Crouching Tiger Hidden Success?

- A Futurology of the Chinese Stock Market

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Authors:
Lulu Li 801202
Linda Malmström 820909
Supervisor:
Curt Scheutz
Abstract

This Master’s Degree is a futurology that aims to analyse how the Chinese stock market might develop for a period of ten years, i.e. between the years 2005-2015. Since the future never with certainty can be predicted, scenarios will be presented displaying other possible outcomes. Naturally these scenarios are built upon given assumptions which otherwise could be as many as one’s imagination allows. The thought is to present the results as an index so the reader easily can see the possible development and scenarios.

The methodology used to collect necessary data is through the classical Delphi method, by which one interviews the selected “experts” that have the knowledge needed of the Chinese stock market. Moreover, the authors have collected further information through literature, the Internet, articles, reports and other written sources needed to continue further investigation. Further, the forecast was measured by two steps. The first step was to calculate the value at the start point. The second step was to create two types of scenarios, added as a frame of the forecast outcomes. To transform the analysis and the scenarios into a numerical index, a technical measurement of Quasi Monte Carlo Simulation was applied.

The theories applied when creating the index is foremost the Arbitrage Pricing Theory, which makes it possibly to measure several factors at the same time, including macro economical effects on the stock market.

According to the result, four factors were identified as the driving forces when finding a balanced economy, which affect the stock exchange: the investment structure; equal standard of living; the state of the financial sector and increased transparency. The result also indicates that the Chinese stock market will not stay in parity with the earlier development. A healthier and more efficient market will occur, due to structural reforms and the expected improvements within the financial sector including the stock exchange.

It is with great anticipation that the authors await a bright and successful future for the Chinese stock market. A new direction has been settled, although there are many difficult challenges.
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1. Introduction

China, with approximately one fifth of the world’s population, is a market that the west has focused more on in recent years\(^1\). One can presently discern an increased interest from both private as well as public investors\(^2\), but what will it look like in ten years? The American economy, which has been seen as the most significant during the 20\(^{th}\) century, with one of the world’s most influential stock markets\(^3\), is now facing a new competitor. Perhaps China will be the counterpart of the American stock market in the 21\(^{st}\) century.

In this chapter an explanation of the background, problem, purpose and delimitations will be presented to the questions posed.

1.1 Background

Since China opened its borders in 1978, and welcomed other economies, investments have flowed into the country\(^4\). During the past couple of years, the country has had an average growth of 9\(^{\%}\)\(^5\). If the development should continue in the same condition, the GDP of China would within a couple of decades become comparable with that of the United States\(^6\). When the country in 2001 was affiliated to the World Trade Organization (WTO), it was seen to have a great potential for progress due to the economical reforms that was initiated by the former leader of China, Deng Xiaoping\(^7\). The membership requires that China has to be more globally open by increasing trade, both domestic as well as foreign, and perhaps most importantly, to work for an increased trade between people over national borders\(^8\). If they fulfil these demands, China will probably receive greater influence in the world. This is already evident, in that the country’s demand for raw material for its present industrialization has increased the price on the world market for materials such as oil and steel\(^9\).

\(^1\) Landrapporter Kina; Andreasson Lars; “Shanghai och Yangtze Delta- en översikt”; 2004
\(^2\) Widman Erik; “Kinas ekonomi 2004: Kamp mot obalansemerna”
\(^3\) Nielsen Erik; “USA- En fortsatt intressant investering?”
\(^4\) Widman Erik; “Kinas ekonomi 2004: Kamp mot obalansemerna”
\(^5\) Ibid.
\(^6\) Kiesow. I & Sandklef. K; “Kina inför framtiden-några viktiga trender i mittens rike “, 2004
\(^7\) Widman Erik; “China Business Climate report 2005”
\(^8\) Kiesow. I & Sandklef. K;“Kina inför framtiden-några viktiga trender i mittens rike “, 2004
\(^9\) Kiesow. I & Sandklef. K; “Kina inför framtiden-några viktiga trender i mittens rike “, 2004
The financial system of China has developed from having consisted of only the central bank, in the establishing of several other banks and two stock markets\textsuperscript{10}. The way of thinking resembles that of South Korea, where the objective of the Government clearly is to develop the financial sector to support a rapid and stable economic growth to the credit of the whole nation\textsuperscript{11}. Bank loans are by far the most significant external source of financing domestic enterprises, which often have resulted in bad ones, forcing the Government to provide the banks with new capital on numerous occasions\textsuperscript{12}.

China’s first organized security market started as early as in 1914 in Shanghai, which led to the opening of the Shanghai stock market in 1920\textsuperscript{13}. However, it was closed when the communists took over power in 1949 and was not reopened until December 1990, when China’s second stock market opened, in Shenzhen. In the first two years, however, no private investor was allowed to speculate on the stock market, due to it was primary seen as a mean of obtaining capital for the inefficient public companies\textsuperscript{14}. Historically seen, both stock markets have had a positive development, as seen from the statistics below, with the exception of the Asian crisis and the economic decrease after the Internet boom\textsuperscript{15}. After 2001, the Shenzhen Stock Market has shown a weak tendency for recovery. The statistics below show the development in the Shenzhen stock market from 1999 to 2004\textsuperscript{16}.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{chart.png}
\caption{Development of the Shenzhen Stock Market from 1999 to 2004.}
\end{figure}

\textsuperscript{10} Widman Erik; "Kinas finansiella sektor: En överblick "; 2004
\textsuperscript{11} Ibid.
\textsuperscript{12} Ibid.
\textsuperscript{13} Barck-Holst Cecilia; "Kinas kapitalmarknader-En studie av utvecklingen av Kinas kapitalmarknader i Shanghai och Shenzhen ", 2004
\textsuperscript{14} Ibid.
\textsuperscript{15} Ibid.
\textsuperscript{16} Ibid.
If one looks at the development in the Shanghai stock market during the corresponding period, one can see that it has had a slightly weaker development than that of Shenzhen, yet it shows a similar trend\textsuperscript{17}. From 2001 it had a stock market decline similar to that of Shenzhen. The recovery, however, was slightly weaker than that of Shenzhen. Overall, the Chinese stock markets are distinguished by high volatility\textsuperscript{18}.

Despite the fact that the development is moving forward, many experts claim that their stock markets still remain in the early phase of development, and that it will take a long time before they reach the same standard as the ones in west\textsuperscript{19}. However, previously there have been plans to incorporate a fusion between the two stock markets, when foreign companies have not been allowed to invest on the domestic. The strong interest from foreign companies pushed the Government to proceed with the plans and in December 2003 a limited number of qualified foreign companies got access to China’s A-stock market\textsuperscript{20}.

Besides the reformation of the financial market, the country faces new challenges on the social level, the foreign political as well as the provisions- and energy supply\textsuperscript{21}. The perhaps most delicate question on the foreign political level, concerns Taiwan. China has declared that they never will acknowledge Taiwan as an independent state and that they would not exclude

\textsuperscript{16} Ibid.
\textsuperscript{17} Ibid.
\textsuperscript{18} Ibid.
\textsuperscript{19} Barck-Holst Cecilia; ”Kinas kapitalmarknader-En studie av utvecklingen av Kinas kapitalmarknader i Shanghai och Shenzhen”, 2004
\textsuperscript{20} Ibid.
\textsuperscript{21} Ibid.
the possibility of taking military action to maintain the country\textsuperscript{22}. On the economical level, which the authors will focus on, the largest difficulty will be to find a balance due to the rapid growth. It is of great importance to obtain control of the overheated industrial sectors that could push the inflation to higher levels\textsuperscript{23}. The country does not only need a well functional financial market but also a competitive domestic industry for its continuous growth\textsuperscript{24}. Furthermore there is a willingness to push up the national consumption without having to increase the inflation. There have also been discussions whether the strict governmental ruling has to be relieved and that the communistic plan economy should be fully abolished to be replaced by market economy\textsuperscript{25}. 

Only time can tell if China has the political willingness to fully carry out these economical reforms. The extreme development and modernisation that is taking place in the southern of China, creates business opportunities that should be of great interest to other countries. The question that is of most interest for this study is whether China will find balance between on the one hand a strong growth and political control and on the other hand a sound development and regulation in their stock markets.

\textbf{1.2 Problem analysis}

- Which are the most important factors that affect the future development of the Chinese stock market?
- Will China’s stock market continuously to stay in parity with its earlier development, or are there any indications that point out another development direction?

The research seeks support to estimate a probable development of the Chinese stock market by examining different indicators that are directly related to the stock market. These are stock valuation, liquidity and macro economic factors such as GDP, inflation and FDI. A study of indirect factors such as market entry barriers and politics as well as relevant legal aspects, corruption and other risks will also be preformed. Our focus lies above all to the direct related

\textsuperscript{22} Ibid.
\textsuperscript{23} Ibid.
\textsuperscript{24} Kiesow. I & Sandklef. K;"Kina inför framtiden-några viktiga trender i mittens rike”, 2004
\textsuperscript{25} Ibid.
indicators. We use the indirect indicators to get an overall picture of the stock markets probable development.

1.3 Purpose

The main purpose of this research is to investigate and analyse how the Chinese stock market probably will develop according to given conditions, in a ten-year perspective.

1.4 Delimitations

The investigation is limited to the most significant companies that are situated on the Chinese stock market. A focus on the two stock exchanges, Shanghai and Shenzhen, rather than the whole stock market is necessary when an analysis of all investment options is too extensive. Only A- and B-shares will be taken into account since these constitute the majority of stock exchange. \(^{26}\) The authors still believe the study to be fully viable when this investment form is the most significant. \(^{27}\) Furthermore, a delimitation of the period of time is fixed to a ten-year perspective. The reason for this is that the insecurity of the estimates increases the longer period of time one uses. Finally, the scenarios, or the conditions applied, are limited to what the authors, together with the experts find to be the most probable within chosen period of time.

\(^{26}\) Appendix 2

\(^{27}\) Barck-Holst Cecilia; "Kinas kapitalmarknader - En studie av utvecklingen av Kinas kapitalmarknader i Shanghai och Shenzhen", 2004
2. Methodology

This section describes the scientific approach, data collection and methods used to perform the study.

2.1 Scientific approach

When valuating a stock exchange, there are many factors that play an important role, both direct and indirect. The authors partly adopt a positivistic approach through different calculations, partly a hermeneutic in the background information collected through interviews. It is difficult to completely dedicate oneself to a single scientific approach and therefore the authors, amongst many other researches believe that one can combine these two.

2.2 Quantitative and qualitative method

A quantitative data collection has been chosen when calculating different variables. The information will be brought from secondary data in the form of monthly-, quarterly- and annual reports as well as macro- and other stock related information. Furthermore, a deductive qualitative approach will be used through structured interviews. Should the information received not be enough, it can become possible to perform unstructured open interviews to collect additional complements.

2.3 Validity and reliability

Reliability means that the research is reliably and correctly performed\(^{28}\). A reader should be able to come to the same or similar conclusions. To achieve high reliability, the calculations will be based on company ratios from annual reports and similar trustworthy sources of information. This is also obtained by choosing the most unified answers collected from the interviews. Validity is distinguished by investigating what is truly relevant for what you stated as your purpose\(^{29}\). To achieve high validity, the authors will use newly updated ratios in the calculations and seek literature that best describe how a valuation is carried out. This is important to find a result as equal to reality as possible.

\(^{28}\) Andersen Heine; “Vetenskapsteori och metodlära: en introduction”; 1994

\(^{29}\) Ibid.
2.4 Data collection
To receive a more profound knowledge within the subject area and to obtain the purpose, the authors will use both primary- and secondary data. Primary data is information that you gather on your own at the time of research\(^{30}\). In this study a focus will lie on this kind of data through interviews with experts. Secondary data is information that already exists in the form of books, reports, articles and other literature as well as the Internet\(^{31}\).

2.5 Sources
2.5.1 Written sources
The study will be primary based on research, annual reports and the Internet (homepages) for updated information. The authors turn to student literature to be able to enter more deeply into theoretical knowledge that is required to perform the analyses.

2.5.2 Verbal sources
The authors will mainly be interviewing Swedish experts in the form of stockbrokers and macroeconomists, which have good insight in the development of the Chinese market as well as their stock market. These will constitute of a chosen “expert panel” in the Delphi investigation. The panel consists of civil servants from the following institutions:

- Hagströmer&Qvidberg
- Carnegie
- Kaupthing
- Swedbank (Föreningssparbanken)
- SEB
- Skandia
- The Foreign Ministry
- The Chinese embassy
- Stockholm School of economics (Handelshögskolan)

The selection of experts is based on their profession and experience within the current area. These are foremost business school graduates and political civil servants that actively work with the development of the Chinese market. The selection of experts is subjective, whereupon a person’s real qualification to be called “an expert” constitutes a problem in the study.

\(^{30}\) Ibid.
\(^{31}\) Ibid.
2.6 Outline

To reach the purpose, the outline of the study is disposed in the following manner:

![Diagram showing the outline: Delphi Method (input) -> The Empirical Work Process -> Index (output) -> Conclusions]

2.6.1 Delphi method

Delphi is a dependable method that has been used within many different areas, although it is most common within futurology\(^{32}\). By the help of experts, one hope to reach consensus within the area one is investigating. Olaf Helmer and T.J Gordon by RAND CORPORATION developed the method during the 1950\(^{th}\) and 60\(^{th}\)\(^{33}\). It is intended to enable rational and long-term decision-making and control. The task of knowledge, that the Delphi method is suppose to solve, is the uncertainty of the future, and this is rendered by making predictions. You also need conditions that the researcher chooses himself\(^{34}\). By interviewing experts, the authors will use the classical Delphi in an attempt to form an image of how the economical future may be. The variables one receives are compiled to get an overall picture of how the Chinese stock exchange probably will develop.

To ensure oneself that the method is suitable for the study, one must first investigate who and where the experts are. It is also crucial to decide how the interviews should be carried out as well as looking into alternative methods that possibly is better suited. When performing interviews, the information received is subjective and the experts might have different

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\(^{33}\) [http://www.cins.se/OA/Handledning/default.asp?id=delphi; 2005-09-29](http://www.cins.se/OA/Handledning/default.asp?id=delphi)

\(^{34}\) Ibid.
opinions. To overcome this problem, the opinions with most majorities will be accounted for. When the answers from the first interview are gathered, the respondents take part of each other’s opinions and are given the opportunity to alter them. A second round of interview is then performed to receive more specific information. This continues until one has gathered as much information needed to proceed with the study and reached consensus. Hence, you cannot in advance decide how many rounds of interviews that are needed. One must rely on the answers received in order for the Delphi method to function. It can be resembled to a funnel that makes the subject narrower, thus creating a platform for the study to grow from. The Delphi method’s funnel is presented below, explaining how the authors have intended to structure the interviews.

**Interview 1:**
The Identification of the most important macro economical factors, which should be included within the analysis. These function as a part of the starting point for further investigation. The questions are intended for stockbrokers and economics.

**Interview 2:**
The information gathered from the previous interview, constitute a basis for further investigation of how the identified macroeconomic factors might affect the Chinese stock market. The questions are intended for stockbrokers, economics and employees from the Chinese embassy.

**Interview 3:**
The information gathered from the previous interviews, constitute a basis for investigating how the identified factors might develop more specifically. The questions are mainly intended for stockbrokers and economics.

When consensus is reached, the gathered information is used as a foundation when creating an index that represents the possible development of the Chinese stock market.
2.6.2 The Delphi method’s premises

The Delphi method must obey the following three premises:\(^{35}\):

1. The information regarding the subject area is negligible or uncertain.
2. There are no known boundaries within the subject area.
3. It is important to act or to choose between different options to take action.

2.6.3 Delphi critique

The method has been exposed to both blame and praise throughout the years. Perhaps the foremost criticisms were conveyed by Sackman (1974), in the book *Delphi critique*, who pointed out that the method is unscientific but also strongly subjective.\(^{36}\) The critique also involved validity and reliability when the future is uncertain and cannot be compared against independent data and that it is lacking of repeated research within the same problem area. Armstrong (1978) criticised the difficulty of achieving exact measurements. Makridakis and Wheelright (1978) summarized a number of points of the shortages they thought the method had. Amongst others, they especially pointed out the low reliability, regarding the expert panel, whether one can decide that the chosen interviewees really are experts. Furthermore, they criticised the difficulty of applying the respondents’ answers and the security, regarding a futurology. Martino (1978) pointed out further criticism regarding the respondents’ possibilities to modify their answers afterwards. He stated that one could manipulate the answers in order to make them more similar to the others.

On the other hand, others have appraised the method. Milkovich et al. (1972) believe that the method has shown a high degree of resemblance with reality. Basu and Schroeder (1977) agree with Milkovic after having performed a comparison between different methods and found that the Delphi was highly useful for structured interviews, even if the accuracy decreases the more factors you involve. There are several researchers that agree with them.

The authors consider this method to be fully useful when performing the study, when they both limit the number of factors as well as interviewing experts with different occupations. The trend whether the Delphi is accepted or not seem to vary throughout time, whereupon the

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36 http://www.enlace.it/documenti/some-notes-delphi-method.pdf; 2005-10-02
37 Ibid.
method cannot be ruled out. It is impossible to disregard the fact that the method still is one of the most common when it comes to futurology\textsuperscript{38}. Furthermore, it is not the method alone that represents the focus of this research though it is only used as a tool to gain deeper knowledge of how the Chinese stock market may develop.

2.6.4 The empirical work process

In this chapter the authors seek to find clues and indications of the future development, by studying the historical and present state of the Chinese economy. When predicting the development of the Chinese stock market, several important factors that influence its future must be considered. These include not only the macro economical factors such as GDP, Inflation etc., but also the political decisions that has been made by the Chinese Government presently and which might affect the future of the Chinese stock market. Hence, it is more than necessary to analyse the present, when forecasting an index. To be more specific, this analysis is divided in two main parts, where the first part focuses on the present year of 2005, and the other on the future, i.e. within the chosen time line of nine years forward. The calculation of the first period is based on the multifactor model APT. This model is used as a tool which shows the summarized result of the total effect, when all factors are added.

The second part of the analysis is based on the conclusions made from part one. This is further divided into three periods, in which the first period is between 2006 and 2008; the second period between 2009 and 2011; and the third between 2012 and 2014. These periods are abbreviated into “P1” (period one), “P2” (period two) and “P3” (period three). Various factors might have different effect on the timeline, depending on where one is looking. Hence, dividing the timeline into periods makes these effects easier to measure. The periods are exhibited below:

\begin{center}
\begin{tabular}{c c c c}
2005 & P1 & P2 & P3 \\
\end{tabular}
\end{center}

To create a frame for the second part of the analysis, two opposite scenarios are added. The purpose of the scenario analysis is to produce conceivable outcomes of the predicted future.

\textsuperscript{38} http://www.ssc.fi/mat/framtid/Delphimetoden_files/frame.htm 2005-10-02
The scenario analysis provides several options of how the future might be. This enhances the analysis’ stability and it increases the preparedness for possible future events.39

The first scenario indicates a positive development, and establishes a top line for the best probable result, given certain assumptions. The second indicates a negative development creating a bottom line for the worst possible result, given certain assumptions. Furthermore, both scenarios consider the time perspective in the same way the APT does, namely in periods. The positive scenario is abbreviated into “POS” and the negative into “NEG”. This is displayed below:

Further, to be able to create a future index, a Quasi Monte Carlo simulation is used to transfer the data in the APT into a visual index. This is a mathematical method that relates different variables to each other to provide every possible outcome based on given assumptions. In the simulation, the values of the APT are systematically and automatically calculated by the computer program MATLAB. The result of the simulation is presented as an index showing a general development, in which both the positive and the negative extreme scenario and the average outcome are included.

2.7 Alternative methods

Naturally, there are many ways to perform a futurology. One could establish a single round of interviews, combining this by inviting several participants and perform an open discussion.

39 http://www.cins.se/OA/Handledning/default.asp?id=scena; 2005-10-12
There is also the possibility of attending seminars regarding the subject or by collecting information through literature or other written sources. Due to the lack of time, the authors estimate the Delphi method to be the most appropriate. Since the availability of the interviewees is somewhat limited, separate structured interviews will be held. When calculating the index, one could focus on technical methods, instead of a fundamental, used on the stock market instead of looking at underlying factors that influence the future development of the stock market. Compared to chosen method, a technical method requests less time and informational research. However, the authors believe that this is a somewhat limited method due to two main reasons. Partly, it cannot advocate a long-term perspective because of the uncertainty that lies within the risk factors; partly it does not consider indirect factors that influence the long-term development of the stock market. Hence, this method is more suitable for analyses with a short-term perspective.
3. Theoretical Framework

In this chapter, the authors will examine the theoretical aspects that are relevant for the valuation and forecast of a stock market. These are mainly the fundamental analysis and the Arbitrage Pricing Theory model.

3.1 Fundamental and Technical analysis

When analysing a stock market, there are two common valuation tools – the fundamental and the technical analysis. The main differences between the two are the time zone one chooses to study, and which factors to focus on. A fundamental analysis is used to analyse all relevant data in a company. In other words, it contains everything from the overall economy of one single company to the general status in the whole industrial environment. The supporters of the fundamental analysis assert that the valuation of a company should be based on its result, earning per share and the return on equity. One should also focus on the financial condition, the leadership and strategy of the company. The central idea is that one should base the valuation on the all above given information. On the other hand, supporters of the technical analysis focus on buy/sell rates and the fluctuations of share prices. They see share prices as their real value, and the rates are assumed to be uncountable. This type of analysis is better suited for measuring fluctuations in short-term shares and gives investors an indication whether to buy, sell or to wait. Indicators that are usually used here are cash flow, ROA etc.

The fundamental analysis demands increasingly more time and work, but the informational outcome is also much more profound. When creating a futurology, the fundamental analysis is much more common since it allows you to receive more specific information. Hence, the authors have chosen this type of analysis.

Within the fundamental analysis, there are several valuation techniques such as the residual model, the Gordon growth model, the P/E-ratio, substance- and Cash Flow (CF) valuation model. Since the authors will focus on the most significant companies on the stock market,
the P/E valuation method is suitable and fully applicable when finding an indication of how the stock market may develop.

3.1.1 P/E-ratio

P/E-ratio (Price/Earning) describes the financial analyst’s expectation of a company. The ratio relates the share price to the company's actual earnings. The result is given in a positive number, and in the most traditional branches, the ratio is normally somewhere between 5 and 30. If the outcome shows a very low value, it means that the share price is cheap. On the other hand, should it turn out to be a high value, it indicates an expensive share price.\(^4^4\) After calculating the company’s P/E-ratio, one can either compare the outcome with its own historical P/E performance, or with the mean P/E-ratio within a specific branch. The method has the advantage of being both easy and rapid when searching for an indication of the company’s condition. There are those who criticize the method claiming it to be too focused on the company’s result, thus ignoring the cash flow that shows a more just image of the company's general condition. In theory, the share value depends on the size of insurance and its security in all the future cash flows\(^4^5\). Yet, the P/E-ratio still is the most commonly practiced by financial analysers globally.

3.2 Factor models

The purpose of the Delphi was to find relevant factors and how these would affect the Chinese stock market in a ten-year perspective. The results formed a basis for the forecast index, which was based on a suitable factor model. A factor model shows that the return of a risky investment contains two components. The first is factor/factors that influence the investment and the other is the risk one has to take for such an investment.\(^4^6\) There are many different ways to predict the future return of an investment, and there are two nearly related models one should considerate. The first model, **CAPM** (Capital Asset Pricing Model) was developed in the 1960\(^{th}\). It is commonly used when describing the relationship between risk and expected return on a given investment. It has a central roll when pricing risky investments. A fundamental result of this model is the so-called **SML** (Security Market Line), which displays the market’s rate of return on an investment as a linear combination of the expected


\(^{4^5}\) Ibid.
market risk premium and its sensitivity for changes in market returns.\(^{47}\) An alternative model that developed 15 years later and received great attention was the APT (Arbitrage Pricing Theory).

### 3.2.1 Previous research regarding the APT

The APT model was developed in the United States and was, first and foremost, tested on the American capital market. Since the 1980\(^{th}\) the interest for the APT model in other countries has increased\(^ {48}\). After the main factors in the APT model were identified, by applying it to the American stock market in the early eighties, economic researchers tested the APT models applicability on other countries capital markets, of which one of them was Sweden's\(^ {49}\). The main focus during this era was determining whether the same factors had the same weight when studying other capital markets than the US. One investigation within this field has been conducted by Chen (1984), which indicates that different capital markets are governed by different APT factors. The less similarity one can find between two countries, the more probable it becomes that the governing APT factors will not be the same for these countries.

In a study performed by Roll and Ross (1980) they came to the conclusion that a share had three to four factors that affected its yield\(^ {50}\). Bravely, R.A. and Myers, S.C (1996) believed the factors to be four to five\(^ {51}\). In another study, Chen, Roll and Ross (1986) concluded that the GDP growth, the yield curve between short and long Government bonds and two inflation measurements had a significant affect on shares while consumption and the oil price did not\(^ {52}\). A fourth study conducted by Elton, E.J, Gruber, M.J and Mei, J. (1994), the conclusion were that five macro economical factors had the most affect on shares. These were the spread between the yields of two bonds and 30-days T-bills, interest rate, exchange rate, GDP and inflation\(^ {53}\). Today the APT-model is an accepted and commonly used financial tool, though

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\(^ {47}\) Stephen A. Ross, Randolph W. Westerfield, Jeffrey Jaffe; “Corporate finance”; 2004


\(^ {49}\) Ibid.

\(^ {50}\) Nielsen Erik: "USA- En fortsatt interessant investering"

\(^ {51}\) Ibid.

\(^ {52}\) Ibid.

\(^ {53}\) Ibid.
mostly by American analysers. However, its applicability on other markets cannot be ignored\textsuperscript{54}.

\subsection*{3.2.2 The APT Model}

Stephen Ross developed the multifactor model in 1976 when he considered the CAPM not to be adequate enough when it came to pricing the capital market.\textsuperscript{55} The model assumes that a share’s yield partly depends on different macro economical factors, partly unexpected risk\textsuperscript{56}. Since macro economical factors affect countries’ stock markets differently, it is important to identify which have the most affect on the ones in China. The formula of the APT can be presented as followed\textsuperscript{57}:

\[ R = \bar{R} + \beta_1 F_1 + \beta_2 F_2 + \beta_3 F_3 + \ldots + \varepsilon \]

Where:
- \( R \) = Total return
- \( \bar{R} \) = Expected return
- \( \varepsilon \) = Unsystematic risk
- \( \beta_k \) = Beta, the risk of each factor
- \( F_k \) = Factor input

\subsection*{3.2.2.1 Return of investment}

The return of an investment consists of two parts; the expected - and the unexpected return. The first mentioned explains the market’s expectations, while the second displays the parts that the market did not count on. The relationship between them is explained by using following formula\textsuperscript{58}:

\[ R = \bar{R} + \bar{U} \]

Where:
- \( R \) = total return;
- \( \bar{R} \) = expected return;
- \( \bar{U} \) = unexpected return

\textsuperscript{54} Ibid.
\textsuperscript{55} Håkan Filipson, Fredrik Åkerman: "Arbitrage Pricing Theory – ett alternativ till CAPM?", HHS, 1985
\textsuperscript{56} Stephen A. Ross, Randolph W. Westerfield, Jeffrey Jaffe: “Corporate finance”, 2004
\textsuperscript{57} Ibid.
\textsuperscript{58} Stephen A. Ross, Randolph W. Westerfield, Jeffrey Jaffe: “Corporate finance”, 2004
3.2.2.2 Risk

Risk is identified as how much the return of an investment varies over time.\(^{59}\) A risk-free investment means that the return of an asset is constant. The greater risk, the larger the variation becomes\(^{60}\). In other words the conception of risk contains volatility, the variation of an effective rate of return. In general, risk can be explained as systematic and unsystematic, in which the systematic risks more or less affect many investments\(^{61}\). Moreover, a systematic risk means that an asset’s variance can be explained by movements of the market, while an unsystematic risk cannot\(^{62}\). The most common factors related to systematic risks are GDP, interest rate fluctuations and inflation while the unsystematic risks only influence a specific type of investment\(^{63}\). These two risks are directly involved with the unexpected return “\(U\)” and by calling the systematic risk “\(M\)” and the unsystematic risk “\(E\)”, one receives a formula presented below\(^{64}\):

\[
R = \bar{R} + M + E
\]

There are also other types of risk, company specific risk and market specific risk. By diversifying a portfolio, one can eliminate the company specific risk, also called “unique or diversifiable risk”, versus with the market specific risk, that arise from the macro economical factors one cannot. Moreover, the risk premium one uses to retrieve the values of the shares is affected by the market specific risk, not the company specific\(^{65}\).

3.2.2.2.1 Risk factor Beta: \(\beta\)

Beta is a measure of the volatility of a security/portfolio, or systematic risk, in comparison to the whole market\(^{66}\). A beta of one indicates that the security's price will move with the market. A beta higher than one indicates a greater risk of the security. When calculating the APT, the values of the factors identified as the most significant in the Delphi is used multiplied with a

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\(^{59}\) De Ridder, 2003

\(^{60}\) Malmer. C & Pettersson J. "Aktievärdering, en studie av finansanalytikers val av värderingsmodeller, värderingsfaktorer och informationskällor", LTU, 1999

\(^{61}\) Ibid.

\(^{62}\) Ibid.

\(^{63}\) Ibid.

\(^{64}\) Stephen A. Ross, Randolph W. Westerfield, Jeffrey Jaffe: “Corporate finance”, 2004

\(^{65}\) Ibid.

\(^{66}\) www.investopedia.com/glossary; 2005-11-01
beta. In practice, it is not easy to find all betas needed for each factor whereupon an index beta can be used that is applicable for the entire market. One can also assume a beta of one should it prove to be difficult finding an index beta.

### 3.2.2.3 Factor input

To calculate the factor input one have to relate the market’s expectation with the actual outcome of the factor:

\[ R_{factor} = \beta(R_m - \bar{R}_m) \]

### 3.2.3 Why the APT?

CAPM has the advantage that one through the model can diversify different degrees of risk. Thus, one can obtain a portfolio with low risk. However, the risk is treated as whole instead of relating different risks to each factor as the APT do. The APT summarizes the factors, until the unsystematic risk of a specific asset is uncorrelated with other unsystematic risks of the assets in the portfolio. The relationship between these variables can also be shown in CAPM, but not as clearly as in the APT. Further, the APT has the advantage of being able to measure more factors than one and allows you to measure macro economical factors unlike CAPM. In other words, the APT can be used as a multifactor model, which better reflects the reality and by its consideration of more than one factor.

Another disadvantage with CAPM compared to APT is that the outcome is estimated in relation to an index of the effective market, and the algebra measured by CAPM results in that all investments fall on the SML. Should the outcome be related to an ineffective market index, the model fails and cannot say anything about whether the investment is good or bad. Since the authors need a model that can take both several factors as well as macro economical ones into consideration, the APT model is the one to prefer.

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67 Nielsen Erik; ”USA- En fortsatt intressant investering?”
68 Ibid.
69 Ibid.
70 Stephen A. Ross, Randolph W. Westerfield, Jeffrey Jaffe: “Corporate finance”, 2004
71 Ibid.
72 Ibid.
73 Ibid.
3.2.4 APT Critique

A difficulty when applying the APT is that it according to Damodaran (1994) does not specify which factors or how many that should be included in the formula. The reason is that the factors used, as mentioned before, is country specific. A related problem is the difficulty of finding the beta for each factor that should be included in an APT calculation in practice. Hence there is a possibility that the researcher selects the wrong factors with the risk of overlooking important ones. Further, it is also possible that the calculations become inaccurate due to the difficulty in finding values for same of the factors.
4. Empirical results and analysis

In this chapter, the authors present a more profound discussion of the factors used in the Arbitrage Pricing Theory. Further, the result of the APT-index will be displayed that shows an indication of how the Chinese stock market probably will develop for the following ten years. Moreover, alternative scenarios will be given that exhibits other possible outcomes should something unexpected happen.

4.1 Introduction

The year 2005 was a braking point for the development of China. This year symbolizes not only the end of the first phase of the Chinese development but also the beginning of a new. During the past period, China experienced strong economical growth due to successful development strategies and the efforts made by the Government in the attempt of opening up the Chinese market for the rest of the world. However, the success has also brought problems to the surface. How one chooses to deal with them will directly affect the direction of the development in China. In the near future, there are strong indications that points towards a shift from the present focus of economical growth orientation to maintaining the overall stability and to develop the financial market including the stock exchange. Finding balance between these forces is crucial for how the stock exchange will develop.

4.2 Interview results

The received results compiled from the Delphi method showed that the most important systematic factors to focus on are: GDP, corruption, government investments, exchange rate RMB/US dollar and industrial production. The other factors will mainly be taken in to a secondary consideration, to receive a full picture of the stock markets development. The two remaining interviews are foremost complementary information regarding the result from the first interview. These are mainly used as an underlying material, when finding an indication of how the macro economical factors might develop.

74 See appendix 3
75 See appendix 4 and 5
4.3 Analysis: 2005

The analysis focuses on two main parts of the APT model. The first part includes those factors that indicate an overall state of development in China. They are indirectly related to the stock exchange. The second part of the analysis focuses on factors such as the reformation of the financial system, the market’s expectation of the stock exchange and the share price development which are directly related to the stock exchange.

4.3.1 Part one

In this part, the condition of factors such as the development of GDP, inflation rate, industrial production, Government investments, exchange rate RMB/USD and the situation of corruption will be discussed76.

4.3.1.1 Overall growth - GDP

In general, 2005 has been a great year for China. The GDP growth was approximately 9.4 %, of which almost 6 % was due to the success within the industrial sector77. Especially export orientated sectors, such as computer, fax machine -and mobile telephone related industries grew tremendously78. These sectors had an average growth of more than 40 %, and the raw material industry for steel, electricity and coal as well as other energy products had a strong average growth of 20 %79. Service sectors on the other hand, resulted in only 2.6 percentage points of the total growth and within agriculture the corresponding value was almost invisible80. The automobile industry showed a poor growth with an averaged annual growth at approximately -2 %. In addition, the largest drivers of the annual economical growth in 2005 were within the export industry and the industrial production81. According to the Government’s development goals in question of upholding the economic stability, the GDP growth should decrease to somewhere around 8 % in the following years82.

76 Appendix 6
77 http://www.stats.gov.cn/index.htm; 2006-01-04
78 Ibid.
79 Ibid.
80 Ibid.
81 http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-10-11
82 Ibid.
Although the GDP growth rate was high, the GDP Per Capita remained very low. A basic reason for the low GDP Per Capita is the combination between the huge population of more than 1.3 billion people and the unbalanced development between different parts of the country. Since the beginning of the 1990th, the Chinese Government has preceded the strategy of growth by focusing on the development of several economical zones. The main purpose with economical zones was to provide a friendly economical environment for FDI. Evidently, the strategy was of great success, but it also contributed the problematic of a growing gap between urban and rural areas. Today, there are still around 70% of the people are formers from the rural area. Because of the regulations concerning the ownership of land according to the Government; the secondary priority in the Government’s development plan; and the hard competition on the market; this enormous group of people is living in much worse condition, compared to those who live in the urban area. Hence, the inhabitants in the rural areas tend to show higher unemployment, lower wages and to be less educated, compared to the urban areas. This unbalanced development has already shown several serious consequences in the form of higher criminality and other negative effects. In other words, expansive costs for the society might remain in the long term.

Another GDP related issue should also be discussed. Since the economy took off in the 1990th, achievement of GDP growth has been the leading objective in almost every decision made by the Government. The central Government’s pressure on local Governments, to achieve the goal of GDP growth, has indirectly resulted in an extensive manipulation of economical reports. There are at least two types of manipulation that are common. The first concerns the manipulation of the economical reports by irresponsible officers, who consciously accept unqualified products to be produced and purchased on the market. In this way, a higher production rate would raise the performance growth in the reports to be more positive. An

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83 http://www.indexmundi.com; 2005-01-01
84 http://news.tom.com/2005-12-31/000T/23514994.html
85 http://www.hb.xinhuanet.com/newscenter/2005-12/31/content_5943586_1.htm
87 Ibid.
88 http://www.stats.gov.cn/index.htm; 2006-01-04
89 http://www.indexmundi.com/g/g.aspx?c=ch&v=78; 2005-10-24
90 http://www.apptdc.com/zixunwang/about.asp; 2005-10-22
91 Zhangping, Sunming; “Comparing economical structure”; 1994
92 http://www.hb.xinhuanet.com/newscenter/2005-12/31/content_5943586_1.htm
93 http://www.apptdc.com/zixunwang/about.asp; 2005-09-30
opposite situation regarding manipulation occurs more often in less developed areas. Instead of exaggeration, these local governments consciously lower the actual performance rate with the purpose to obtain contribution from the state.\textsuperscript{92} These are only two of many examples in how the reports can be manipulated. A more serious problem is that those events are almost always related to corruption that will be discussed later on.

4.3.1.2 Inflation

According to the CPI (consumer price index), the inflation decreased to 2\% at the end of the year 2005\textsuperscript{93}. Compared to the CPI rate in 2004 the inflation showed a total decreased of approximately 0.7 percentage points\textsuperscript{94}. In general, the inflation dropped to 1.6\% in the first half of 2005\textsuperscript{95}. However, it increased again in the second half of the year, mostly due to the general price increase of products for everyday use. Several analysers believe that this might indicate a trend of a new raise in the inflation. Moreover, the problem of the real estate boom since 2004 has been of great concern for the Government\textsuperscript{96}. Even for 2005 and forward, this sector remains a threat\textsuperscript{97}. However, according to the Government’s goal of providing a stable economic growth, the inflation should be kept to a level of approximately 3\%\textsuperscript{98}. If the inflation rate increases above 3\%, there is a risk that the interest rate will be adjusted upwards. This measurement was applied during 2004, when the construction sector was overheated\textsuperscript{99}.

4.3.1.3 Industrial production

As mentioned before, the growth of industrial production was one of the most important driving forces that contributed to the high growth rate in the economy. A negative effect that has risen due to the strong growth rate of 20\% is the problem of overproduction\textsuperscript{100}. Especially the raw material industry for both coal and steal that has created a bubble is of

\begin{itemize}
\item \textsuperscript{92} Ibid.
\item \textsuperscript{93} http://www.stats.gov.cn/index.htm; 20060104
\item \textsuperscript{94} Ibid.
\item \textsuperscript{95} Widman Erik; "China Business Climate report 2005"
\item \textsuperscript{96} http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-10-11
\item \textsuperscript{97} Ibid.
\item \textsuperscript{98} http://www.apptdc.com/zixunwang/about.asp; 2005-11-30
\item \textsuperscript{99} http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-10-11
\item \textsuperscript{100} Ibid.
\end{itemize}
great concern for the Government.\textsuperscript{101} Both of them are materials used as input within the production process.

Textile related industries are also noticeable, and was meaningful for the total value of export, especially in the year 2005\textsuperscript{102}. Further, nearly 75\% of 129 important industrial products indicated an increase in storage\textsuperscript{103}. This can be explained by the industrial overproduction, which was caused by the general overinvestment in the industry during the last years. A related factor that also should be highlighted is the unbalanced state of income between the farmers and those that live in the urban areas that was discussed before. The negative effect that follows is the market demand, which is mainly provided by the minority of the total population, from the urban areas. This situation restricts the total purchase power, which provides the limited market demand.

\subsection*{4.3.1.4 Governmental investments}

During 2005, governmental investments ended up at 25.3 \%\textsuperscript{104}. To deal with the overheated economy since 2004, the government adjusted their investment strategy by increasing it within the agriculture sector, while decreasing the speed of investment in the industry, especially within heavy industry\textsuperscript{105}. Yet, there are many problems unsolved by the adjustment. One of the problems concerns the increased dependence of energy supply, especially oil and coal supplies, that are needed to uphold the overall growth. It means that import of those types of raw material might be needed in the future to uphold the growth, and the price of investment and the industrial production might rise. Another related problem is the growing number of unprofitable investments. In 2005, an investment of one Yuan could only raise the GDP by 0.185 Yuan, which is nearly 0.1 Yuan less compared to 1981\textsuperscript{106}. This is also much lower than the international average\textsuperscript{107}. Further, the government investments were primarily focused on the industrial growth. Historically, the government has invested a relatively small

\begin{footnotesize}
\textsuperscript{101}http://business.sohu.com/20060106/n241300904.shtml
\textsuperscript{102}http://www.apptdc.com/zixunwang/about.asp; 2005-10-23
\textsuperscript{103}http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-10-11
\textsuperscript{104}http://business.sohu.com/20051213/n241116686.shtml
\textsuperscript{105}http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-10-11
\textsuperscript{106}http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-10-11
\textsuperscript{107}http://business.sohu.com/20051213/n241116686.shtml
\end{footnotesize}
amount to build up the infrastructure and the society\textsuperscript{108} and the investment within the financial sector was also limited.

Moreover, there are still several basic problems concerning the structure of the public organisation that are unsolved. One problem that is related to the issue of investment is the unclear role and the diffused tasks that put the government in the middle of two opposite purpose\textsuperscript{109}. On one hand, the government has to act as an investor, whose foremost purpose is to increase the economic growth. One the other hand, the same government must act as a regulator, whose most important task is to adjust abnormal investments\textsuperscript{110}. These incongruous responsibilities were the basic problem that led to bad investments and ineffective regulation earlier\textsuperscript{111}.

4.3.1.5 RMB/USD

In the end of 2005, the exchange rate of RMB/USD had a mean value of 8.0678, which indicated a growing trend of the exchange rate value compared to the beginning of the year\textsuperscript{112}. However, compared to 2004, it decreased by approximately 2.5 %\textsuperscript{113}. Further, the pressure on the Chinese exchange rate policy increased, due to the unbalanced trade value between China and the United States. The pressure mainly came from the United States that claimed that their unbalanced import rate was caused by the undervalued Chinese Yuan\textsuperscript{114}. Since 1995, the Chinese Yuan has been pegged to the US dollar. According to the present policy, the value is not allowed to fluctuate more than +/- 0.3 % per day\textsuperscript{115}.

However, many discussions concerning the RMB have been brought up concerning whether one should apply a more flexible currency. Proposals such as pegging the RMB into a currency basket which includes not only the USD but also EURO and several other currencies, that have been taken in to consideration by the Chinese government. But according to the

\textsuperscript{108} Ibid.
\textsuperscript{109} http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-10-11
\textsuperscript{110} Ibid.
\textsuperscript{111} http://business.sohu.com/20051226/n241139915.shtml
\textsuperscript{112} http://news.sohu.com/20060106/n241301232.shtml
\textsuperscript{113} http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-11-20
\textsuperscript{114} Widman Erik; "China Business Climate report 2005"
SVD –Näringsliv: “Kinas boom bunden till USA“, 20051014
http://www.apptdc.com/zixunwang/about.asp; 2005-10-22
government, if such an adjustment obtains, it would not primarily be based on the outside pressure, but more based on the condition of China’s economy, especially the stability of the financial sector. At the moment, certain improvements have already been made within the financial sector. More legible regulation and control is under discussion, and certain legislation is implemented regarding how much responsibility the banks should have. Government analyses claim that these improvements indicate the possibility of a new evaluation of the Chinese Yuan within the coming years.

4.3.1.6 Corruption

Previously, there was a brief discussion regarding the manipulation of economical reports and statistics and as to why it occurs in China. Below, this issue is extended to better understand its existence. As it is today, a large number of “bad loans” exists, which indirectly was due to the encouragement of investment by the Chinese government since the 80th.116 Loans at favourable rates and taxation rules were suppose to lift the Chinese economy. Along with the enormous economical expansion that has occurred during the last 10 years, there have also been many unprofitable investments117. During the economical reforms in the 1990th, many companies, especially state owned ones went in bankruptcy, mainly for the reason of the unfamiliar environment of a market economy. After having been a closed -and protected economy for so many years, they were simply unprepared for the new market competition. Many bad loans were also made because of the strong relationship between banks and companies (and other official organizations), that “friendly” loans were more prioritised than pure business. However, the Chinese government acknowledges the problems and they realize that by not dealing with these issues, they will disturb the economic goal of a “harmonic growth” in the long run118.

Naturally, this was one of the most difficult factors to estimate, mainly because of the sensitivity regarding the subject, and as to how correct the values really are. According to the international corruption index for the year 2005, China was allotted by 3.2 points, which gives

115 Ibid.
117 Zhangping, Sunming; “Comparing economical structure”; 1994
them a rank of 78 out of 159 countries\textsuperscript{119}. Compared to the year before, there was a slight improvement of 1\%\textsuperscript{120}. One can discuss whether these statistics reflect the reality but a conclusion can be made regarding the corruption’s effect on the stock market and the overall development.

4.3.2 Part two

In this part of the analysis, issues that are directly related to the stock exchange will be discussed. The focus is to elucidate the general condition of the stock exchange and to indicate the direction for its development, considering the present state in China.

4.3.2.1 The Chinese stock market

Compared to international standards, the Chinese stock exchange still is underdeveloped. There are two stock markets, in which one is situated in Shanghai, while the other is in Shenzhen.\textsuperscript{121} The primary companies that are situated on the Shanghai stock exchange are within traditional branches such as raw material production. On the Shenzhen stock exchange, relatively new and fast growing companies are situated such as branches within telecommunication and other high Tech orientated companies\textsuperscript{122}. There is also a secondary trade market on the Shenzhen stock exchange, which foremost is for security trading of the companies that are not listed on the main board. Further, there are mainly 4 types of securities that are tradable today.\textsuperscript{123} Besides the stock market, the bond market (including Government bonds and company bonds), option market and fund market are all relatively new. Especially company bond and different types of funds are newly developed within the last years.\textsuperscript{124} In general, the state of the whole stock exchange tends to be underdeveloped in question of at

\textsuperscript{119}http://www.transparency.org/policy_and_researvh/surveys_indices/gcb; 2005-12-5
\textsuperscript{120}Ibid.
\textsuperscript{121}http://www.hkex.com.hk/csm/highlight.asp?LangCode=en; 2005-12-16
http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-11-20
\textsuperscript{122}Ibid.
\textsuperscript{123}http://www.sse.com.cn; 2005-12-19
http://www.sse.org.cn; 2005-12-19
http://www.csrc.gov.cn; 2005-10-10
http://www.sse.org.cn; 2005-12-19
http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-11-20
least three areas: the inefficiency of the market, the shortage of experience and the incomprehensive market system.

4.3.2.2 Market inefficiency

In general, the development of the stock exchange for both Shenzhen and Shanghai has been tardy, even thought there were some degree of improvement. During the last years, the average market value for A -and B shares fell to the bottom on both markets. Compared to 2004, the index value of the “change year to date” showed a total lost for 2005 of approximately – 12.06 % in 2005\(^{125}\). For the time being, more than 70 % of the listed companies on the stock exchange are more or less directly controlled by the State. This means that a majority of the total number of shares are negotiable. Such a large amount of negotiable shares prevents the efficiency of price establishments, which should be one of the primary functions of a stock exchange market\(^{126}\). The inefficiency of the stock exchange is the basic reason for the negative general development on both markets.\(^{127}\)

To deal with the problem of market inefficiency, the Chinese commission of security carried out a transformation of 46 listed State-owned companies to make their shares available for market trade. 15 of those companies went through the whole process and finished the transformation. The majority of the companies that completed the process, showed a market value decrease between 10 % and 25% during the transformation\(^{128}\). However, in August 2005, the market value of these companies ended up at an average of 11 % to 29 % higher, mainly due to the reinvestments made by the State-owned companies and the reinvestments of the banks\(^{129}\). The transformation was appreciated as a success. In September 2005, 40 additional companies were announced as the second group of state-owned companies, which will begin with the transformation in 2006. Even though the stock market ended with a total

\(^{126}\) Ibid.
\(^{127}\) http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-11-20
\(^{128}\) Ibid.
lost, the market’s expectation was still around 17 % higher than 2004\textsuperscript{130}. The increased market expectation can be interpreted as a result of raised faith, caused by the positive effect of the reforms within the market.

However, this process demands a long period of time, before it is completed. Today, there are approximately 1400 listed companies that must go through the transformation. According to the current regulation, one is not allowed to sell more than 10 % of total owned shares within a period of three years.\textsuperscript{131} In practice, it means that one cannot count on any noticeable improvement for a long time ahead.

\textbf{4.3.2.3 The shortage of experience}

When studying the Chinese stock exchange, one must consider the environment, in which the market was developed. During the past years, the development of the Chinese stock exchange has been stuck between two basic ideas: the capitalism and the communism. For a long time, capitalism was seen as the negative opposite of the communistic idea, which was the one that the government chose to believe.\textsuperscript{132} At the same time, the government was in need to find a way to increase the standard of living. In practice, the only way to provide a fast growth was to introduce a market economy - based on the fundamental idea of capitalism. By accepting the “opposite”, the government would resist its own basic idea of existence. Under those conditions, a new direction was introduced under the slogan: “socialism by Chinese character”\textsuperscript{133}. Practically, the direction allowed them to introduce the market economy. Although the growth increased at high speed, a change in the basic ideology was not that obvious. By observing the Chinese stock markets, this fundamental problem is very clear. For those who are responsible for deciding the structure and regulation on the stock exchange today, it is important to consider the efficiency of a functional stock exchange and the chronic change in the ideology. Today, a challenge for the government is to provide a balance between those two factors, without any previous experience to compare with. Yet, the transformation of making the shares of state-owned companies tradable can be carefully

\textsuperscript{130} Appendix 6
\textsuperscript{131} http://www.apptdc.com/zixunwang/about.asp; 2005-09-30
\textsuperscript{132} Zhangping, Sunning; “comparing economical structure”; 1994
\textsuperscript{133} Ibid.
interpreted as an indication that the governing party is preparing to ease some of its present control. However, it is still too early to say whether the government is going to succeed.

4.3.2.4 The incomprehensive market system

The incomprehensive market system is the third problem, and it is closely related to the other two problems above. An important event in 2005 was the widespread audit of all existent stockbrokers. The results showed that more than half of stockbrokers did not perform any profit. Around one third were close to bankruptcy. According to current regulation, a stockbroker that is unprofitable three years in a row will lose their license. Since the rules regarding the bookkeeping transparency and other related issues for the moment are unclear, it creates an incentive for the stockbrokers with poor growth to manipulate their real performances. A negative effect is that too many “lemons” can make the honest companies leave, thus creating an inefficient stock exchange without any transparency.

This incomprehensive market system contributed to a slow development of the financial sector with the results of a total down fall in the whole financial market. However both WTO and the Chinese audit have brought the problem to light and since 2005, many of the unacceptable stockbrokers have been withdrawn from the market. Even so, many hinders still remain before a functional comprehensive stock market can arise.

4.3.2.5 The financial sector in need of more transparency

In an earlier section, the problem of transparency was discussed. A deeper discussion regarding this subject is now brought to light within the frames of the financial sector. During the last years, WTO, EU, and other international organizations have pressured China to deal with the lack of transparency. In 2005, the problem of transparency was one of the most highlighted questions in China, especially the discussions whether it is suitable to be fully open with government reports, such as corruption related research documents. Another question concerned the openness within the financial sector, first and foremost bank reports. It

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134 http://www.apptdc.com/zixunwang/about.asp; 2005-09-26
135 Ibid.
136 http://www.apptdc.com/zixunwang/about.asp; 2005-09-26
137 Ibid.
is clear that the public demand for more transparency, not only in economical reports but also other types of government reports, such as different statistical researches and studies, etc.\textsuperscript{138}

The financial reforms and the increased amount of foreign investments in Chinese banks and other financial organizations, is another reason to become more transparent. However, some domestic analyzers believe that transparency would lead to informational drain that might put China in to serious problems that lead to profitability loss.\textsuperscript{139} In this case, it is the fundamental idea of whether the transparency is a positive or a negative that is the problem. Obviously, from those analyzers’ points of view, transparency is negative. There are also others, who are more positively inclined as to the effects of transparency. However, they do not believe it to be suitable for the financial sector, as long as the financial reforms are in process. They also claim that some degree of transparency will appear, when stability within the financial sector is obtained\textsuperscript{140}. As one can see, there are still mixed opinions regarding this subject and for the time being, one can only await the results of this matter.

4.4 Measurements by the APT

This part is mainly focused on the transformation and measurements of the data that have been analysed in the earlier section. In this section, the measurement of data by using the APT model, and the technical approach by Quasi Monte Carlo Simulation are introduced.

4.4.2 The outcome of 2005

Based on the data for the relevant factors in 2005, the APT model is used to provide the value, and to measure the starting point of the forecast index. According to the calculation, the total return of the stock market is at –1\%.\textsuperscript{141} The negative value corresponds to the poor development on the market throughout the year\textsuperscript{142}.

\textsuperscript{138} Ibid.
\textsuperscript{139} http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-11-20
\textsuperscript{140} Ibid.
\textsuperscript{141} http://www.apptdc.com/zixunwang/about.asp; 2005-10-11
\textsuperscript{142} Ibid.

Appendix 6
4.4.3 Highlight - the driving forces

Based on the analysis in the previous sections, several driving forces were identified that are taken into consideration. When creating a forecast concerning the development of the stock exchange, changes within these driving forces are assumed to cause huge effects in the forecast. The common basis for the driving forces is the balance of the economical development. In other words, they are closely related to the goal of balanced economy.

4.4.3.1 The balance of the economical development

For the coming years, the Chinese economical growth is facing continuous pressure regarding the adjustments within many sectors. At the same time it also faces the pressure of abundance of the overall supply, caused by the overproduction since the last years. According to the “five years plan”, the focus for the following years is foremost directed to the change in the economical growth structure, the acceleration of the growth pace, continued industrialization and to upgrade consumption. To attain balance, the government must deal with following tasks according to the analysis in the earlier section:

4.4.3.1.1 The investment structure

The investment structure must be adjusted by accelerating the pace of investments within the industrial sector, to deal with the problem of overproduction within the industry. More investment must be made in terms of building up the society, especially in the rural area. Further, investments must increase to provide a healthier financial sector.

4.4.3.1.2 Equal standard of living

The focus is to provide a more equally standard of living, especially within the rural area. The gap between rich and poor is an urgent problem to deal with. This dose not only concerns the differences between the urban -and rural areas, it also concerns the gap between the more developed coast cities and the cities in the middle and in the northwest side of the country.

142 See earlier discussion: “Analysis -part one”
143 Ibid.
144 Ibid.
4.4.3.1.3 The financial sector

The whole financial sector is facing many restructuring changes. There are many areas waiting for improvement, including more legible allotments to the banks regarding their responsibilities, the regulation of the financial system, the taxation system regarding the financial sector, and streamlining the stock exchange\textsuperscript{145}.

4.4.3.1.4 Transparency

A higher degree of transparency is urgently needed to provide a more healthy development. It concerns not only the economical annual report from the government, companies as such, but also an overall attitude of openness. This is the only way to reduce the extensive problem of corruption. Moreover, the driving forces must be taken in consideration, when creating the scenarios, which provide a frame for the most possible index development.

4.4.4 Assumptions

For the following section, a few general assumptions have been made regarding the forecast. First, the authors have chosen to not considerate sensitive political issues, like the conflict between Taiwan and the main land of China. Since issues as such are highly complicated, and a negative development in this kind of problem might change the current overall condition. Further, the Chinese government has recently declared that, their focus is to provide economic stability, which means they would avoid any negative political development that might cost the success in economical growth.\textsuperscript{146} Based on those reasons above, those kinds of political issues are considerate as abnormal situation that will not be counted in the forecast.

Secondly, events as nature catastrophe or diseases that are as extensive as SARS are not treaded as a further factor of risk. Since the historical performance in the economy showed strong growth, despite those types of catastrophe, the authors considerate those as already included, without highlighting them as a separate section. In stead, the authors will perform

\textsuperscript{145} http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-11-20

http://www.apptdc.com/zixunwang/about.asp; 2005-10-12

http://www.swedishtrate.se/i_utlandet/landsrapporter/Kina.htm; 2005-11-20

\textsuperscript{146} http://business.sohu.com/s2005/2006jingji/; 2006-01-05
this study with the basic assumption that normal conditions will continue, according to the realization of the overall improvement within the highlighted areas that was discussed above.

4.4.5 Scenario added forecast

To create a forecast, two types of scenarios are added on the time line, which is divided in three periods: P1, P2 and P3\(^{147}\). The scenarios are first and foremost applied to facilitate a frame of the upper line and the bottom line for the most possible outcomes in the forecast, based on the overall assumptions above. Therefore, the scenarios do not work in detailed correlations, but only indicate the direction of the outcomes.

4.4.5.1 The first scenario: POS

In this scenario, the overall economic development is assumed to be at the most positive side. It means that the Chinese Government will succeed with a harmonic development, and that the goal of growth is obtained at the end of the forecast period.

The first period POS (2006-2008): from 2006, new investments will be made within the agricultural sector. According to the “five years plan”, the farmers are going to be able to make use of new favourable taxation rules, including the free taxation quotas. At the same time, the wages for the growing amount of middle class are expected to rise. Also, the new investments pace within the industry sector will slow down. These three factors are expected to increase the total purchasing power, which in turn will higher the total markets demand\(^{148}\). Further the problem of stocked products caused by overproduction during previous years can partly be reduced. On the other hand, growth within the service sector and tourism related sectors might increase tremendously, mostly due the OS arrangement in China 2008. As a result, the demand on RMB would rise, which in turn would lead to an upgrade of the RMB value by limitation. Also, it is fully possible that the RMB might be pegged to a basket of several currencies, which in turn will lead to decreased influence of USD. In addition, the GDP will continue at approximately the same pace as earlier. Further, according to the goal of economic growth, the inflation should be kept at +/- 3 %. The corruption investigations are only at the beginning of a long journey, and it is most possible that the corruption rank to ratio

\(^{147}\) See “Methodology”

will continue to decrease in the short term, because of more discovered cases. Also, the upgrades within the financial sector might show some degree of positive effect, such as an increased public confidence for the banks and stockbrokers.\textsuperscript{149}

**The second period POS (2009 – 2011):** The development will continue at the same positive direction as earlier and the GDP growth will slow down towards the economical goal of long-term growth. Further, the gap between the urban and rural areas will be smaller, and the consumption propensity will be even more upgraded. The ownership will shift within industrial sector, from state-owned to more private-owned companies. Increased transparency will lead to increased public trust for listed companies, which in turn will raise the expectations on the stock exchange. Investments within the financial sector from earlier period are going to provide improvement of supply in question of better service and more variable supply. This will lead to increased option for privet investors /savers to choose long term investment by funds, options or obligations, instead of saving by bank account. Increased transparency is going to facilitate the improvement of the stock exchange. The problem of corruption should be less, which results in rise of the corruption rank for China.\textsuperscript{150}

**The third period POS (2012-2014):** In overall, continuous positive development will lead the fulfilment of the goal of long-term growth and economic stability. Transparency, urbanization and privatisation will continue towards a positive direction. The improvements that were made during the last two periods have provided a relatively functional stock market.\textsuperscript{151}

4.4.5.2 The second scenario: NEG

According to the given assumptions, the worst possible scenario of the economical development will be presented. This means that the Chinese government will fail with the goal of a harmonic development.

**The first period NEG (2006 – 2008):** If the government fails with the restraining policy, i.e. restraining the industrial sector and the construction sector; fails with adjusting the problem of

\textsuperscript{149} See Appendix 7
\textsuperscript{150} Ibid
the social gap between urban rural areas; and fails with solving the lack of energy supply and other conflicts that contribute to the hindrance of a balanced development. The economy will remain overheated or simply create a crisis. Further, the growing gap between the rich and the poor will cause huge problems in the society. The production supply might cause a price war and many companies will face bankruptcy. The unsolved problem of corruption will probably become aggravated and new “bad loans” might appear to be able to finance those companies that are in danger of bankruptcy. In turn, the financial reform will be affected, and in the worst case, the reformation of the financial sector will be interrupted thus prolonging the process. Since the government has declared that no adjustments of the RMB will be carried out under the circumstance of unstable financial sector, the plan of adjusting the currency will be interrupted as well152.

The second period NEG (2009 – 2011): In a longer perspective the total growth will be disturbed and the situation of the above described factors will develop even worse. The overall uncertainty regarding the state of the economy will increase the pressure on the areas that have remained relatively poor. Because of the increased number of bankrupted companies, unemployment will rise which might lead to more criminality153.

The third period NEG (2012 – 1214): The vacancy of the oil is rapidly pushing the prices upwards. According to several researches, the oil supply will not be able to meet the demand, given the current speed of growth. Even at a lower growth rate, the oil price would be enough high that many industries would be negatively affected154. In return, the total industrial production would decrease. Generally, a negative spiral continues to develop, and the overall instability may aggravate the situation of corruption. The stock exchange may lose all its credibility and since the only thing that has kept the governing party at a strong position is the economical success, the political stability might be jeopardized as well155.

151 Ibid
152 Ibid
153 Ibid
154 Ibid
http://www.mkeever.com/china.html; 2005-11-29
155 Ibid
4.4.6 Forecast index – result

The APT added forecast is provided by a technical approach of the Quasi Monte Carlo simulation in MATLAB.\textsuperscript{156} The APT values are estimated as intervals, according to the scenarios in the earlier section. The index result is presented in two different ways. The detailed calculation and the simulation codes are presented in the Appendix.

4.4.6.1 Index One

In the first index, the Y-axle exhibits the values of the mean market return, in which the calculations of the market return are provided by using APT model. The X-axle indicates a time line, in which the estimated value for the end of 2005 is used as a starting point, which is exhibited in period 0. The rest of the time line (from 2006 to 2014) is divided in 3 periods.

The upper line (blue) is created by using estimated interval values, based on the “Best case” scenario (POS), while the bottom line (red) is created according to the estimated interval values, based on the “worst case” scenario. Further the middle line (green) indicates the results that contain a 95 % of possibility to occur, while the upper line and the bottom line together indicates the result that only have a 5% chance of occurring. In other words, for the

\textsuperscript{156} Appendix 8
first period, there is 95% of chance that the averaged return on the market will lay between 3% - 12%. For the second period, the mean market return is somewhere between 8% and 17%, while for the third period, the interval is between 9% and 19%. The increased distance of the periodic intervals depends first and foremost on the increased uncertainty, as time proceeds. For a more detailed forecast of the development, a second index is applied.

4.4.6.2 Index two

In this index, an interval of the return is presented for each year, in which the starting point is the end of 2005. By study this complementary index, it is not difficult to discover that the index development is characterized as a flight stair. It is also easy to discover, that the slope between every period is less steeped. Further the first slope between the start point and the first year of period one is the most remarkable. There are several explanations. First, the year of 2005 that was used as a start point showed a total market loose.\footnote{http://www.hkex.com.hk/CSM/indexMoveC.asp?LangCode=en&mkt=sh&StockCode=000002; 2005-12-28http://www.hkex.com.hk/CSM/indexMoveC.asp?LangCode=en&mkt=sh&StockCode=000003;2005-12-28} This was mostly caused by the extensive reforms, regarding the stockbrokers and the listed companies. Second, the first year in the first period – 2006, assumptions were made regarding the increased market
expectation and the improved system on the stock exchange. The negative value at the start point and the assumed positive development in the first period provided the first slope.

Looking at the other two sloops, by comparing each of them with the part of index line that shows the development one year before (2008-2009 compared with 2007-2008; 2013-2014 compared with 2011-2012), one can see that just right before the remarkable upwards movement alone the index, there is limited downwards movement. The explanation of those movements is based on the assumption that some sort of adjustment (regarding regulation improvement or other events, that occurs on the stock exchange market with the purpose of improving the market efficiency), will indicate a downwards movement in the short term because of the uncertainty that occurs. But in the long term it should lead to positive movement. Moreover, the second slope is not as steep as the first one, which also can be explained by the assumptions that has been made regarding the effect of changed circumstance forced by a reform. While the slope between the second and the third period, is much smoother. This can be explained regarding the positive effect of a more market steered stock exchange, caused by earlier improvement on the stock exchange, is beginning to appear.

Further, the index line characterizes of discreet movement. The reason to this type of movement is that the input values are assumed within intervals. In other words differentiations of the intervals occur at every change of a new interval.\textsuperscript{158} Also, the outcomes of one period are always related to the outcomes in the previous period.\textsuperscript{159}

\textsuperscript{158} Appendix 7
\textsuperscript{159} P. 47, Critical Review/Quasi Monte Carlo Simulation
5. Conclusions

The empirical analysis is mainly focused on finding an indication for the future development of the Chinese stock exchange. According to the result of the empirical analysis, whether the government will succeed in providing a general balanced development, which is the key event that will decide the direction of how the stock exchange will develop. Further, there are four factors (driving forces), which should be considered as the most affective issues, regarding the key event of balanced development. Those are:

1. **The investment structure:** Which must be adjusted to solve the problem of overproduction in the industry, while deficiency of investment within the agriculture sector and the urbanisation of rural area in the country.

2. **Equal standard of living:** This is an urgent problem to solve, since the poorness within the majority the whole population restricts the total purchase power. It also causes extensive problems in the society, which will only be more costly in the long-term.

3. **The financial sector:** improvement within the financial sector is also urgently needed, since it has come to a point, that without a functional financial sector, the success of previews economic growth will not be able to continue.

4. **Transparency:** the transparency in overall is important event, which not only affect the market expectation and degree of the public trust on the stock exchange; it is also the only tool that works against the extensive problem of corruption.

However, taking those issues in consideration, two opposite scenarios was provided. By using the scenarios as a frame and measurement by ATP applied Quasi Monte Carlo simulation, the most possible outcome of the forecast was provided. Hereby, the second question can be answered, regarding whether there is any indication on a continued development of the Chinese stock exchange to stay in parity with earlier development. According to the result of empirical analysis, the Chinese stock exchange is facing an enormous change by several extensive reforms. In the short term, those reforms are going to create a turbulent environment.
on the stock exchange. But in the long perspective, there is noticeable possibility that the reforms might drive the stock exchange forward into a functional market. A new direction has been settled, although there are many difficult challenges to expect. In conclusion, the reforms that has already been done, and that are going to occur; the goal of a “harmonic economy”; the strong will of improvement, along with the proved capacity of development, indicate that the Chinese stock exchange will not stay in parity with earlier development, but a healthier development that contains more positive surprises awaits
6. Discussion

Historically, the Chinese stock markets have had a slow development despite the economic boom period. The authors speculate that this is due to the reasons given above but changes are taking place as we speak. Even though the Chinese financial market still is a relatively closed system, money is flowing in the country. During the past, the increasing wealth from its successful export trade along with the limited supply of Chinese shares, amount several other reasons, made some of the share prices to rise to high levels. However, the regulation controlling the financial market is improving, thus hopefully increases induce to invest on the stock market for the foreigners. A proposal of putting A-shares and B-shares was discussed in the beginning of January 2006, if it comes through, it possibly will increase the influences of the private investors. Further, discussion regarding the ownership of the Chinese companies’ shares by foreign companies, as a resulted of Joint Venture has also been brought up. In the past, the foreign companies can not own more than 33 % of the total share amount. Discussion regarding the upwards adjustment of this perceptual rate might lead to increased openness against the foreign investors. In the long run, there is a slightly possibility that China will pass the United States regarding the stock markets, but not within ten years.

Politically, China has chosen a more diplomatic and constructive line, which indicates that China gradually is being recognised as a super power. So far, the world has experienced an impressive development as a result of the new attitude. However, they have a long way to go when it comes to the unbalance within the country. The access to WTO has put pressure on the China to begin with its transformation into a market economy, even thought the Chinese government mostly do not want to admit the influence from the outside word. Mover, it is necessary for them to make extensive adjustments in the strategy of the economical growth, and improvements regarding legislation are needed. While the privet companies are doing very well in general, the state owned companies need to adapt to the increased competition along with the increased openness.

Further, the authors believe that the past performance might only be the warming up of a great future success, if China manages to deal with all the problems that have been discussed. For the next ten years, improvement within the financial sector, including the stock exchange market will be one of the most important events that affect the future performance.
6.1 Critical reviews

In this section the authors criticize the methodological process and other aspects used in the study.

6.1.1 The Delphi method

When using interviews as a foundation within research, there are many factors that need to be considered. One has to be careful in the process of designing the questions to avoid any misunderstandings or misguiding the respondents. How one conceives a question is crucial for the whole study. Otherwise the whole investigation might be of no use. Further, one has to make sure that the interviewees have enough knowledge so that the answers do not become inaccurate or misleading for the researcher. The Delphi method does not help you find the right persons, nor does it foretell if the questions are well preformed. Another perspective one has to consider is the subjectivity. One has to keep in mind that it is the respondents’ personal opinions that one is dealing with. Hence, all the more reason to find the right person for an interview.

The authors found that the answers were somewhat uniform when second rounds of the interviews were accomplished. However one cannot be certain that it was the respondents who really believed in their changed opinions or if they simply did not want to feel that they had a different opinion. The embarrassment of being on the outside of what everyone else believes can have a negative effect.

The internal loss that the authors experienced can mainly be explained by the lack of time amongst some respondents. They were more willing to answer the questions that already had different alternatives to choose from than the ones that they had to justify themselves.

6.1.2 The reliability of the numerical data

Many discussions have been held that questions the reliability of the public statistics provided by the Chinese government. Unfortunately, the authors have enough reasons to believe that the official data that are used in the empirical measurement contains a certain degree of error. To make the problem clearer, there is a typical example. According to the statistics, the GDP growth was at 9.7% in the end of 2004. But this number was adjusted up to 16.8% in the end of 2005. According to their explanation, the enormous change in data was first and foremost
caused underestimated data within service sector, and the adjustment was made on many local levels. According to their own investigation, manipulation of financial report, and other types of reports was a common problem. However, since the fundamental idea in this study is to provide a forecast, which base on the historic development, a huge change within the historical data as such provides big amount of uncertainty in the outcomes, based on those data. Moreover, the government announcement expressed that also other data, which are considered in this study are going to be adjusted. Hence, the outcome of the measurement might contain more errors than one can imaging. However, the official data might continue to be unreliable, for a long time forewords. Therefore, it is necessary to go trough the research method applying new and more reliable data, within the nearest in the future.

6.1.3 APT application

Generally, the APT model is proved to be useful for all kinds of stock market. The discussion concerning the APT in this study is not pointed at the model its own, but the application of the model. In the chapter of theory, the model was compared to CAPM, and a conclusive factor that made APT more favorable than CAPM was the application of the macro economical factors that can be included. According one of the experts, several financial reports from Karolinska Institution (KI) showed that the relationship between macro economical factors and the stock market was very weak. If that is the case, it means that the reason of choosing the APT would be reduced, since the majority of those factors that have been worked up were macro economical factors. However, the authors do not agree the result of uncorrelated relation between the macro economical factors and the Chinese stock exchange for two reasons. First, that research result described the state of the relationship between the macro economical factors and the Chinese stock exchange for the present time, while this study concerns the 10 years forewords. Due to the historical development in overall, the Chinese market is shifting foreword to a more opened market economy. The authors believe that the stock exchange market that was newly developed is heading the same direction. Since the correlation between macro economic factors and the stock exchange within a market economy is clear. It is necessary to take those factors in consideration.

160 See p. 31 "Corruption"
Secondly, the correlation might be unclear on the surface. But they are indirectly related to each other by the common basis of the problematic in the management by governing party. Hence, the basic and unsolved dilemma between the fundamental ideology and the practical solution that is contradict. However the undeveloped financial sector including the stock exchange market and success the enormous growth are two opposite result of the same basic conflict. In other words, one comes to the end of the same root.

6.1.4 The Quasi Monte Carlo simulation

There are two flaws in the MC model. The first is the assumption that the stochastic variables follow the rectangular distribution (see file “y. m”). However the boundary values for the intervals are determined from psychological factors (the market expectation) as well as values obtained from the market. As such deviations from future real values, that this model will produce, will most likely arise from ill determined interval ranges as well as other factors outside the scope of the APT model.

The second is the assumption that the determined factors for the R value in one period (the simulated actual value) will make up the excepted values for the next period. The assumption is based on the fundamental idea, regarding the expectation is based on historical experience. As such the spread in probable values becomes increasingly large with time. The fact that the standard deviations only increases slightly in this simulation is probably a fact that there is a thicker region of equally probable values contained in roughly the same range. That is to say the point R value in period goes in some way towards an irregular hill.

In conclusion, since calculation was based on assumed values, the outcomes in the simulation might indicate manipulative results in certain degree.

6.2 Further research

When performing a futurology of the Chinese stock market, the authors found that the Governments control and lack of transparency of the market made it difficult to find some of the key information. The current political situation is a difficult task to comprehend and it seems as everything that does not concern politics and regulations is accomplished relatively.

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fast. Therefore a suggestion for further research is to come back to this study after 2014, to find out which of the studied factors that have changed the most, which of them has remained unsolved or not significantly regulated. As it is today, the country needs to open up more to the outside world before a legitimate stock market can be obtained. In this case a study of the political decisions and the Government’s control that affects the financial capital market would be of great interest.

Further, the authors also recommend researches that use the same methodology for short term analysis, with application of other macro economical factors than those that have been used in this research. Another interesting research area is the international political situations that affect the development in China. Such issues as “China - Taiwan conflicts”, “China - India competitions”, etc were not discussed in this study. But those are controversial problems that should be highlighted. An interesting question one can ask is whether those issues have any affection regarding development of the Chinese stock market. It is also necessary to considerate how different kinds of reform could be affecting the stock market and what result those would provide. In this case, one can create more detailed scenario that provides different kinds of suggestion. One possible scenario can be based on the question: “what are consequences, if the Chinese government decides to carry out a fusion of those two stock exchanges?” Another related question might be: “How dose the fusion affect the foreign investors/ the domestic private investors/ or the domestic state owned companies?”

More over, this study is mainly focused on the domestic stock exchange in general, without any detailed selection of type of listed companies or comparing their performance with other Chinese companies that are listed on international stock exchange, such as the so called “red chips”. For the further research, it might also be an option. During the last years, many Chinese internet companies such as “Sina”, “Sohu”, “e-long” has been appreciated as the most profitable ones on international stock exchange. A further research concerning why those types of companies succeeded, while the others failed during the last year might also be interesting.

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7. Appendix

7.1 appendix 1

An overview of the Chinese capital market

For the time being most investments take place through listed companies in Hong Kong. Only a small fraction of the companies listed on the domestic stock market in Shanghai (SHSE) and Shenzhen (SZSE) have the transparency and the quality that foreign investors demand. In addition, there are other unofficial markets for non-listed companies and shares that are sold outside the regular stock markets.¹⁶³

<table>
<thead>
<tr>
<th>Type of share</th>
<th>Description</th>
<th>Currency</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-shares</td>
<td>Shares from domestic mainland companies. Sold on SHSE or SZSE.</td>
<td>RMB</td>
<td>Chinese institutions and private investors.</td>
</tr>
<tr>
<td>B-shares</td>
<td>Shares from domestic mainland companies. Sold on SHSE or SZSE.</td>
<td>USD on SHSE, HKD on SZSE</td>
<td>Foreign -and domestic investors.</td>
</tr>
<tr>
<td>LP-shares</td>
<td>Cannot be bought on the stock markets. All listed companies have shares of this kind.</td>
<td>-</td>
<td>Local State-owned institutions with at least one private owner besides the Government.</td>
</tr>
<tr>
<td>Government owned shares</td>
<td>Cannot be bought on the stock markets. All listed companies have shares of this kind.</td>
<td>-</td>
<td>The Government.</td>
</tr>
<tr>
<td>H-shares</td>
<td>Shares from domestic mainland companies. Sold on the Hong Kong stock market</td>
<td></td>
<td>Everyone has access to these shares.</td>
</tr>
<tr>
<td>&quot;Red chips&quot;</td>
<td>Shares registered of Chinese companies abroad. Sold on the Hong Kong stock market</td>
<td></td>
<td>Everyone has access to these shares.</td>
</tr>
</tbody>
</table>

*Since 2003, foreign investors who count as a “Qualified Foreign Institutional Investor” (QFII) can buy A-shares on both public stock markets¹⁶⁴ But the amount is limited.

¹⁶³ Barck-Holst Cecilia; "Kinas kapitalmarknader-En studie av utvecklingen av Kinas kapitalmarknader i Shanghai och Shenzhen”, 2004
¹⁶⁴ ibid
7.2 Appendix 2

Important factors considered when valuating the stock market

**Stock exchange related factors**
- The most significant shareholders
- Bank system (underdeveloped or efficient)
- Identifying the most important industries and companies
- Stock evaluation (P/E-ratio and other stock related valuation techniques)
- Efficiency in the economical infrastructure
- Earnings per share (generally)
- The Stock Markets history, its development and current situation

**Macro economical Factors**
- Budget deficit
- Economic growth
- GDP
- FDI
- Inflation
- Government investments
- Etc.

**Political factors**
- Management of foreign dept
- Political stability
- Risks
- Governmental influence
- Corruption

**Legal factors**
- Financial regulation
- Foreign limitations
7.3 Appendix 3

Interview 1

-Identification of macro economic factors, which affect the development of the Chinese stock market. The authors also wanted to know more about who the experts were to increase the reliability. This interview was sent in two rounds until as many respondents as possible had come to similar conclusions.

Part one:
-Who are the experts?

Gender:
Man
Female

Age:
<20
20-30
31-40
41-50
51-60
> 60

Occupation:

Years of relevant experience:
<1
1-3
4-6
7-9
>10

Part two:

1) Which of the following indicators do you believe effect the development of the Chinese stock market the most?

Circle your answer and motivate briefly (max. five alternatives)

- GDP growth
- Change in export
- Change in import
- Change in Government investments
- Change in inflation (CPI)
- Change in prices (retail trade)
- Change in wages
- Change in Industrial production
- Change in Foreign Direct Investment (FDI)
- Change in foreign dept
- Change in RMB/US Dollar Exchange rate (to for example Euro)
- Change in unemployment
- Corruption
- Change in domestic R & D (innovative and technical advances)
- Change in investors’ influence (companies)
- Change in oil price
- Other

Results interview 1

This interview was sent to eight experts and the answering frequency was 100%.

Part one:

![Gender Pie Chart]

- Females: 38%
- Males: 62%

![Ages Pie Chart]

- 31-40: 13%
- 41-50: 25%
- 51-60: 62%
The factors that the respondents were most agreed upon were: GDP, Government Investments, Industrial production, Exchange rate RMB/US Dollar and Corruption. Only one believed CPI/Inflation to be an important factor. However, the authors chose to conclude this factor in the study since it is of great importance when calculating the index of a stock market.
7.4 Appendix 4

Interview 2

-Underlying information regarding the development of the Chinese stock market.

This interview was sent to ten people, the same previous eight but also two from the Chinese embassy. The interview was sent in two rounds until as many respondents as possible had come to similar conclusions.

1. According to the Government’s restraining policy, the present GDP of 9% should be decreased by 2-3% within three years. On a probability scale of one to five, where one is the least probability, how probable do you think it is that the Government will succeed?

2. If the Government were to succeed, how long do you think it would take to decrease the GDP?
   - < 1 year
   - 1-3 yrs
   - 4-6 yrs
   - 7-9 yrs
   - > 10 yrs
   - Do not know

3. How will the inflation develop for the following ten years under the condition that the Government will precede with its restraining policy?
   - It will probably decrease as an direct effect of the restraining policy
   - It will probably increase as an direct effect of the restraining policy
   - It will probably decrease in the long run
   - It will probably increase in the long run
   - The inflation will not be significantly affected by the Government’s restraining policy
   - Other answer

4. How will the Government’s investments develop within five years under the condition that the Government will precede with its restraining policy?
   - They will probably decrease as an direct effect of the restraining policy
5. How will the Government’s investments develop within ten years under the condition that the Government will precede with its restraining policy?
   - They will probably decrease as an direct effect of the restraining policy
   - They will probably increase as an direct effect of the restraining policy
   - They will probably continue at the same pace as they do today
   - They will probably decrease gradually
   - They will probably increase gradually
   - Other

6. How do you believe that the restraining policy will affect the economical growth in terms of trade? (Justify briefly in your own words)
   - In five years?
   - In ten years?

7. If China were to change the pegged RMB to Us Dollars into a more flexible, what do you believe would be the effects on the Chinese stock market? (Justify briefly in your own words)

8. According to you, what is the most hindrance for the development of the Chinese stock market? (Maximum three answers)
   - Corruption
   - Government control
   - Poor regulation
   - Poor transparency
   - The focus on economical growth
   - Other
9. If the Government succeeds with the ongoing restraining policy, how long do you believe it would take before they manage to retrieve a more stable development?

- < 2 yrs
- 2-4 yrs
- 4-6 yrs
- 6-8 yrs
- 8-10 yrs
- > 10 yrs
- Do not know

10. For the last 10 years, the companies within the private sector have experienced rapid growth. How will the restraining policy effect the small domestic companies’ economical growth for the following ten years?

- It will have no significant effect
- The economical growth will decrease
- The economical growth will increase, despite the restraining policy
- Other answer

11. With the same conditions as the previous question, how will the restraining policy effect the medium-large domestic companies’ economical growth for the following ten years?

- It will have no significant effect
- The economical growth will decrease
- The economical growth will increase, despite the restraining policy
- Other answer

12. With the same conditions as the previous question, how will the restraining policy effect the large domestic companies’ economical growth for the following ten years?

- It will have no significant effect
- The economical growth will decrease
- The economical growth will increase, despite the restraining policy
13. Which of the following industries do you believe have the greatest possibilities to develop most within five years? (Maximum three answers)

- Textile industry
- Steal industry
- Engineering industry
- Software industry
- Hardware industry
- Telecom industry
- Electronic industry
- Provision industry
- Automobile industry
- Cosmetic industry
- Plastic surgery industry
- Other

14. Which of the following industries do you believe have the greatest possibilities to develop most within ten years? (Maximum three answers)

- Textile industry
- Steal industry
- Engineering industry
- Software industry
- Hardware industry
- Telecom industry
- Electronic industry
- Provision industry
- Automobile industry
- Cosmetic industry
- Plastic surgery industry
- Other
Results interview 2

The answering frequency was 70 %, i.e. only seven responded. The internal loss was mainly due to those questions that demanded for a justification.

1. The majority of the respondents answered a possibility scale of three out of five that the Chinese Government would succeed with the restraining policy and thus lowering the GDP of 2-3 per cent. Two respondents answered a probability scale of one.
2. The majority of the respondents believed that if the Government were to succeed with the restraining policy, it would take between 1-3 years before the GDP decreased. Two answered that it would take 4-6 years.
3. The majority of the respondents believed the inflation to increase in the long-term regardless of the restraining policy. Only one respondent believed it to decrease in the longer run.
4. The majority of the respondents answered that the Government’s investments probably would increase gradually for the next five years. Two believed them to continue at the same pace.
5. The majority of the respondents answered that the Government’s investments probably would increase gradually for the next ten years, two believed them to decrease gradually.
6. The majority believed that there would be a trade surplus within the following five years, thus the economical growth would continue in a positive direction. Only one thought that China would import more than export due the restructuring of the infrastructure and the Olympic Games. However not all of the respondents answered the second question of a period of ten years. Two answered that they thought the trade surplus would have turned into a trade deficit. Two answered the opposite.
7. The answers were somewhat mixed as to how the effects on the Chinese stock market would be if the pegged RMB/US Dollar were to become even more flexible. Two believed that there would not be any significant effect; two believed that there would be no change at all until the exchange rate is fully convertible. Three did not answer.
8. On the question regarding the largest hindrance for the development of the Chinese stock market, the majority answered the three alternatives; corruption, the
Government’s control and the bad transparency. Two answered poor regulation and the unbalance within the society.

9. In the question of how long it would take for China to obtain a more stable development if they succeed with the restraining policy, the majority answered between 2–4 years. One answered 8-10 years and another did not know.

10. All of the respondents believed that the economical growth for the small domestic companies would increase throughout the period of ten years.

11. The majority answered that the economical growth for the medium-large companies would continue to increase. However two believed it to stay at the same pace. One believed it to decrease.

12. The majority answered that the economical growth for the large domestic companies would continue to increase. However two believed it to decrease.

13. The two last questions were directed to identify which industries that would have the greatest influence for the next five and ten years. For the period of five years the majority answered that the engineering industry, the provision industry and the cosmetic industry were the most important. One believed the textile industry to be of great importance as well and two the automobile industry.

14. For the period of ten years, the majority believed that the engineering industry would continue to be of importance, software industry and the electronic industry. Two thought the automobile industry would be of importance and one the telecom industry.
7.5 Appendix 5  
Interview 3

- A more profound analysis connected to the chosen intervals of how the chosen economical factors, found in interview one, might develop. This time only the eight respondents from the first interview were considered. It took the authors two rounds of interviews before a majority of opinions were obtained.

1. GDP Development  
For the time being the GDP of China is approximately 9.7%. How do you believe this will change until:

The end of 2008?

It will increase by:
< 1%  
1-2%  
2-4%  
> 4%

It will decrease by:
< 1%  
1-2%  
2-4%  
> 4%

From the end of 2009 to the end of 2011?

It will increase by:
< 1%  
1-2%  
2-4%  
> 4%
It will decrease by:
< 1%
1-2%
2-4%
> 4%

From the end of 2012 to the end of 2014?

It will increase by:
< 1%
1-2%
2-4%
> 4%

It will decrease by:
< 1%
1-2%
2-4%
> 4%

2. Inflation development

Presently, the inflation rate is approximately 3%. How do you believe this will change until:

The end of 2008?

It will increase by:
< 1%
1-2%
2-4%
> 4%

It will decrease by:
< 1%
From the end of 2009 to the end of 2011?

It will increase by:
< 1%
1-2%
2-4%
> 4%

It will decrease by:
< 1%
1-2%
2-4%
> 4%

From the end of 2012 to the end of 2014?

It will increase by:
< 1%
1-2%
2-4%
> 4%

It will decrease by:
< 1%
1-2%
2-4%
> 4%
3. Government investments
How much do you believe the percentage for Government investments will be until:

The end of 2008?
Approximately: _____

Between the end of 2009 and the end of 2011?
Approximately: _____

Between the end of 2012 and the end of 2014?
Approximately: _____

4. Industrial production
How much do you believe the percentage for industrial production will be until:

The end of 2008?
Approximately: _____

Between the end of 2009 and the end of 2011?
Approximately: _____

Between the end of 2012 and the end of 2014?
Approximately: _____

5. Corruption
Do you believe China will strengthen its regulation regarding the corruption within a period of ten years?
Yes
No
5a. Do you believe that the corruption will decrease within a period of ten years?

Yes

No
Result from interview 3
The answering frequency was 87.5% i.e. seven out of the eight respondents answered the interview questions. No internal loss exists.

1. The majority of the respondents believed the GDP to decrease by less than one per cent until the year 2008. Two thought that it would have increased by less than one per cent. Between the years 2009-2011, the majority believed the GDP would continue to decrease but still less than one per cent. One believed it to have decrease by 1-2 percent. The last period, however, the majority of the respondents thought it would have decreased by 1-2 per cent. One that it would have decreased less than one per cent.

2. The majority answered that the inflation would increase by 2008 to a level of two to four per cent. One believed it to increase by less than one per cent and a third that it would decrease by less than one per cent. Between the years 2009-2011, the majority believed the inflation rate to be as high as four per cent while one thought it would decrease by less one per cent. Between the period 2012 and 2015, the majority believed it to have decreased by less than one per cent. One believed it to have decreased by 1-2 per cent and another that it would have increased by 1-2 per cent.

3. Regarding the Government’s investments, there were some mixed answers. The majority believed them to have increased to a level between 24-27 per cent. Until the year 2008. The rest of the period it would remain at the approximately same levels.

4. The majority of the respondents believed the industrial production to obtain a level between 17-20 per cent and the rest of the period it would increase between 20-23 per cent and between the years 2012-2015 it would have increased to a level of 23-26 per cent. Two respondents thought that it would be a slightly weaker development.

5. All of the respondents believed the Government would have strengthened the regulation regarding corruption. All of the respondents thought that corruption would have decreased by the year 2015.
7.6 Appendix 6

APT calculations: 2005

The APT-model:

\[ R_{2005} = \bar{R}_{2005} + U_{2005} = \bar{R}_{2005} + \bar{M}_{2005} + \varepsilon_{2005} \]

The expected return: \( \bar{R}_{2005} \)

There are many companies included in this part of the calculation, and since the purpose of this study is to create a general forecast for the stock exchange market, and not to analyze any specific company per se. Therefore, it is more efficient to measure the expected return by using the average P/E ratio, for A and B shares in both stock exchange markets. The following table shows the calculation of the average P/E ratio for A and B shares for both stock exchange markets:\(^{165}\).

<table>
<thead>
<tr>
<th></th>
<th>Shanghai Stock Exchange</th>
<th>Shenzhen Stock Exchange</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A share</td>
<td>B share</td>
</tr>
<tr>
<td>Average P/E ratio</td>
<td>15.98</td>
<td>11.98</td>
</tr>
<tr>
<td>Total</td>
<td>(15.98+11.98+16.79+8.93)</td>
<td>53.68</td>
</tr>
<tr>
<td>Average P/E ratio on total</td>
<td>(53.68/4)</td>
<td>=13.42</td>
</tr>
</tbody>
</table>

The P/E ratio alone doesn’t say so much about the performance of the companies that offers A and B shares in those market. To make it more useful, it must be compared to its own historical data. In this case, the P/E ratio has been compared with the data from 2004:\(^{166}\):

<table>
<thead>
<tr>
<th></th>
<th>Shanghai Stock Exchange</th>
<th>Shenzhen Stock Exchange</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A share</td>
<td>B share</td>
</tr>
<tr>
<td>Average P/E ratio</td>
<td>24.59</td>
<td>21.19</td>
</tr>
<tr>
<td>Total</td>
<td>(24.59+21.19+0+0)</td>
<td>45.78</td>
</tr>
<tr>
<td>Average P/E ratio on total</td>
<td>(53.68/4)</td>
<td>=11.445</td>
</tr>
</tbody>
</table>

Compared with 2004, the average P/E ratio of both markets A and B shares went up from 11,445 to 13.42. In other words, it went up with approximately 17 % ((13.42-11.445)/11.445). Hence: \( R_{2005} = 17\% \)

---

Measurement of the systematic risk: $M$

The systematic risk $M$ includes five factors and it can be measured as following:

$$M = F_{GDP} \cdot \beta_{GDP} + F_{Inflation} \cdot \beta_{Inflation} + F_{Industrial\ Production} \cdot \beta_{Industrial\ Production}$$
$$+ F_{Government\ Investment} \cdot \beta_{Government\ Investment} + F_{Corruption} \cdot \beta_{Corruption}$$

In other words, the systematic risk in this study includes GDP, Inflation, industrial production, government investment and the corruption rank of position.\textsuperscript{167} These factors were commonly selected by the expert pane. Since it is practically almost impossible to find a beta-value for each factor, the average index beta (=1) has been implied:

<table>
<thead>
<tr>
<th>Factors</th>
<th>Expected growth</th>
<th>Actual growth</th>
<th>$\Delta$ factor</th>
<th>$\beta$</th>
<th>$\Delta$ factor $\cdot \beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>9 %</td>
<td>9.4%</td>
<td>+0.4</td>
<td>1</td>
<td>+0.4</td>
</tr>
<tr>
<td>Inflation</td>
<td>2.7 %</td>
<td>2 %</td>
<td>-0.7</td>
<td>1</td>
<td>-0.7</td>
</tr>
<tr>
<td>Industrial Production</td>
<td>17 %</td>
<td>20 %</td>
<td>+3</td>
<td>1</td>
<td>+3</td>
</tr>
<tr>
<td>Government investment</td>
<td>29%</td>
<td>25.3%</td>
<td>-3.7</td>
<td>1</td>
<td>-3.7</td>
</tr>
<tr>
<td>Corruption: rank of position</td>
<td>2%</td>
<td>1%</td>
<td>-1</td>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>RMB/USD</td>
<td>1%</td>
<td>-2.5%</td>
<td>-3.5</td>
<td>1</td>
<td>-3.5</td>
</tr>
</tbody>
</table>

$\Sigma = -6 \%$  

(5.5%)  

In summary the added value of the factors is: $M_{2005} = -6 \%$

Measurement of the unsystematic risk: $\varepsilon$

The unsystematic risk is closely related to the unexpected of informational announcement by a company. In this case, the value was found in the price index movement.

$$\varepsilon_{2005} = \frac{- (10.89\% + 20.69\% + 8.33\% + 8.35\%)}{4}$$
$$= -12 \% \text{ (12.065\%)}$$

The result of APT for 2005 is:

$$R_{2005} = \bar{R}_{2005} + M_{2005} + \varepsilon_{2005}$$
$$\approx 17 + (-6) + (-12)$$
$$\approx -1\%$$

\textsuperscript{166} Ibid
\textsuperscript{167} http://www.stats.gov.cn/index.htm; 2005-12-23
### 7.7 Appendix 7

**Intervals according to the scenarios**

<table>
<thead>
<tr>
<th>POS (estimated value in percent points)</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
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</thead>
<tbody>
<tr>
<td>P/E</td>
<td>10</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>GDP</td>
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<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Inflation</td>
<td>3.5</td>
<td>4</td>
<td>3</td>
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<tr>
<td>Industrial production</td>
<td>18</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>Government investment</td>
<td>24</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Corruption rank of position ratio</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>RMB/USD</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ε</td>
<td>10</td>
<td>12</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NEG (estimated value in percent points)</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
</tr>
</thead>
<tbody>
<tr>
<td>P/E</td>
<td>5</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>GDP</td>
<td>7</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Inflation</td>
<td>3.5</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>Industrial production</td>
<td>22</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>Government investment</td>
<td>20</td>
<td>21</td>
<td>20</td>
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<tr>
<td>Corruption rank of position ratio</td>
<td>0</td>
<td>-1</td>
<td>-2</td>
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<tr>
<td>RMB/USD</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ε</td>
<td>-10</td>
<td>-7</td>
<td>-5</td>
</tr>
</tbody>
</table>

---

See “Scenario one”; “Scenario two”
7.8 Appendix 8

Quasi Monte Carlo simulation

In this modelling scheme the main idea is to utilize the fact that the “R” values in the APT model is basically a sum of stochastic variables. As such, one can approximately determine an interval that each variable belongs to. Then one can simulate a "real" outcome by letting a random number determine the outcome of every such state. When applying the simulation, the authors have assumed that each outcome vary linearly in the random number range. This means that the probability for any number in the range of outcomes are equally probable in the predetermined range and is the reason why this is a quasi MC simulation\(^{169}\). After these stochastic variables have yielded outcomes, the “R” factor for the year (period) in question is calculated. All the calculated values that the “R” factor comprises of are then stored in order to be used as the expectations for the next year (the values from 2005 are used as starting values). This process is then repeated a large number of times to create the final standard deviations as well as the mean values for the period in question.

The simulation code

clear,clf
DAT=load('interval.dat');
[w,q]=size(DAT);
beta=[1 1 1 1 1 1];
N=10000;
R2005=-1;

for n=1:N
  prevyr=load('start.dat');
  for yr=1:9,
    per=ceil(yr/3);
    p=(per-1)*round(w/3)+1;
    for i=1:6
      if n~=N-1 && n~=N,
        s=rand;
        s2=rand;
      end
      \(\% i=0->PE \ i=1->gdp \ i=2->inflation \ i=3->ind.prod \)
      \(\% i=4->stat.invest \ i=5->corrupt \ i=6->rmb \ i=7->epsilon \)
      if n==N-1 & & n==N,
        s=round(w/3)+1;
        s2=round(w/3)+1;
      end
      \end
    end
  end
end

\(^{169}\) D.P. Landau and K. Binder, “Monte Carlo Simulations in statistical physics”
Christopher Z. Mooney, "Monte Carlo Simulation -Quantitative Applications in the Social Sciences”
Don L. McLeish, “Monte Carlo Simulation and Finance”
if n==N-1,  
    s=0;  
    s2=0;  
end  
if n==N,  
    s=1;  
    s2=1;  
end  
Ri=y(DAT(p+i,1),DAT(p+i,2),s);  
F(i)=Ri-prevyr(i);  
prevyr(i)=Ri;  
end  
Rb=y(DAT(p,1),DAT(p,2),s2);  
m=sum(F.*beta);  
ep=y(DAT(p+7,1),DAT(p+7,2),s2);  
R(yr,n)=Rb+m+ep;  
end  
end  
j=1;  
for i=1:9,  
    year(i)=2005+i;  
    Rm(i)=mean(R(i,(1:N-2)));  
    Rstd(i)=std(R(i,(1:N-2)));  
    if rem(i,3)==0,  
        Rm3(j)=mean((R(i-2,(1:N-2))+R(i-1,(1:N-2))+R(i,(1:N-2)))/3);  
        Rstd3(j)=std((R(i-2,(1:N-2))+R(i-1,(1:N-2))+R(i,(1:N-2)))/3);  
        Rg(j)=(R(i-2,N)+R(i-1,N)+R(i,N))/3;  
        Rb(j)=(R(i-2,N-1)+R(i-1,N-1)+R(i,N-1))/3;  
        j=j+1;  
    end  
end  
f(figure(1))  
errorbar([2005 2005;R2005 Rm],[0 0;Rstd],[0 0],'--g*'),hold on,xlabel('Years'),ylabel('R [%]')  
plot([2005 2005;R2005 R(:,N-1)],'--r')  
plot([2005 2005;R2005 R(:,N)],'--b')  
figure(2)  
errorbar(0:3,[R2005 Rm3],[0 Rstd3],[0 Rstd3],'--g*'),hold on,xlabel('Period'),ylabel('R [%]'),title('Quasi MC simulation with N_{trials}=10^4')  
plot(0:3,[R2005 Rb],'--r')  
plot(0:3,[R2005 Rg],'--b')
Complementary files

“Interval. dat”

<table>
<thead>
<tr>
<th>P1</th>
<th>P2</th>
<th>P3</th>
</tr>
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<td>7</td>
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<td>2</td>
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<td>2</td>
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<tr>
<td>-10</td>
<td>10</td>
<td>-7</td>
</tr>
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</table>

“Start. dat”

9.4
2
20
25.3
1
-2.5

“y.m”

function f=y(a,b,x)
  f=(b-a)*x+a;
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8.1 Literatures

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Veckans Affärer; nr. 38 2005; “Den nya Folkrepubliken Kina”

8.3 Internet addresses for articles and other data

http://www.affarsvarlden.se  http://www.indexmundi.com
http://www.content.se.etrade.com  http://www.ssc.fi
http://www.hkex.com