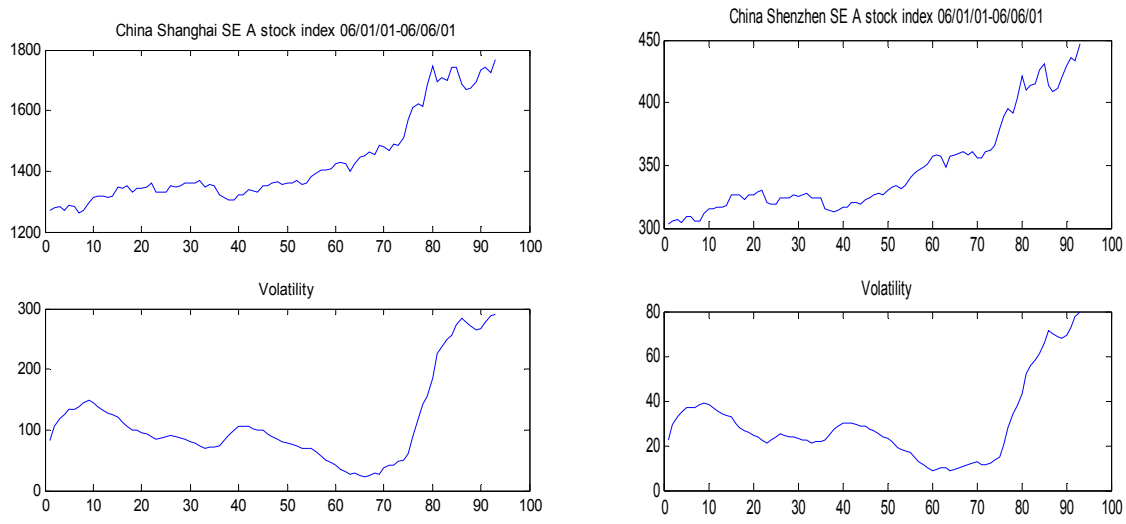

Figure 3 Index and volatility changes 06/01/01-06/06/01

Compared to the domestic markets the USA S&P 100 and the Hong Kong indices have relatively low volatility. In emerging markets the volatility is often higher than in well

developed countries. The large and important companies have a more steady growth than companies in emerging markets therefore their indices have a lower volatility.

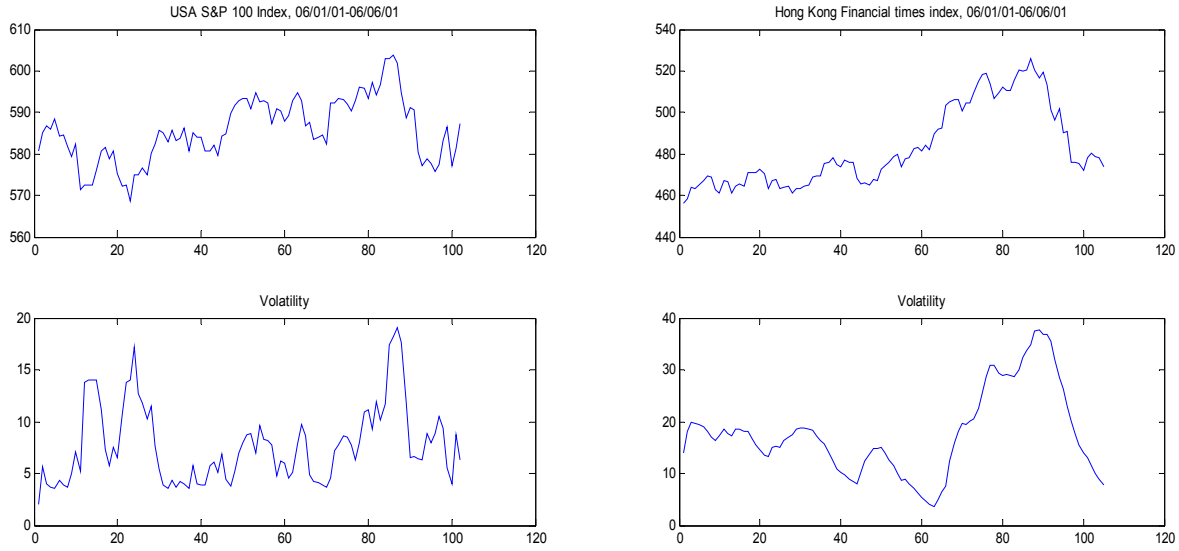

Figure 4 Index and volatility changes 06/01/01-06/06/01

7. RESULTS & DISCUSSIONS

The results of the hypothesis and regression tests are in this chapter presented and discussed.

7.1 Movements on report day

At each report day every stock is scrutinized to get an overview of the market behaviour. As seen in figure 5 we conclude that the stocks behave differently. The daily returns on the report day deviate widely. Our interpretation for the stocks that are unchanged is that the information releases are in line with investors' expectations, thus no extreme actions are taken. However there are stocks where the returns are large compared to a normal day. The reason for these extreme actions is that the new information changes investor's valuation of the specific stock. An interesting observation is that several A- and H-shares issued by the same company moves in opposite directions. In these cases investors interpret the new information differently.

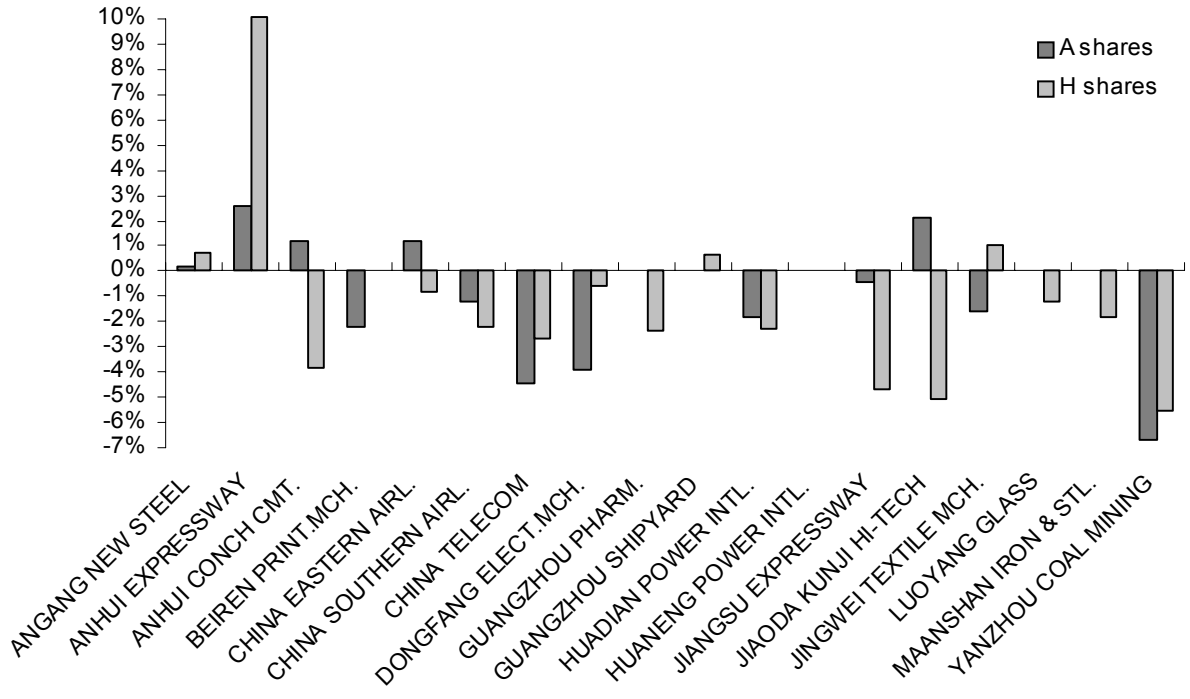

Figure 5 Daily returns at the report dates for each stock in research sample

Observing figure 5 we notice that H-shares change more than the A shares. This is in line with our hypothesis that the H-shares investors have had no opportunity to trade on the information

released prior to the report. On the contrary the A shares investors possessed this information prior thus were able to act resulting in smaller daily returns.

An interesting additional comparison would be to measure the normal daily turnover in the stocks compared to the turnover at report date. Normally the activities in a stock increases when new information is released to the market. Unfortunately we have no turnover information thus the liquidity of the stocks are not observable.

The daily returns of the eighteen shares at the report dates are summarized in table 5.

	A-shares	H-shares
Max daily return	2,6%	10,1%
Min daily return	-6,7%	-5,6%
Mean daily return	-0,8%	-1,1%
Volatility of return	2,3%	3,5%
Correlation of daily returns	0,37	

Table 5 Daily return statistics at report dates

There are several interesting observations to be made when studding the statistics for the activities at the report days.

The maximal return of the sample deviates seven point five percent between A- and H-shares. When studding the individual shares in figure 5 the occurrence of this event is related to the extreme return in Anhui Expressway. When using a small sample any extreme individual event will affect the results. However the positive information resulting in an extreme daily return in Anhui Expressway H-shares should result in a similar daily return of the A-shares, which is not the case. The return is positive but not in a comparable size as the H-share. Of course as mention previously several reasons may explain the different behaviour but our conclusion is that this indicates insider trading.

The minimum daily returns are more similar. A- and H-shares minimum occurs in the same stock and only deviating roughly one percent.

Mean returns are negative for both A and H shares. This means that investors in both A and H shares have in general over estimated the performance of the companies. The mean returns for H-shares are less favourable than for A-shares. This is an indication that the investors

overestimated the stock more than A-shares investors. Our intuition is that this is a sign of insider trading.

The volatility of the returns at the report dates compared to normal days as seen in table 1 have increased for the H-shares while decreasing for the A-shares. The interpretation is that H-shares move more than A-shares at event days. This is another indication of insider trading. Deviations in the behaviour may vary on various factors but we interpret this as A-shares investors have acted on the information prior event day.

The correlations of the returns are higher than under normal trading days, 0.37 compared to 0.23. This is as expected since on event days stock specific information is stronger than other market information. On normal trading days macro information dominate stock behaviour since there are not much stock specific information released.

7.2 Hypothesis testing

If the differences of all returns are added would result in a mean close to zero since the differences are positive for some stocks while negative for others. Thus we create a series comprising the absolute values of the differences between A- and H-shares returns for the eighteen stocks.

$$\lambda_i = \left| RA_i - RH_i \right|$$

As seen in figure 6 the resulting series is very deviating. Only Huaneng Power Int. behaves exactly similar in both A- and H-shares, se appendix for a full description of the daily return on report day.

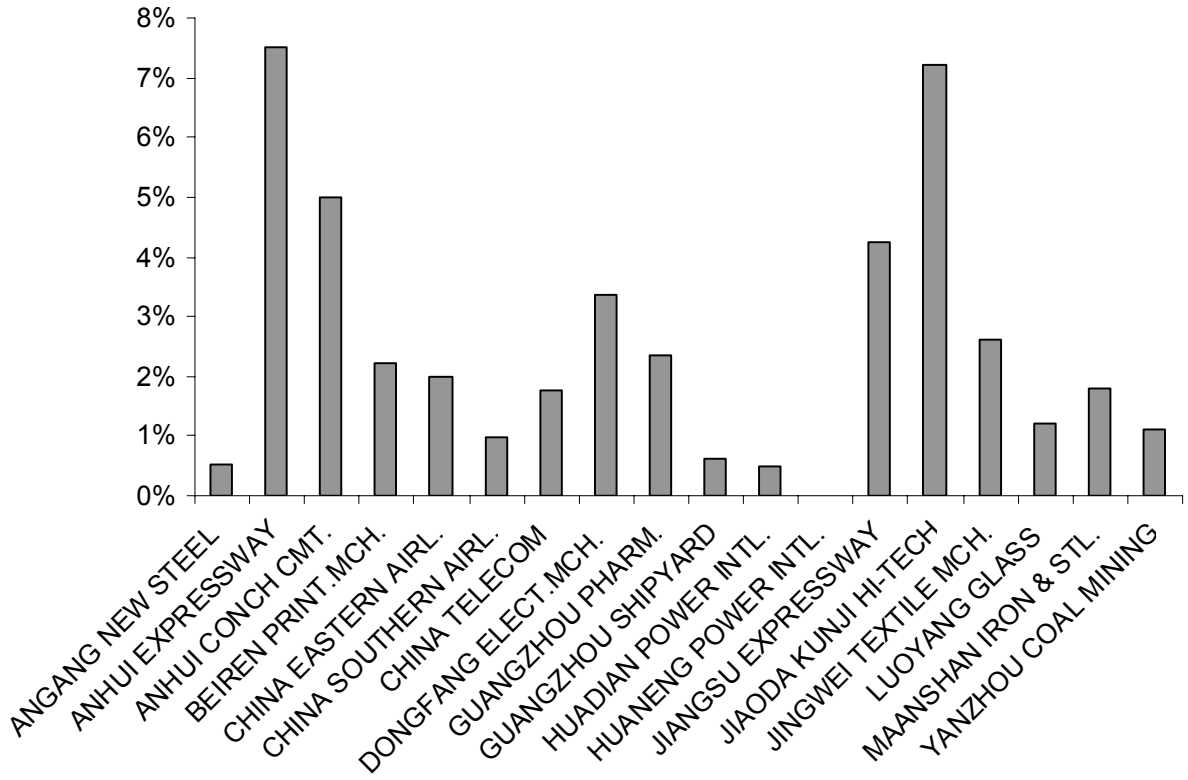

Figure 6 Absolute differences returns

The explanation of different behaviour can be as simple as domestic and international investors interpret information differently. However we interpret this as some investors are more informed of the outcome at the event days.

The series of absolute differences have the following statistics:

	λ_i
Mean daily return difference	2,50%
Standard deviation	2,20%

Table 6 Statistics of the absolute differences daily returns

An interesting observation is that the mean difference between daily returns is two point five percent.

Based on the statistics in the series of absolute differences we test our hypothesis. We conduct a 95% level of confident test.

95% confident level	0,99%
Absolute difference interval	2,50 % ± 0,99%
Upper bound	3,49%
Lower bound	1,51%

Table 7 Result of confident test

A seen in table 7 our interval of confident does not cover zero which represents our null hypothesis. We can with 95% certainty reject the null hypothesis in favour of the alternative hypothesis.

Our initial intuition in different behaviours of the shares types have been verified by hypothesis testing. We accepted this as evidence of insider trading.

Our explanation of insider trading has been argued through the paper. However we are well aware that several variables not included in this study may influence the results.

Additional studies including turnover volume in order to study the liquidity of share type and to see how the turnover is affected on event days would be of great interest. Further it will also be of interest to explore if the owner structure of a company influences the volatility and insider trading in a stock.

Large institutions may not be as flexible as small actors. This may be a reason why the A shares moves less on event day. Thus studying investment policies of the owners would be interesting, although hard.

7.3 Regression analysis

A regression analysis has been carried out for a deeper survey of the stock data. It demonstrates how well the different stock category co varies. At the report date the stock specific information is very strong so the stock category should react similar. A linear regression is performed based on the following model:

$$A_i = \alpha + \beta H_i + \varepsilon_i$$
$$\varepsilon_i \in N(0,1)$$

As seen in table 8 Alpha is close to zero as expected. The confidence interval covers zero which implies that we can not reject that alpha equals zero. Beta has an estimated value of roughly a quarter. Our hypothesis that beta would be close to one in a normal relationship between stocks in the same company is rejected. The lower beta could be explained that A-shares in general move less than the H-shares. However the confidence interval covers zero implying that there is no connection between the two share types at the report date. The return of A-shares can not be explained by the returns of H-shares and vice versa.

	Coefficients	*Standard Error*	*Lower 95%*	*Upper 95%*
α	-0,005468687	0,005573609	-0,01728421	0,0063468
β	0,253369609	0,157220611	-0,079923196	0,5866624

Table 8 Linear regression parameter values

The validity of a regression model can be evaluated by the R2 measurement. The interpretation of R2 is the proportion of variation in the response values explained by the model. A value of one means that the model can describe the response terms based on the in data[29]. As seen in table 9 our regression model has a R2 value of fourteen percent. This implies that only fourteen percent of the total variation in one market is explained by the variation in the other. This is a low value that strengthens our theories of different behaviour of the markets.

Regression Statistics	
R Square	0,140

Table 9 R square of regression model

[29] http://en.wikipedia.org/wiki/R_square

8. CONCLUSIONS

How well the research purpose is fulfilled is concluded in the following chapter.

The purpose of the thesis was to describe the Chinese stock market in order to analyse investors' response to information release. We have studied a sample of Chinese companies listed on both the domestic stock exchange and the Hong Kong stock exchange. There are regulations regarding ownership of different stocks. International investors are not allowed to own type A-shares. These are primary owned by the Chinese government and large institutions. Investors interested in Chinese stocks have to invest in type H-shares listed in Hong Kong.

We have concluded with an event study that there are differences in information interpretation. The results are that the different types of shares behave differently. Our interpretation is that insiders act prior to the public releases of crucial information. We argue that this indicates insider trading.

However there are several variables not incorporated in our studies which may have a great influence on the stock movements. The most obvious explanation of the smaller motions of A-shares are that these are less liquid and the owners have restrictions in trading thus not able to act as fast on information.

9. BIBLIOGRAPHY

Literature

Chai, C.H (1997), *China and the Asia Pacific economy*. Nova Science Publisher

Cho Frédéric (2006), *Kinesisk kapitalmarknad - och varför muren inte syns från månen*. Hagströmer & Qviberg

Dahmström, Karin (2000), *Från datainsamling till rapport*. Studentlitteratur: Tredje upplagan

Green, Stephen (2003), *China's Stockmarket*. Profile Books Ltd.

Heine, Andersen (1994) *Vetenskapsteori och metodlära. En introduktion*. Studentlitteratur

Kwan & Yu (2005), *Critical issues in China's growth and development.* Aldershot

Nolan, Peter (2001) *China and the global economy: national champions, industrial policy, and the big business revolution*. Palgrave

Electronic Sources

www.wikipedia.org

http://www.maths.lth.se/matstat/kurser/fms012.old/regression.pdf

http://www.anhui-expressway.cn/index_e.asp

http://www.chinatelecom-h.com/eng/global/home.htm

http://www.hdpi.com.cn/

http://www.chinagsi.com

APPENDIX 1

To receive an approximate solution to the parameter estimation the MATLAB routine fminsearch is used. We minimize the likelihood function of the GARCH model.

g=fminsearch(@garchestproject,g,[],dailyreturns)

```
function z = garchestproject(theta,y);

% inparameters theta and dailyreturns

b0=theta(1); %guess the values of theta(1,2,3) = [0,1]
b1=theta(2);
b2=theta(3);

sigma(1)=sqrt((b0)/(1-b1-b2)); %initial variance
for i=2:length(y)
    z(i) = 0.5*log(2*pi)+log(sqrt(sigma(i-1)))+0.5*(y(i)-
mean(y)).^2/sigma(i-1);% maximum likelihood for Garch(1,1)
sigma(i)=b0+b1*(y(i-1)-mean(y)).^2+b2*sigma(i-1);%the variance is according
to GARCH(1,1)
end
z = sum(z);%if we minimize z with respect to Theta it will maximize our
likelihood until to correct our model.
%As we minimize Z the negative signs disapers that shall be in z(i)=-(...)
%g=fminsearch(@garchestproject,g,[],dailyreturn)



function [sigma2, normres]=variance(dailyreturn,x)

% x=estimated values by garchestproject, gives var(t)=b0+b1*res(t-
1)^2+b2*vat(t-1)

b0 =x(1);
b1 =x(2);
b2 =x(3);
res = dailyreturn -mean(dailyreturn); %res=residuals

h=data;
sigma = zeros(94,1);
sigma(1)=sqrt((b0)/(1-b1-b2));%we have to use stdev otherwise divagates our
sigma

for i=2:length(res)
    sigma(i)=sqrt(b0+b1*res(i-1)^2+b2*sigma(i-1)^2);

end
sigma2=sigma.^2;
normres=res(1:end)./sqrt(sigma2(1:end));

subplot(211);
plot(dailyreturn (2:end));
```

```
subplot(212);
plot(sigma(2:end));
```

APPENDIX 2

Additional owner structure presentation:

Huadian Power International Corporation Limited	Number of shares as at 31 December 2005	Percentage of the total number of shares in issue as 31 December 2005	Share class
China Huadian Corporation	3 011 075 430	50.01	A-shares
HKSCC NOMINEES LIMITED	1 421 041 900	23.60	H-shares
Shadong International Trust and Investment Corporation	903 443 970	15.00	A-shares

Guangzhou Shipyard International	Number of shares as at 31 December 2005	Percentage of the total number of shares in issue as 31 December 2005	Nature of shareholder	Share class
China State Shipbuilding Corporation	210 800 080	42.613	State owned-Unlisted	
HKSCC Nominess Limited	146 942 999	29.705	Foreign Capital shares-Listed	H-shares
Tong Qian Securities Investment Fund	18 283 146	3.696	Legal Entity´s shares-Listed	A-shares
Hang Ye Jing Qi Securities	10 250 490	2.072	Legal Entity´s shares-Listed	A-shares
HSBC Nominess Limited	4 994 000	1.010	Foreign Capital shares-Listed	H-shares
Chan Cheuk Sang	900 000	0.182	Foreign Capital shares-Listed	H-shares
Pan Jing Chang	269 331	0.054	Natural Person shares-Listed	A-shares
Huang Xubin	259 700	0.052	Natural Person shares-Listed	A-shares
Zhang Jinghui	222 901	0.045	Natural Person shares-Listed	A-shares
Chan Kwok Tai Eddie	210 000	0.041	Foreign Capital shares-Listed	H-shares
The total number of shareholders of the company was 52 426, out of which there were 52 198 A shareholers and 227 H shareholders				

APPENDIX 3

Return of the stocks in our sample on report day.

	Daily return of A-share on report day	Daily return of H-share on report day
ANGANG NEW STEEL	0%	1%
ANHUI EXPRESSWAY	3%	10%

ANHUI CONCH CMT.	1%	-4%
BEIREN PRINT.MCH.	-2%	0%
CHINA EASTERN AIRL.	1%	-1%
CHINA SOUTHERN AIRL.	-1%	-2%
CHINA TELECOM	-4%	-3%
DONGFANG ELECT.MCH.	-4%	-1%
GUANGZHOU PHARM.	0%	-2%
GUANGZHOU SHIPYARD	0%	1%
HUADIAN POWER INTL.	-2%	-2%
HUANENG POWER INTL.	0%	0%
JIANGSU EXPRESSWAY	0%	-5%
JIAODA KUNJI HI-TECH	2%	-5%
JINGWEI TEXTILE MCH.	-2%	1%
LUOYANG GLASS	0%	-1%
MAANSHAN IRON & STL.	0%	-2%
YANZHOU COAL MINING	-7%	-6%