# An Empirical Study on Anomalies in China's Stock Market

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## An Empirical Study on Anomalies in China's Stock Market

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#### DECLARATION

"I certify that this work has not been accepted in substance for any degree, and is not concurrently being submitted for any degree other than that of the Degree of Doctor of Philosophy being studied at the University of Greenwich. I also declare that this work is the result of my own investigations except where otherwise identified by references and that I have not plagiarised another's work".

Signed by student: Date: 06-08-2007 Signed by supervisor:

Date: 08-08-2007

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#### ABSTRACT

This thesis conducts empirical studies on China's stock market using contemporary financial theories in order to explain the anomalies in China's stock market and then put forward some policy implications on the basis of the empirical research findings.

The thesis consists of seven chapters. In addition to providing a brief introduction to the relationship between stock market development and economic growth, Chapter 1 describes several anomalies occurring in the international stock markets and sets up a research framework for the thesis to further study. Chapter 2 is a literature review. It reviews major contemporary theories or hypotheses related to initial public offerings (IPOs) underpricing, long-run underperformance and asset pricing characteristics. Chapter 3 is a general description of China's stock market development, which offers an institutional background such as IPOs system and stock market structure. Chapters 4, 5 and 6 conduct empirical studies using data from China's stock market. In Chapter 4, using cross sectional regression, I examine whether short run underpricing exists in China's stock market and the validity of a series of theories used in explaining this phenomenon. In Chapter 5, based on standard event study methodology, I investigate whether long-run underperformance of IPOs exists in China's stock market, and to what extent. In Chapter 6, according to Fama-MacBeth approach, I build a univariant model to examine whether Capital Asset pricing Model and Fama-French Three-Factor Model hold in China's stock market, and to analyse empirically the asset pricing characteristics of China's stock market. Chapter 7, the last chapter, is the summary of the thesis. Some suggestions and policy implications are presented.

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### List of Abbreviations

AMEX	American Stock Exchange
B/M	Ratio of Book Value of Equity to Market Value of Equity
CAPM	The Capital Asset Pricing Model
CLRM	Classical Linear Regression Model
CSRC	China Securities Regulatory Commission
E/P	The Earnings-to-Price Ratio
FF3FM	Three-Factor Model invented by Fama and French
GDP	Gross Domestic Product
IPOs	Initial Public Offerings
NASDAQ	National Association of Securities Dealers Automated Quotations
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares
PBOC	The People's Bank of China
RMB	RenMinBi, the Legal Tender of China
SCOM	The Shanghai Composite Price Index
SOEs	State-owned Enterprises
SSE	The Shanghai Stock Exchange
STAQS	Securities Trading Automated Quotation System
SZSE	The Shenzhen Stock Exchange
ZCOM	The Shenzhen Composite Price Index

#### Chapter 1

#### Introduction

#### **1.1 Stock Market Development and Economic Growth**

In recent years an increasing amount of attention has been devoted to the connection between financial markets and economic development. It is widely accepted that financial development is positively related to economic growth. According to McKinnon (1973) and Shaw (1973), financial liberalisation and deepening such as the establishment and development of a competitive financial market can have a positive effect on its economic performance and growth. The World Bank, in its World Development Report 1989, also underlines the importance of domestic resource mobilisation and financial development, claiming that finance is the key to investment and hence to growth. New insights in growth theory and the theory of finance establishing a link between finance and development have spurred interest in this topic, as has the appearance of a large number of empirical studies which have demonstrated a clear positive correlation between financial indicators and economic growth. Greenwood and Smith (1997) show that large stock markets can lower the cost of mobilizing savings and thereby facilitate investment in the most productive technologies. Levine (1991) and Bencivenga, Smith and Starr (1996) argue that stock market liquidity – the ability to trade equity easily – is important for growth. Levine (1997) argues that stock market development is positively and robustly associated with long-run economic growth on the basis of their cross-country growth regression analysis.

China's efforts to reform its economic and financial system have unfolded contemporaneously with the increased attention that economists and policy-makers have paid to the roles that the stock market plays in promoting growth since the

economic reform started in 1979. Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) were established on the 26th of November 1990 and the 1st of July 1991 respectively. The establishment of two national exchanges marked a new era for China's stock market development, which builds up a new platform for Chinese state-owned enterprises (SOEs), to re-construct their ownership and get financed. Since then, more and more Chinese companies launch their initial public offerings (IPOs), either on the Shanghai Stock Exchange or the Shenzhen Stock Exchange. The establishment and development of China's stock market makes a great contribution to the Chinese economic model transition.

#### 1.2 IPO underpricing, long-run underperformance and CAPM

Since the 1980s, a record number of firms worldwide started to go public. Initial Public Offerings (IPOs) are the firm's first offerings of shares to the public for raising equity capital in the stock market. It is the first step for firms to be floated on stock markets. Ghosh (2006) presents that without the IPOs, the U. S. stock market boom of the 1990s would not have been sustained for such a long time and with such strengths to push the US stock prices to a historical high.

There are three anomaly phenomena associated with the process of IPOs in the stock markets. The best-known anomaly associated with the process of the IPOs is the IPO underpricing. The IPO underpricing, namely the large initial returns, which is measured from the offering price to the market price at the end of the first trading day. In 1963 the United States Securities and Exchange Commission first empirically found that there were positive average initial returns on companies going public. Logue (1973) and Ibbotson (1975) are among the first to use United States data to document this anomaly in their academic literature.

The anomaly has already been well documented and many different IPO underpricing hypotheses have been developed, but satisfactory explanations have not been found

yet. <sup>1</sup> Economists have still been haunted by these questions: Why the shares are "abnormally" discounted to the outside investors both systematically and statistically? Why would a firm willingly underprice its shares at the cost of limiting the equity capital received?

Other anomaly regarding Initial Public Offerings (IPOs) considered in my thesis is their poor long-run investment performance reported in Aggarwal and Rivoli (1990) and Ritter (1991). Aggarwal and Rivoli and Ritter examine the long-run performance of new issues in the US and report some degree of underperformance in the aftermarket. Various studies with international data generally suggest that the long-run underperformance of IPOs is a global phenomenon.

It might not be difficult to find that the long-run underperformance puzzle is related to not only the primary stock market but also the secondary stock. In fact, the IPO underpricing, the first puzzle we have mentioned, is also closely related to the secondary stock market as well. The underpricing phenomenon that happened in the primary stock market might be the result of overpricing in the secondary stock market, which gives us a very strong hint that we have to take the secondary stock market into account when trying to explain the above two puzzles.

Although it is a common perception that there is a positive relationship between expected return and risk – for instance, risky investment will generally yield higher returns than investments free of risk - it was only with the development of the Capital Asset Pricing Model (CAPM) that the trade-off between risk and expected return could be quantified. On the basis of research of Markowitz (1959), Sharpe (1964), Lintner (1965) and Mossin (1966) independently developed the standard form of the capital asset pricing model, which is often referred to as the Sharpe-Lintner-Mossin model or the standard CAPM. The essence of CAPM is that the expected return on any asset is a positive linear function of its beta and that beta is the only measure of risk needed to explain the cross-section of expected returns. The development of the CAPM can be regarded as a revolution in the field of finance. There is, of course, a

<sup>&</sup>lt;sup>1</sup> These relevant hypotheses, issues and literature will be discusses in details in Chapter 2.

huge amount of literature to examine if the CAPM is valid since the CAPM was developed. The early empirical tests such as the empirical findings of Fama and MacBeth (1973) focusing on the relationship between return and the beta confirm the CAPM's prediction that the higher the risk, the higher the return. With further studies, Fama and French (1992, 1993) find that beta cannot explain the difference in return between portfolios formed on the basis of the ratio of book value of equity to market value of equity. Fama and French (1993) then invent a famous three-factor model (FF3FM), arguing that many of the CAPM average-return anomalies can be captured by their model using three explanatory variables, the excess return on a broad market portfolio, the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB, small minus big); and the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (HML, high minus low).

As mentioned above, following Chinese economic reform in 1979, some Chinese scholars suggested that central government establish financial markets to solve some critical conflicts in the process of economic reform such as the conflict between ownership right and operating right, the conflict between state ownership and material incentive. China started its stock market experience in 1991. Though IPO underpricing, underperformance and CAPM have already been highlighted and studied for a very long time, unfortunately these topics have just been touched upon by Chinese scholars in the late of 1990s. Su (1998), jointly with Fleisher, might take a lead in exploring the IPO underpricing phenomenon in China's stock market. Their findings, though confirming that IPO underpricing did exist in China, were still rather astonishing: the mean IPO initial return was 948.59 percent, which was much higher compared to those that had been reported in other country studies, for instance, conducted by Loughran, Ritter and Rydqvist (1994). Their research results enlighten us to generate a hypothesis that the IPO underpricing might be caused by over-pricing in the secondary stock market due to high speculation and bubbles. Chinese scholars started their similar research in 1999. Mok and Hui (1998) argue that A-share IPOs underpricing level in Shanghai stock market is far higher than findings in other stock

markets, and explore that the so-called long-run underperformance exist in A-share and B-share stock markets in Shanghai by testing the speculative bubble hypothesis. In 1997, Chinese scholars, Liu Bo and Zhao Xiaoping (1997), took the lead in using the standard CAPM to do an empirical analysis on the relationship between returns and beta in China's stock market. It is quite understandable that their findings cannot point out a clear relationship between returns and beta due to the primitiveness of China's stock market. To the best of knowledge, using Fama and French three factor model (FF3FM) on China's stock market is still rare. Since then more Chinese scholars have started similar studies in this area, but generally speaking, comparing to similar studies for mature markets, the relevant studies for China's stock market are under-researched. The systematic research applying the latest theories of IPO underpricing, IPO underperformance and CAPM testing with China's stock market are rather important and timely. Since the establishment of Chinese stock exchanges, the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE), China's stock market has been an important avenue for the investment of funds and for the growth of the private sector since then. The evidence of anomalies and CAPM findings has a huge effect on the functioning of China's stock market and the cost of raising funds for individual Chinese firms. Accordingly, this study will contribute to the literature by examining the hitherto unexplored matter of the investment performance of the Chinese primary stock market and secondary stock market.

#### 1.3 Data and Methodology

#### 1.3.1. Sample Description and Data Collection

#### 1.3.1.1 Sample Description

Our sample firms are selected from the Shanghai and Shenzhen Stock Exchanges. These firms are the earliest listed companies in China and they have been listed so far. Due to different econometric methods employed in Chapter 4, Chapter 5 and Chapter 6, the sample data set has slight differences in these three chapters. The sample data set used in Chapter 4 contains 698 A-share firms going public and subsequently listed either on Shanghai or Shenzhen Stock Exchange during the sample period as of December 2000. In Chapter 5, the sample data set includes 237 A-share IPOs listed on Shanghai and Shenzhen Stock Exchanges during period 1997-2001. Finally, 237 A shares traded in China's stock market were selected as the sample data set in Chapter 6 from 1998 to 2002.

The IPO A-share issued before the end of 1993 and the IPO shares delisted during the sample period are not included in our sample data set. There are four reasons for this. The Shanghai Stock Exchange and Shenzhen Stock Exchange established in 1990 and 1991, respectively. During the period from 1991 to 1993, share price volatility in China's stock market was rather high. The data, especially the first day market closing prices prior to 1994 are full of speculative bubbles and cannot be used. The second reason is the reform of the Chinese accounting system. On July 1993, the new "Enterprise Accounting Standards" and "Enterprise Financial Accounting Principle" came into effect and brought the Chinese accounting practices closer to international standards. The third reason is the time limitation of portfolio benchmarks when various long-run performances of IPOs are measured and compared by different definition requirements. For instance, long-run returns involve long holding periods after the exclusive offering of the initial return period such as 1-year, 3-year and 5-year, so the sample firms in Chapters 5 and 6 are somewhat reduced. Final reason is the time lag in the publication of the annual reports.

#### 1.3.1.2 Data Collection

The data for Chapter 4 and Chapter 5 are mainly extracted from the Shanghai Stock Exchange Statistics Yearbook published by Shanghai People's Publishing House and the Shenzhen Stock Exchange Statistics Yearbook published by Chinese Finance Publishing House, and the prospectus and the annual financial reports of the sample firms. The data for Chapter 6 are retrieved from Datastream, an on-line financial database, which is a subsidiary of Primark Global Information Systems. Other data related to stock capitalization and book to market ratio are collected from the "Wind", a famous database in China. As for the data used in Chapter 1, Chapter 2, and Chapter 3, they are collected from the World Bank Database, the Statistical Information Centre of China Securities and Regulatory Commission, Finance China Database, Development Research Centre of the State Council of China, various years of China Statistical Yearbook, and relative websites.

#### 1.3.2. Methodology

In Chapter 4, Chapter 5 and Chapter 6, the single factor model and multi-factor model are set up to test if the hypotheses exist in China's stock market by using data from China's stock market. The factors adopted in the models are either documented in the literature or represent the special status of China's stock market. Finally we compare our findings with those from similar studies in the literature as well, and give explanations to China's stock market regarding those anomalies we investigated.

Going further, in the process of modelling, firstly, the method of Ordinary Least Squares (OLS) regression analysis and the method of robust regression analysis are applied to our empirical studies. These two analytic tools are supplementary. The OLS is one of the most powerful and popular approaches of regression analysis under certain assumptions of classical linear regression model (CLRM) and ideal data given, but, if the assumptions of CLRM are violated or the data is not ideal, using standard OLS in regression analysis will cause inefficiency of OLS estimators. If we ignore the presence of problems, some hypothesis testing based on the OLS may be highly misleading and result in erroneous conclusions. Robust regression method aims to achieve almost the efficiency of OLS with ideal data and substantially better-than-OLS efficiency in non-ideal situations such as non-normal errors or outliers. Robust regression encompasses a variety of different techniques, each with advantages and drawbacks for dealing with problematic data (Hamilton, 1998). In our study, the robust regression is used to overcome the weakness of OLS in regression analysis, at the same time, we will compare the results from both of methods.

Secondly, In order to conduct a successful empirical analysis, some remedial measures are adopted to correct the non-ideal cross-sectional data and time series data collected from China's stock market. Generally speaking, the cross-sectional data have the problem of heterogeneity because samples often contain outliers that lead to

a heteroscedasticity problem in the regression analysis. Time series data have a serial correlation problem and a non-stationary problem that causes spurious regression phenomenon in the regression analysis. Those problems result in inefficient OLS estimators in the regression model. Without solving these problems, empirical findings will be inconvincible and even totally unacceptable.

1.3.2.1 Dealing with the heteroscedasticity issue in regression analysis

In the regression analysis, because the cross-sectional data often contains outliers, the problem of heteroscedasticity is often more common in cross-sectional data by using OLS in regression analysis. The logarithmic transformation, as a very useful remedial measure, is adopted in our studies to avoid the presentation of the heteroscedasticity issue in regression analysis. The logarithmic transformation can compress the scales in which the variables are measured, thereby, reducing a tenfold difference between two values to a twofold difference, avoiding the presence of outliers in the samples (Gujarati, 1995). That is an important reason why we use the logarithmic transformation to transform the original data into ideal data to avoid heteroscedasticity.

1.3.2.2 Dealing with serial correlation issue in regression analysis

The first-difference method is widely applied to transform data for solving the problem of auto-correlation or serial correlation in our studies, because it is easy to perform. Just as the problem of hetero-scedascity is common in cross-sectional data, the problem of serial correlation or auto-correlation is also common in time series data. Under auto-correlation or serial correlation, the OLS estimators are also no longer minimum variance among all linear unbiased estimators or no longer efficient by using the standard OLS formulas in regression analysis, although they are unbiased.<sup>2</sup> The first-difference method is applied to transform data solving the problem in my study.

1.3.2.3 Dealing with spurious regression issue in regression analysis

<sup>&</sup>lt;sup>2</sup> Gujarati, Damodar, N., 1995, Basic Econometrics, Third Edition, McGraw-Hill International Editions, 408-409

It easily causes the problem of spurious regression by using non-stationary time series data to run regression analysis. The results from spurious regression may not reflect the true association between those variables. In particular, economic time series data often have strong trends of movement in the same direction, upward or downward. The presence of spurious regression brings on incorrect regression model, affects the accuracy of forecasting and misleads policy-makers. In practice, most economic time series data are non-stationary, such as stock price. In our study, the main data used in empirical analysis are monthly stock prices. So we directly use the methods of log transformation and difference transformation to avoid the presence of spurious regression model. It is worth adding that from an econometric point of view, the two methods of data transformation are applied to turn non-stationary data and remain its mean value and its variance not to vary systematically over time; from an economic point of view, the two methods are used to transform the stock prices into returns.

#### 1.4 The Objective of This Study

In addition to the description of the historic development of China's stock market, the primary market and the secondary market, there are three objectives of this study. The first one is to investigate if the underpricing anomaly exists in China's stock market and look for the explanations to this phenomenon. This study is going to relate IPO initial returns to variables either widely used in studies of IPO underpricing in literature or elaborately selected to take into account some special. factors, which might also have influences on IPO underpricing in China's stock market, hoping to make a valuable contribution to better understanding of IPOs' anomalies in China's stock market. The second objective is to examine and measure the extent of long-run underperformance of Chinese IPOs and then empirically test the validity of two hypotheses: the divergence of opinion hypothesis (Miller 1977) and the speculative bubble hypothesis (Tinic 1988, Shiller 1990). Both hypotheses are widely used to explain the long-run underperformance phenomenon in the stock markets. In short, we

empirically examine Chinese IPOs to provide one case of the international evidence on the long-run underperformance of IPOs. These two tests are conducted in China's primary stock market. Last, but not least, is to conduct quantitative analyses to assess the share pricing characteristics in China's secondary stock market. Models of the pricing of risk - the CAPM and FF3FM, augmented in standard ways - are employed to test hypotheses derived from the CAPM and FF3FM using data from China's stock market, with an idea that the results of CAPM and FF3FM testing could make a contribution to the explanation of IPO underpricing and long-run underperformance. At the same time, all of the findings in this dissertation are compared with those from similar studies in the literature respectively.

#### **1.5 The Structure of This Study**

The study comprises seven chapters.

Following the introduction, Chapter 2 is the literature review. It starts with a brief literature review on the relationship between stock market development and economic growth, followed by IPO underpricing, long-run underperformance, CAPM testing and application of Fama-French three-factor model which are all surveyed and reviewed. Moreover, relevant literature done by Chinese scholars is also included. This chapter acts as a theoretical foundation for the empirical studies carried out in the following three chapters.

Chapter 3 reviews China's stock market development, especially focusing on evolution of stock issuance and listing system, development of stock pricing and allocation mechanism, and lays a foundation for better understanding China's stock market, in particular some features differing from other stock markets in the world.

Chapter 4 discusses the IPO underpricing phenomenon in China's stock market. Firstly, major theories explaining this anomaly are expatiated, such as the Winner's Curse Hypothesis, the Signalling Hypothesis, the Ownership Dispersion Hypothesis, which are based on microeconomic uncertainty and information asymmetry. Then following a brief statement of China' stock market, the study integrates three hypotheses to test the existence of underpricing phenomenon, and reach the conclusion that IPO underpricing does exist in China' stock market, which is coincident with the literature.

Chapter 5 studies the long-run underperformance of IPO companies in China's stock market. Two hypotheses, the divergence of opinion hypothesis (Miller 1977) and the speculative bubble hypothesis (Tinic 1988, Shiller 1990) are presented to explain the phenomenon of the long-run underperformance of IPOs. Then the chapter carries out an empirical test to examine if the phenomenon exists on companies listing in China's stock market and if the hypotheses help to explain this phenomenon. Both of the answers are positive.

Chapter 6 empirically examines the validity of the Capital Asset Pricing Model (CAPM) and three-factor model (FF3FM) invented by Fama and French using data from China's stock market to give a better description of returns in China's stock market. Firstly, the CAPM and FF3FM are reviewed. Secondly, these two models and their modifications are used to analyse empirically the asset pricing characteristics of China's stock market from different aspects. Finally, conclusions are presented and some extra explanations of the CAPM and FF3FM tests in China's stock market are added. As an emerging stock market, it is still a long way for China's policy-makers to narrow the gap between China's stock market and developed stock markets.

Chapter 7, the last Chapter, presents the summary and conclusions of the dissertation and some suggestions are also put forward for the improvement of China's stock market on the basis of empirical findings achieved in Chapters 4, 5 and 6.

#### Chapter 2

#### Literature Review

Since 1980, thousands of firms started to go public to raise capital. Comment and Jarrell (1995) report that since 1979, more and more firms in the United States have been selling and spinning off divisions, reducing the importance of internal capital markets and increasing the importance of public capital markets. Over the same time period initial public offerings (IPOs) have reached record levels. Ritter and Welch (2002) describe that the number of companies going public in the United State exceeded one per business day from 1980 to 2001. There was also an incredible speed and scale of development on IPOs in emerging stock markets such as China's. In 1992, there were only 14 A shares listed on Shanghai Stock Exchange and Shenzhen Stock Exchange and total funds raised RMB 5 million. By the end of 2006, the A shares listed on SSE and SZSE had reached 1,293 and raised capital RMB 1,572.24 million.<sup>1</sup> Although the number of IPOs has varied from year to year in stock markets, it is very apparent that the initial public offerings (IPOs) have become an important channel for firms to raise capital for their growth.

IPOs' boom attracted lots of attention of researchers. There have been a large number of both theoretical and empirical studies on the IPOs and relative studies. In this Chapter, the review starts with a brief literature review on the relationship between stock market development and economic growth; part two provides the literature review on IPOs that concentrates on the decision to go public, underpricing of new issue and long-run underperformance, and finally, a review on the capital asset pricing model and its extension such as the three-factor model are given in Part three.

<sup>&</sup>lt;sup>1</sup> http://www.csrc.gov.cn/cn/statiinfo/index.jsp?

## 2.1 The Relationship between Stock Market Development and Economic Growth: literature review on the importance of stock market to economy

In recent years, there has been an expanding theoretical literature on the links between stock markets and economic growth. As early as 1976, Fama (1976) writes that an efficient capital market is an important component of a capitalist system. If the capital market is to function smoothly in allocating resources, prices of securities must be good indicators of value. Greenwood and Smith (1997) argue that the markets, especially financial markets, promote economic growth, and that growth in turn leads to the formation of the markets. Three points are summarised. Firstly, market formation is an endogenous process. Markets open when the economy is wealthy enough to support them. The cost of market formation will be reduced by market development which follows some period of real development. Secondly, financial markets enhance economic growth. Financial markets promote the allocation of capital to its highest return uses; provide liquidity; permit the efficient pooling of risk; change the composition of saving to boost capital accumulation and foster specialization in firm development and adoption of new technologies. Thirdly, the consequence of perfect competition in the markets formation is that it is perceived to be efficient by market participants.

Bencivenga, Smith and Starr (1995) present a model where the employment of long-gestation capital production technologies requires the existence of supporting financial markets. In their model, these capital production technologies have different gestation periods for converting current output into future capital, where longer gestation technologies enjoy greater returns. Investors, however, do not wish to lose control of their savings for very long periods. Thus, long gestation production technologies require that ownership be transferred throughout the life of the production process in secondary capital markets. The transfer of ownership is costly, and long gestation capital production technologies will therefore be less attractive. So the liquidity, as measured by transactions costs of financial markets, affects the set of technologies in use and the equilibrium rate of growth of economy. Reductions in transactions costs always induce a shift to longer-gestation, higher-return capital production technologies, and such reductions can raise high returns on savings.

These effects are conducive to higher rate of growth. But an increase in liquidity of the stock market can also cause a shift in the composition of saving away from the initiation of new capital investment and towards the purchase of existing capital-in-process (CIP) in secondary capital markets. When this effect is large enough, which requires an alteration in the equilibrium choice of investment technologies, improvement in the liquidity of stock markets will be growth reducing. On the contrary, if a sufficiently large reduction in transactions costs leads to the use of longer gestation capital investments of sufficiently greater productivity, then capital market improvements are growth enhancing.

Atje and Jovanovic (1993) present a cross-country study of stock markets and economic growth and they find a significant correlation between economic growth and the value of stock market trading relative to GDP for 39 countries over the period 1980-1988. Their model was initially estimated by OLS with lagged or initial variables under the assumption that both investment and stock market activity are endogenous. In their samples of 39 countries they find that lagged investment is not significant, but that the product of investment with initial stock market activity is, and conclude that stock markets do indeed increase the rate of return on investment, and therefore induce economic growth.

Demirguc-Kunt and Levine (1993) construct and compare a broader collection of stock market development indicators which are total market capitalization divided by GDP; total value traded divided by GDP; the turnover ratio; asset pricing indicators and dummy variables of institutional indicators based on the information provided in the feedback, for many countries, to explore the interactions between stock market development and financial intermediary development. They find that the relationship between the development of stock markets and the functioning of financial intermediaries may be complementary.

Demirguc-Kunt and Levine (1996) collect and analyse an array of stock market

development indicators, including stock market size, market liquidity, turnover ratio, market concentration, market volatility, the degree of market integration and institutional indicators, using data on 41 countries from 1986 to 1993, to provide a positive relationship between stock market development and economic development. Their findings are supported by Levine and Zervos (1996, 1998). In a series of papers, Levine and Zervos (1996) employ pooled cross-country, time-series regressions to evaluate the relationship between stock market development and economic growth, using data on 41 countries over the period 1976-1993. They find that stock market development is positively associated with economic growth.

Once again, Levine and Zervos (1998) provide a strong, positive link between stock markets and long-run economic growth by using data on 47 countries from 1976 through 1993. They present measures of stock market and banking development and economic growth indicators to empirically investigate the relationship between stock markets, banks and economic growth. They find that stock market liquidity and banking development are both positively and robustly correlated with the rates of economic growth, capital accumulation, and productivity growth when entered together in regressions, even after controlling for economic and political factors. Their results are consistent with the views that financial markets, especially stock markets, provide important services for economic growth, and that stock markets provide different services from banks.

Similarly, Rajan and Zingales (1998) develop a new methodology to investigate whether financial sector development has an influence on industrial growth. Under the assumption that capital markets in the United States, especially for the large listed firms they analyse, are relatively frictionless, they argue that financial development facilitates economic growth, specifically, industries that rely heavily on external finance develop disproportionately faster in countries with better developed financial markets in a large sample of countries over the 1980's. Beck, Demirguc-Kunt, Laeven and Levine (2005) extend the Rajan and Zingales (1998) methodology, and further confirm that stock market development fosters aggregate economic growth.

Though some economists still cast doubts on the positive links between stock market

development and economic growth, generally speaking, it is widely, though gradually, accepted that stock markets are positively related to economic growth with the increasing evidence, either theoretical reasoning or empirical findings. The roles that stock markets play in promoting economic growth have been recognised.<sup>2</sup>

#### 2.2 The Initial Public Offerings (IPOs)

#### 2.2.1 Theoretical Explanations of Going Public Decision

The finance literatures suggest that stock markets serve important functions even in those economies in which there already exists a well developed banking sector. This is because equity financing and debt financing are in general not perfect substitutes, in other words, they have different attributes. The firms can choose different ways to fund capital for their development according to their preference. Going public has been frequently used since 1980.

Why do firms go public? The decision to go public perhaps is one of the most important and least studied questions in corporate finance. There has been some research to address the going public decision. Basically, according to Subrahmanyam and Titman (1999), the literature on the decision to go public is roughly classified by three viewpoints, the role of information, corporate control rights and others.

2.2.1.1 Focusing on the Role of Information

Lucas and McDonald (1990) present an information-theoretic, infinite horizon model to explain a large number of facts about price behaviour around equity issues and the timing of those issues. In their model, there are two assumptions: one is infinitely lived firms; the other is short-term information asymmetries between managers and outside investors. The managers have information about the firms today, but the outside investors will not obtain that information from the market until the next period.

 $<sup>^2</sup>$  For instance, Lucas (1988) stated that economists "badly over-stress" the role of the financial system. The empirical evidence also shows that crisis-like developments in the financial markets has occurred with increasing frequency in recent years, and that such phenomena at least temporarily limit the scope for economic development. The East Asian financial crisis is the latest and most severe example.

The firms are undervalued if the revelation of this information causes the price to rise. The firms postpone their equity issue until the undervaluation is corrected. They also explain the fact that equity issues tend to follow a general increase in the market. If in a bear market, the firms will delay their issuing to wait for a coming bull market, because the firms expect an increase in their equity price.

Chemmanur and Fughieri (1999) develop a rigorous theoretical analysis of the going public decision of a firm. Under the assumption of asymmetric information, the entrepreneur has private information about his firm's value, but outside investors can reduce this informational disadvantage by evaluating the firm at a cost. The equilibrium timing of the going public decision is determined by the firm's trade-off between minimizing the duplication in information production by outsider investors and avoiding the risk-premium demanded by venture capitalists. Thus, they show that, in equilibrium, firms go public only when a sufficient amount of information about the firms has accumulated in the public domain, because the longer track records about firms can reduce the cost of information acquisition for outside investors. Conversely, the firms will be private at an earlier stage in their lives.

Subrahmanyam and Titman (1999) argue that the information aspects of the going public decision also explore the issue that there is a so-called snowballing effect resulting from the positive interaction between going public and development of the financial market.

They show that if costly information is diverse and cheap to investors, and if valuable information is freely available to investors, the firm chooses to go public; it remains private if the investors have to incur significant costs to obtain the information. They also point out that there is a positive interaction between going public and the size of stock markets. When the stock market grows, more stocks are publicly traded, the information conveyed by the share price generally improves, it is more attractive for individuals to become stock markets' investors, these additional active investors improve the capital allocation process, making it more attractive for additional firms to go public.

Maksimovic and Pichler (2001) argue that the firm's IPO conveys valuable

information to the competitors in the product market. They analyse how both technological and competitive risks affect the timing of private and initial public offerings in an emerging industry. The timing of the choice of financing depends on three factors: the public perception that the industry is viable, the prior probability that a superior technology will appear and the initial cost of research and development that must be paid by new entrants.

#### 2.2.1.2 Focusing on the Corporate Control Rights

Zingales (1995) provides a new framework to analyse the decision of a firm to go public. His paper focuses on the role of an initial public offering in maximising the proceeds an initial owner obtains by eventually selling his firm, and argues the decision to go public is affected by corporate control. Zingales also explains that the separation of control rights and cash flow rights can raise the proceeds. By selling cash flow rights to dispersed shareholders, the initial owner maximises his proceeds from the sale of cash flow rights. By directly bargaining with a potential buyer, the initial owner maximises his proceeds from the sale of control rights. The model suggests that when the potential buyer is expected to increase the value of cash flow rights, then the initial owner can use an IPO to extract a portion of surplus, without bargaining with the buyer. What fraction of corporate control rights to retain is a very important issue to the initial owner. Finally, his model provides implications on the strategy to be followed in selling a firm as well as on the timing of IPOs and going private transactions.

Pagano, Panetta and Zingales (1998) address the issue that the change in the structure of ownership and in controlling shareholder can provide important insights into the motives to go public. Their empirical study shows that diversification of controlling shareholders' portfolio and the reduction of the risk of the controlling group's holdings are the motivation of IPOs. The finding is consistent with Zingales (1995); the transfer of corporate control as a key factor affects the decision to go public.

Mello and Parsons (1998) highlight the fact that going public is a complex process with distinct markets for dispersed shares and controlling blocks. An optimal strategy is set up for going public. IPO is a first step for going public and particularly suited to the sale of dispersed shares to small and passive investors; the sale of controlling blocks to active investors should occur subsequently. They also develop a framework for evaluating alternative methods of sale and show that discriminating in favour of active investors can raise the market value of the firm for all shareholders and assure an efficient ownership structure.

#### 2.2.1.3 Other Viewpoints about the Decision to Go Public

Pagano (1993) provides a model of the effect of opportunities for diversification on entrepreneurs' portfolio choices. He argues that diversification is an important motive in the decision to go public. In an economy in which equity markets are imperfect, the entrepreneurs face costs of diversifying their portfolios. The costs of diversification may induce the entrepreneurs to avoid the use of equity markets. The entrepreneurs undertake to go public when they face borrowing constraints and lack liquidity.

Lerner (1994) focuses on a single US industry, biotechnology, using a sample of 350 firms from 1978 to 1992, to examine the timing of initial public offerings and private financings. His study shows that industry market-to-book ratios have a substantial effect on the decision to go public rather than to acquire additional venture capital financing. These firms go public when equity valuations are high, or to employ private financing.

Schultz and Zaman (2001) report that many internet firms went public in the late 1990s, and provide two explanations to explain why those firms went public so early. The first explanation is to take advantage of irrationally high price for internet shares. The second explanation is to establish market share and take advantage of economies of scale because internet business has tremendous potential. They also examine the behaviour of individuals closest to internet firms such as firm managers, underwriters, and venture capitalists, to explore their motives for going public. The managers of internet firms sell fewer shares from their personal holding in IPOs than managers of other firms do; venture capitalists are more likely to be involved in internet IPOs than others; underwriters with the most valuable reputation are more likely to underwrite internet IPOs than IPOs of other firms.

The decision to go public is very complicated. It is hard to explain it clearly with a

single model or a single viewpoint. Pagano, Panetta and Zingales (1998) summarise the costs and benefits of going public from many models.

The costs of going public include: i) Adverse selection. The asymmetric information exists in the process of going public, and hence adversely affects the average quality of the firms going public. All investors should be treated equally, although some investors have information about the firms. Thus the share price can be discounted to investors. This adverse selection cost usually happens to young or small listing firms because they have little track record and low visibility as highlighted by Chemmanur and Fulghieri (1999). This adverse selection cost should be positively related to the age and size of the firms; ii) Administrative expense and fees. Like Ritter (1987) analysis, these are direct costs, including underwriting fees, registration fees, auditing fees, certification fees, dissemination of accounting information fees, and stock exchange fees, etc. these direct costs should be positively correlated to the size of firms and, iii) Loss of confidentiality. The listing firms face the disclosure of information about firms to all investors according to the rules of stock exchanges.

The benefits of going public include: i) Overcoming borrowing constraints. The best benefit of go public is to obtain access to a source of finance other than the bank. In general, the firm goes public when it cannot fund capital at very favourable terms from other financing source. ii) Greater bargaining power with bank. When the firm faces higher interest rates and a more concentrated credit source, it is more likely to go public. By gaining access to stock markets and disclosing information to investors, the firm brings competition to its lenders and obtains cheaper credit. iii) Liquidity and portfolio diversification. Going public provides the owners with opportunities to diversify their portfolio and share risk with other investors, as in Pagano (1993), in the meantime, the firm can reinvest in other assets, optimize its ownership structure, and raise fresh equity capital by going public. Other benefits such as monitoring, investors' recognition, change of control and windows of opportunity are also included.

#### 2.2.2. The IPO Underpricing

Underpricing of IPOs is the best-known anomaly associated with the process of going public, namely large initial return, which is measured from the offering price to the closing price at the end of the first trading day after the IPO. This phenomenon is well documented in a large number of finance literatures. In 1963, the U.S. Securities and Exchange Commission first empirically found that there was a positive average initial return on firms going public. This discovery was based on casual observation and no explanations were offered, but academic studies followed. Logue (1973) and Ibbotson (1975) are among the first to use US data to document this anomaly in academic literature. Ibbotson (1975) tested a sample of 120 IPOs from 1960 to 1969, finding that the distribution of initial return was highly skewed, with a positive mean and a median near zero. Thereafter, numerous further studies have confirmed the underpricing anomaly. For instance, Ibbotson, Sindelar and Ritter (1994) report that for 2,439 US IPOs in 1975–1984, the average initial return on IPOs with an offering price of less than US\$3.00 is 42.8 percent whereas the average initial return on IPOs with an offering price of US\$3.00 or more is only 8.6 percent. Aggarwal, Leal, and Hernandez (1993) report 78.5 percent, 16.3 percent, and 33.0 percent average initial returns on IPOs in Brazil, Chile, and Mexico, respectively. Dawson (1987) reports a 17.6 percent initial return for the IPOs in Hong Kong, and Kim, Krinsky, and Lee (1991) find an initial return of 79.0 percent for the Korean IPOs. Rydqvist (1993) reports a 12.0 percent initial return on IPOs in Sweden. Those empirical studies not only confirm the existence of the underpricing anomaly but also argue that this anomaly is a common phenomenon both in the developed stock markets and in the emerging stock markets, although the degree of underpricing varies from country to country. Various empirical findings on short-run underpricing called for a great deal of theoretical study to explain the puzzling phenomena and to postulate new hypotheses, otherwise, these theoretical studies in turn motivated further empirical studies that tested the new implications.

A number of IPO underpricing hypotheses have been developed for this anomaly phenomenon, focusing on various aspects of the relationships between investors, issuers, and underwriters taking the firms public. Here, based on Ritter and Welch (2002), these hypotheses are characterised on the basis of asymmetric information assumption.

#### 2.2.2.1 Hypotheses Based on Asymmetric Information

Many of the hypotheses of underpricing are based on assumption of asymmetric information. Leland and Pyle (1977) argue that the asymmetric information affects substantially capital structure and financial equilibrium. A simple model of a one-short equity offering based on asymmetric information is developed in their study, where risk-adverse insiders who are seeking funds have private information about their firm's true value or quality, but insiders have no way to convey private information directly to other potential shareholders. In such a setting, insiders' willingness to invest in his firm can serve as a signal of firm's quality. In fact, the signal that is taken by potential shareholders as a signal of the true value or quality of a firm is a fraction of equity in the firm that is retained by the insiders. Usually insiders of better types of firms signal true firm value or quality to the market by retaining a larger fraction of their firm's equity than the poorer type firm. The value of the firm increases with the fraction of firm's equity held by the insiders. Signalling incurs costs by inducing insiders to retain a larger fraction of their firm's equity than they would if information could be directly transferred. Such signalling equilibrium exists because, for better type firms, the costs of retaining a larger fraction of the firm's equity by the insiders is lower than the costs caused by the insiders before offering, for holding an optimal portfolio from purely risk-sharing considerations. The resulting equilibrium differs importantly from models that ignore informational asymmetries. On the basis of Leland and Pyle's research, several contemporary hypotheses trying to explain IPOs underpricing are developed

2.2.2.1.1 Winner's Curse Hypothesis

One of the famous hypotheses for the underpricing of IPOs is the "Winner's Curse" explanation introduced by Rock (1986).

Rock (1986) presents an adverse selection model, incorporating the information asymmetry and rationing to explain the underpricing anomaly. In a firm commitment

offering, a fixed number of shares are offered at a fixed price, rationing will occur if the offer is oversubscribed. In general, rationing occurs when good shares are offered to the public; it will make some uninformed investors worse off. But the rationing does not lead to underpricing. Rock divides investors into two groups: the informed investors who have the best knowledge of the market price of the shares being sold and uninformed investors. The informed investors will crowd the uninformed investors out of the share offer, or the uninformed investors will be allocated only a fraction of shares if the shares are underpriced, on the other hand, informed investors will withdraw from the share offer, the uninformed investors will "win" the entire shares if the shares are overpriced. The partial allocation of shares produces an adverse selection problem. To induce a sufficient number of uninformed investors to the IPO market, therefore, the shares must be priced at a discount to overcome the bias of allocation. So, underpricing of IPOs is the compensation to uninformed investors to the IPO market.

An implication of Rock's model is that riskier issues should be underpriced to a greater extent than has been proved by Beatty and Ritter (1986). Beatty and Ritter (1986) develop and test two propositions. One is that there is an equilibrium relationship between the expected underpricing of IPO and ex ante uncertainty about per share value. Rock's model (1986) is employed in their study to prove that the greater the ex ante uncertainty, the greater the underpricing. The other is that this underpricing equilibrium is enforced by the investment banking industry. An investment banker who "cheats" on this underpricing equilibrium will lose its clients. If, on average, the new shares are not underpriced enough, the average initial return will be too low, and potential investors will face the winner's curse. They will cease doing business with this underwriter; on the other hand, if the new shares are underpriced too much, so that the average initial return is too high, the issuers will cease employing this underwriter.

A direct test of Rock's model is provided by Koh and Walter (1989), using data from Singapore. Their empirical results are consistent with the major empirical implications

of Rock's theory. The winner's curse is strongly evident in the Singapore market and hence rationing of new issues is used due to the underpricing anomaly. Lee, Taylor and Walter (1996) provide further evidence on the pricing of IPOs in Singapore, using data from 1973 to 1992. Their results are consistent with the implications of Rock's model (1986). The initial return is positively related to the oversubscription and retained ownership. Rationing can explain underpricing which was supported by Koh and Walter (1989). The winner's curse is strongly evident, and the informed investors crowd uninformed investors out when new shares are underpriced. But with retained ownership as a signalling role, as suggested by Leland and Pyle (1977), this variable is not powerful.

Chowdhry and Sherman (1996) develop a model to show that the strategic allocation of shares in IPO can reduce the winner's curse problem faced by investors. Usually the policy for allocating shares is that the issuers in many countries tend to favour small over large investors which is suggested by Rock (1986), because favouring small investors increases the issuers' expected revenue. Chowdhry and Sherman argue that different IPO methods may affect the adverse selection problem, and the level of underpricing by comparing US firm commitment and U.K. open offer for sale IPO methods. In the UK-style system, the underwriters are given less freedom, less discretion in the allocation of shares than underwriters in the US. Thus, the UK method would cause a greater underpricing, which may be reduced by the policy of favouring small investors whereas the US method has potential to reduce the level of underpricing.

2.2.2.1.2 The Costly Information Acquisition Hypothesis

The investment bankers induce investors to reveal favourable information during the pre-sell period. The favourable information investors reveal is used by underwriters to price new shares and allocate shares to investors according so called indications of interest. This argument was developed by Benveniste and Spindt (1989).

Benveniste and Spindt (1989) analyse the underwriters' IPO marketing process and show how to use information from investors to price and allocate new issues. They argue that the underwriters can reduce IPO underpricing by using their access to investors to collect information. The IPO marketing process is constructed as an auction, conducted by underwriters. By choosing suitable rules relating the offer price and the share allocation to the investors' indications of interest, underwriters induce the investors to disclose positive information. The new shares' offering price must be set low to make a profit to compensate investors for disclosure of the positive information. Underpricing is a result of a pre-market auction. To investors, underpricing is compensation for disclosing good information to underwriters; to underwriters and issuers, the underpricing is the cost for obtaining indications of interest from investors. They also find that the issuers' desire to gain maximum proceeds affects the type of underwriting contract chosen. Under a firm commitment contract, underwriters are given more discretion, if ex ante price uncertainty is great, underwriters' incentive is to pre-sell the whole offering, which promotes the level of underpricing. So, if firms face a high price uncertainty, a best-efforts underwriting contract is a good choice.

Hanley and Wilhelm (1995) analyse a sample of 38 IPOs managed by a single underwriter during the period 1983-1988, finding that approximately 70 percent of the IPOs are allocated to institutional investors in firm commitment offering. This finding confirms the Benveniste and Spindt (1989) prediction that US underwriters behave strategically in the allocation of IPO.

2.2.2.1.3 The Signalling Hypothesis

Underpricing of IPO means "leave a good taste" with investors. In fact, it attracts investors to come back to the market because the issuers want to sell seasoned issues at a high price. This hypothesis is provided by Allen and Faulhaber (1989), Welch (1989), and Grinblatt and Hwang (1989).

Allen and Faulhaber (1989) present a model to explain that the underpricing of IPOs is an equilibrium signal of firm quality, under the assumption of the best information about the firm's prospects held by the firm itself. Good firms wish to give investors a signal about their superior prospects, because it may be very costly or impossible to value firms' true value or quality because of informational asymmetry. So a low IPO price and quantity can be used as a signal to show investors that the firm is good. Underpricing of IPO is a credible signal to investors, because only good firms can be expected to recoup this loss after their performance is realised. The model implies that the better firms will underprice more, will have higher earnings, and will initiate dividends earlier. Good firms leave a good taste with investors, so that their seasoned offering will be sold at higher price.

Welch (1989) provides a signalling model in which high quality firms underprice in order to gain a higher price in seasoned offering. The model strongly suggests that IPO firms pursue a multiple issue strategy when they choose both the price and the proportion of the firm they offer at their IPO. There is asymmetric information between investors and firm owners. High quality firm owners use underpricing as a signal to convey their superior information to investors because the marginal cost of underpricing for high quality firms is lower. At the same time, the high quality firm owner will be rewarded at the time of the seasoned issue by a higher price for shares. The underpricing is a credible signal if the imitation cost is high enough for low quality firms. Welch's model implies that good firms, which underprice more, experience a less unfavourable price response at the time of the seasoned issue.

Grinblatt and Hwang (1989) develop a signalling model with two signals to explain new issues underpricing. In the Leland and Pyle (1977) model, they use only one signal which is retaining a larger fraction of shares by the firm's insiders to overcome the asymmetric information problem. In Grinblatt and Hwang's model, the issuer is assumed to have better information about his firm's future cash flow than outsiders. Two signals, the degree of underpricing and a larger fraction of shares held by insiders, are used to convey the mean and variance of a firm's future cash flow to the market, and to overcome asymmetric information problem. In the model's separating equilibrium, a firm's intrinsic value is positively related to the degree of underpricing of IPOs and the insider's holdings.

Those three signalling models all indicate that "leave a good taste in investors' mouths" is a result of seasoned offerings at a favour price. Allen and Faulhaber (1989) and Welch (1989) provide conditions for the existence of separating equilibrium in the model with two risk-neutral issuer types and an exogenously specified constraint on

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outside financing. The Grinblatt and Hwang (1989) model has an endogenously determined amount of external financing and a continuum of risk-adverse issuer types. Chemmanur and Fulghieri (1997) develop a theory of unit IPOs in a simple asymmetric information set-up, in which the firm going public issues a package of equity with warrants. They assume insiders have private information about the firm. In equilibrium, high risk firms issue underpriced units of equity and warrants; low risk firm issue underpriced equity alone. With or without warrants acts as a signal in their model.

How and Howe (2001) use a sample from Australia to test signalling hypothesis, focusing on the choice of securities as a signalling mechanism in a market characterized by informational asymmetry. They provide evidence that supports the signalling hypothesis explanation for the inclusion of warrants in IPOs.

Loughran and Ritter (2002) offer an explanation for the IPO underpricing phenomenon. They argue that IPO underpricing is an indirect form of underwriter compensation, because investors are willing to offer quid pro quos to underwriters to gain favourable allocations on hot deals. Underpricing is also an indirect cost to issuers; they agree with underpricing only when they are simultaneously getting good news in the form of unanticipated wealth increase.

Su (2004) empirically investigates "winner's curse" and signalling models using data of 587 Chinese IPOs during January 1994 to December 1999. His study once again confirms that underpricing exists in China's stock market, and explores that IPO underpricing is related to pre-IPO information asymmetry and serves as a signal of firm quality. He finds the answers to Chinese IPOs underpricing. Firstly, underpricing is correlated to the size of offering, insider ownership, and allocation mechanism and so on. Secondly, to some extent, underpricing can be explained in terms of a strategy for firms to signal their value to investors. His empirical results are consistent with adverse selection and signalling hypotheses.

Cao and Shi (2006) construct a theoretical model to explain the clustering of underpriced IPOs. The key ingredients of the model are aggregate demand uncertainty in an industry and asymmetric information regarding the quality of individual firms.

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They suggest that firms can signal their quality by underpricing new issues in the IPO market. IPOs underpricing can promote the publicity and consumer awareness of the industry, the expected aggregate demand for the industry's products increases with increasing publicity of the industry. They show that asymmetric information and expectations on aggregate product demand interact with each other to generate multiple equilibriums.

All theories of underpricing based on asymmetric information share the prediction that underpricing is positively related to the degree of asymmetric information.

#### 2.2.2.2 Hypotheses Based on Symmetric Information

There are also theories of underpricing that do not rely on asymmetric information that is resolved at the beginning of trading, the main one being the so-called ownership dispersion hypothesis. Booth and Chua (1996) and Brennan and Franks (1997) develop a new explanation of the underpricing anomaly: the ownership dispersion hypothesis. Booth and Chua (1996) develop an explanation for IPO underpricing in which the issuer's demand for ownership dispersion creates an incentive to underpricing and oversubscription. The issuing firm may intentionally underprice their shares in order to generate excess demand and be able to have a large number of small shareholders. There is at least an advantage for firms to disperse ownership, because dispersed ownership may improve liquidity, and this strategy would tend to make for a lower rate of return required by investors and thus a higher equilibrium price for the firm's shares. IPO underpricing would lead to oversubscription, which allows broad initial ownership dispersion and in turn achieves a liquid secondary market for the shares. Promoting oversubscription can also maximise issue proceeds. Issuer's demand for broad ownership dispersion and a liquid secondary market for the shares determine the equilibrium level of underpricing. This explanation focuses on improving liquidity. Brennan and Franks (1997) provide a study of how the dispersion of ownership and control evolves in UK firms, using data from a sample of 69 IPOs in the UK. They argue that underpricing is associated with oversubscription and dispersion ownership and control is a result of underpricing. In their model, rationing favours small investors over large investors. Underpricing promotes oversubscription to allow the issuer both to ration the allocation of shares and to discriminate between applicants so as to reduce the individual size of new block-holdings post-IPO. This dispersed ownership will both increase the liquidity of the market for the stock, and make it more difficult for outsiders to challenge or monitor managements. Their explanation is also called the reduced monitoring hypothesis.

Pham, Kalev and Steen (2003) use a sample of Australian IPOs to investigate the relationship between underpricing, ownership structure and post-listing liquidity of IPOs. In their study, they use breadth and equality of shareholder distribution to measure the ownership structure, and employ trading turnover and the bid-ask spread to measure the post-listing liquidity. Breadth of shareholder distribution reflects the size and diversity of the outside investor base of an IPO after allocation and is calculated by dividing the total number of new investors by the dollar amount of issued shares. Equality of shareholder distribution refers to the difference in the proportions of ownership possessed by outside investors. Trading turnover is calculated by scaling daily trading volume for the total number of that firm's issued shares and the bid-ask spread refers to the daily closing bid and ask quotes. Their empirical work yields statistically significant evidence in support of the following propositions. Firstly, the level of underpricing is positively related to the breadth of shareholding base, and negatively related to the inequality of outside shareholder distribution formed after the allocation process. Secondly, the degree of underpricing is positively related to the post-listing liquidity. They also provide an explanation that ownership structure plays the main role in forming the relationship between underpricing and liquidity. Their empirical results are consistent with Brennan and Franks (1997).

#### 2.2.3 The Long-run Underpformence of IPOs

Another anomaly of IPOs is their poor long-term stock price performance, the so-called long-run underperformance in the stock market reported by Aggarwal and Rivoli (1990) and Ritter (1991). They examine the long-run performance of new

issues in the US and report some degree of underperformance in the aftermarket. Aggarwal and Rivoli (1990), on the basis of a sample of 1,598 IPOs issued during 1977-1987, document an abnormal return of –13.73 percent for investors purchasing all IPOs in the open market at the close of the first trading day and holding each for a period of 250 trading days. Ritter (1991) examines the underperformance of US IPO firms categorised by adjusted initial returns using a sample of 1,526 IPOs issued during 1975-1984. He reports that there is a tendency for firms with high adjusted initial returns to have the worst aftermarket performance. The tendency is stronger for smaller issues than for large issues. Besides, Ritter's study also indicates that the underperformance of IPOs extends beyond the first year of trading. Loughran and Ritter (1995) document the significant downward drift of IPO firms in the US three to five years subsequent to the offerings, and find that the poor stock performance extends to five years after issue, with no further underperformance in the sixth year, using a sample of 4,753 US companies going public between1970 and 1990.

Various studies with international data generally suggest that the long-run underperformance of IPOs is a global phenomenon. Lee, Taylor and Walter (1996) report a three-year abnormal return of -46.5 percent for Australian IPOs during 1976-89 periods. Aggarwal, Leal and Hernandez (1993) find that the IPOs in Brazil and Chile underperformed a benchmark by 47 percent and 24 percent, respectively, by the end of three years after issue. Keloharju (1993) for Finland, Levis (1993) for the UK, and Ljungqvist (1994) for Germany report average market-adjusted losses of 47.0 percent, 8.1 percent, 21.1 percent, and 8.6 percent, respectively, by the third year anniversary of their first trade.

There have been several hypotheses proposed to explain the phenomenon of the long-run underperformance of IPOs.

2.2.3.1 The Divergence of Opinion Hypothesis

Miller (1977) advances the divergence opinion to explain the sources of long-run underperformance. He assumes that there are constraints on shorting IPOs, and the investors have heterogeneous expectations about the valuation of a firm due to a great deal of uncertainty and incomplete information. Investors are divided into two groups, one is investors who are optimistic about future prospects of the IPO firm, and the other being pessimistic investors. There will be a range of different firms' valuations given by optimistic investors and pessimistic investors. Since new shares will tend to be purchased by optimistic investors, the price of shares will be higher. As time goes on and more information becomes available, the variance of opinions between optimistic investors and pessimistic investors will decrease, and then the market price will drop. Thus, Miller (1977) predicts that IPOs will underperform in the long run.

Jain and Kini (1994) provide evidence that there is a substantial decline in post-issue due to asymmetric information existing, the evidence shows that the managerial ownership retention is positive related to post-IPO operating performance, but there is no evidence to show that underpricing is a signal of quality. They also document the post-IPO performance relative to the pro-IPO performance. They provide evidence to show that high pro-IPO performance level may lead investors to develop optimistic assessments of earning growth for the IPO firms, despite an increase in sale and capital expenditures. They also address the issue that managers attempt to window-dress their accounting figures prior to going public, which leads to pro-IPO performance being overstated; post-IPO performance being understated. Their evidence strongly supports the Miller (1977) hypothesis.

Chahine (2004) provides analysts' optimistic forecast hypothesis to long-run underperformance. While there is asymmetric information between firms, underwriters, and investors, the analysts' forecasts tend to systematically exceed the actual earning figure. Firms go public when their performance is very strong and, thus overoptimistic forecasts of them become more frequent which will bring up more optimistic investors, thereby the price of shares will go up and up. Disclosure of more information about the weaker future earnings would lead to an earning forecast adjustment, which will calm optimistic investors' nerves to the price of shares correction. They argue that the post-IPO performance is relative to earning forecast revisions.

2.2.3.2 The Impresario Hypothesis

Shiller (1990) presents the impresario hypothesis to explain the underperformance of

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IPOs. In the hypothesis, he argues that the market is subject to fad. The investment bankers act as the "impresario" promoting new issues. The investment banks underprice the new shares to create the appearance of excess demand for attracting investors. Comparing the Miller (1977) model, Shiller's hypothesis predicates that underpricing of IPOs is negatively related to underperformance, which is supported by Ritter (1991).

Lee, Taylor and Walter (1996) analyse initial and long-run returns for all Singapore IPOs made from July 1, 1973 to December 31, 1992. Initial returns which were found to be around 30 percent are positively related to the level of oversubscription and retained ownership. The long-run returns for Singapore IPOs are not abnormally poor and not related to initial "underpricing". They further investigate the high oversubscription which is a peculiar feature of the Singapore IPOs market and are not associated with a "speculative bubble" or "fad" explanation. They argue that high oversubscription is better described as demand expansion by informed investors.

2.2.3.3 The Windows of Opportunity Hypothesis

Ritter (1991) reports that long-run underperformance exists in the US market by testing a sample of 1,526 IPOs which are listed on Amex-NYSE and NASDAQ from 1975 to 1984. The level of underperformance varies from year to year. Younger firms and firms going public in the "hot issue" period have more serious underperformance. There are two explanations provided by Ritter (1991). For investors, they are overoptimistic about the earning potential of young firms whereas for issuers, firms take advantage of "windows of opportunity", which is supported by Loughran and Ritter (1995), Jong-Hwan Yi (2001) and Cai and Wei (1997). The "Windows of Opportunity" hypothesis predicts that there will be low long-run returns on conducting IPOs and on firms conducting seasoned equity offerings.

Loughran and Ritter (1995) examine a sample of 4,753 firms going public in the US during 1970 to 1990 to address whether the poor subsequent performance is merely a manifestation of long-run return reversals. They also document that the degree of underperformance to issuing firms varies over time. Firms do not underperform when firms issue shares during a quiet period when there is little issuing activity, whereas

firms underperform when they sell shares during a high-volume period. Their evidence is consistent with a market where firms take advantage of transitory windows of opportunity by issuing equity when, on average, they are substantially overvalued.

Cai and Wei (1997) examine a sample of 180 IPOs listed on the Tokyo Stock Exchange during 1971 to 1992 period, finding the post-issue operating perform poor. The post-issue ownership concentration has been lowered significantly due to the ownership structure of Japanese firms held high by financial institutions. In Japanese IPOs, important evidence shows that managers take advantage of "windows of opportunity" to issue new shares when the cost of capital is low, which strongly supports Loughran and Ritter (1995) and Ritter (1991).

Teoh, Welch and Wong (1998) take into account the accounting factor to document that the negative relationship between discretionary current accruals and subsequent return is common to all firms during the 1976 to 1999 test period. The hypothesis is that investors naively extrapolate pre-issue earnings, and ignore relevant information contained in pre-issue discretionary current accruals. In this interpretation, an informational imperfect market is too optimistic when a seasoned equity issue is offered and later on becomes disappointed when the high earnings cannot be sustained.

Yi (2001) finds IPO firms going public with negative earnings have statistically, significantly negative abnormal mean returns, which may be caused by the investors who may have been too optimistic about future prospects of these IPO firms. The finding in this study is consistent with Ritter's finding (1991).

Kutsuna, Okamura and Cowling (2002) examine the relationship between the ownership structure pre and post-IPOs, and the operating performance of the Japanese OTC market (JASDAQ) companies by using data of 247 JASDAQ companies. Their empirical results show that the top 10 shareholders decrease their stakes after IPO, but the ownership is still concentrated. Banks increase their stakes after the offering. On the relationship between ownership structure and operating performance, their empirical results support the view that the post-IPO deterioration in operating

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performance is partly attributable to the reduced managerial ownership, which contrasts with Cai and Wei (1997). They also argue that market capitalisation is positively related to pre-IPO operating performance while the size and the firm's age is negatively related. Their regression analysis shows that poor operating performance before and after IPO is associated with large and established companies.

Kooli and Suret (2004) empirically investigate Canadian IPOs to provide an out of sample evidence of the long-run performance of IPOs. They test the performance for up to 5 years after listing over 445 Canadian IPOs from 1991 to 1998. Firstly, they find that the average initial return on the first trading day is 20.57 percent. Secondly, the sample underperforms in the long run. The observed pattern is not always statistically significant, and depends on the methodology used and on the weighting schemes. When the performance is measured by the value-weighted cumulative abnormal returns, the empirical result shows that Canadian IPOs underperform significantly after the first 5 years; when the performance is measured by buy-and-hold abnormal returns, the empirical result is no longer statistically significant. The interpretations of IPOs underperformance are explored in their study. The divergence of opinions hypothesis does not apply in explaining the aftermarket performance of Canadian IPOs, but the fads hypothesis can be used to explain the long-run behaviour of large IPOs.

Ritter and Welch (2002) put forward that "Long-run performance may be the most controversial area of IPO research, with some researchers lining up behind an efficient markets point of view and others lining up behind a behavioural point of view". Eckbo and Norli (2005) propound that this long-run return evidence challenges the efficient markets hypotheses and motivates the development of behavioural asset pricing models. To some researchers, for instance, Loughran and Ritter (2000), and Wu and Kwok (2007), have started to use the capital asset pricing model and Fama-French three-factor model to investigate the long-run performance in stock market and examine the efficient markets hypotheses.

# 2.3 The Capital Asset Pricing Model and Fama-French Three-factor Model

When investing in the stock market, the top priority for investors is to get expected returns and risks balanced. Although it is a common perception that there is a positive relationship between expected return and risk – for instance, risky investment will generally yield higher returns than investments free of risk - it was only with the development of the Capital Asset Pricing Model (CAPM) that the trade-off between risk and expected return could be quantified. Markowitz (1959) creatively casts the investor's portfolio selection problem in terms of expected return and variance of return and he further argues that investors would optimally hold a mean-variance efficient portfolio; that is, a portfolio with the highest expected return for a given level of variance. Sharpe (1964), Lintner (1965) and Mossin (1966) independently developed the standard form of the capital asset pricing model, which is often referred to as the Sharpe-Lintner-Mossin model or the standard CAPM. The standard CAPM yields the following expression for the equilibrium expected returns, E(Ri), on asset i:

$$E(R_{i}) = R_{f} + [E(R_{m}) - R_{f}]\beta_{i}$$
(1)

where Rf is the riskless rate of interest; E(Rm) is the expected return on the market portfolio of all assets; and  $\beta_i = \operatorname{cov}(R_i, R_m) / \delta_{(rm)}^2$  the co-variance between the return on asset i and the market return divided by the variance of the market return, is the measure of systematic risk of asset i.

The main implications could be expressed as follows:

1) CAPM relates the expected return for any asset with the risk for that asset as measured by beta.

2)  $\beta$ , the slope in the regression of an asset's return on the market, is the only risk that affects expected return, namely,  $\beta$  suffices to explain expected return. When this proposition holds, then

3) There is a positive price of risk in the capital markets. [E(Rm) - Rf], the market risk premium in terms of excess returns, is positive.

Put differently, the essence of CAPM is that the expected return on any asset is a

positive linear function of its beta and that beta is the only measure of risk needed to explain the cross-section of expected returns.

The development of the CAPM can be regarded as a revolution in the field of finance. There is, of course, a huge amount of literature to examine if the CAPM is valid since the CAPM was developed.

#### 2.3.1 The Relationship between Returns and Beta

The early empirical tests focusing on the relationship between return and the beta confirm the CAPM's prediction that the higher the risk, the higher the return such as the empirical findings of Fama and MacBeth (1973). But with the process of testing the CAPM, several anomalies in terms of firm characteristics such as the price-earnings-ratio and size emerged, challenging the CAPM's argument that the beta is sufficient to describe the cross-section expected. That is to say, these firm characteristics might also have an explanatory power for the cross section of the expected returns beyond the beta of the CAPM.

#### 2.3.2 The Relationship between Returns and Price-earning Ratio

The price-earnings-ratio effect was first documented in the academic literature by Basu in 1977. Basu (1977) describes it as such a phenomenon: firms with low price-earnings-ratio have higher expected returns, and firms with high price-earnings-ratio have lower expected returns.

#### 2.3.3 The Relationship between Returns and Size of Market

Banz (1981) first documents the size effect, which refers to low market capitalisation firms having higher expected returns and vice versa. Banz (1981) finds that market capitalisation (a stock's price times shares outstanding) adds to the explanation of the cross-section of average returns provided by market  $\beta$  s. Average returns on small (low market capitalisation) are too high given their  $\beta$  estimates, and average returns on large stocks are too high. 2.3.4 The Relationship between Returns, Beta, Size, P/E Ratio, and Book-to-market Besides, Fama and French (1992) have found stronger evidence to cast doubt on the CAPM's implication that the beta is sufficient to describe the expected returns. Fama and French (1992) look closely at the relationship between expected return and the beta in a large cross-section of equities, testing the joint roles of market beta, size, earnings-price ratio and book-to-market equity in the cross-section of average returns on NYSE, AMEX, and NASDAQ stocks. Their findings are: beta does not seem to help explain the cross-section of average stock returns, and the combination of size and book-to-market equity seems to absorb the roles of earnings-price ratio in average stock returns. Put differently, they explain the cross-section of average stock returns not by beta defined in the CAPM, but rather by two other factors, the size and the book-to-market equity. When these two factors are taken into account, beta adds nothing to the explanation.

#### 2.3.5 Fama and French Three-factor Model

Fama and French (1992,1993) find that beta cannot explain the difference in return between portfolios formed on the basis of the ratio of the book value of equity to the market value of equity. Fama and French (1993) then invent a famous three-factor model, arguing that many of the CAPM average-return anomalies can be captured by this model. They start with the observation that two classes of stocks have tended to do better than the market as a whole: one being stocks with small size, that is to say, small market capitalisation; the other is stocks with a high book-to-market ratio (customarily called "value" stocks: their opposites are called "growth" stocks). They then add two factors to CAPM to reflect a portfolio's exposure to these two classes and finally form their famous three-factor model, which is called the Fama and French Three-factor Model, the FF3FM hereafter. The model says that the expected return on a portfolio in excess of the risk-free rate  $\begin{bmatrix} E(R_f) - R_f \end{bmatrix}$  is explained by the sensitivity of its return to three factors: (i) the excess return on a broad market portfolio  $(R_m - R_f)$ ; (ii) the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB, small minus big); and (iii) the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (HML, high minus low). In other words, SMB is meant to mimic the risk factor in returns related to size. HML is meant to mimic the risk factor in returns related to size. Specifically, the expected excess return on portfolio i is,

$$E(R_i) - R_f = b_i [E(R_m) - R_f] + s_i E(SMB) + h_i E(HML)$$
(2)

where  $b_i$ ,  $s_i$  and  $h_i$ , are the factor sensitivities or loadings.

Fama and French (1996) use this three-factor model to examine the simple monthly percent excess returns on 25 portfolios formed on size and BE/ME and listed on NYSE, AMEX and NASDAQ during July 1963 to December 1993. The results show that coefficient  $\alpha_i$  is (i) negative for portfolios located in the extreme quartiles of the stocks of small capitalisation and low ratio book to market and (ii) positive for portfolios located in the extreme quartiles of the stocks of big capitalisations and high book to market ratio. In addition to these results on the extremes, the coefficient is not significantly different from zero; which makes it possible to affirm that the three-factor model explains cross-section stock returns. Their results are consistent with their assumption that the anomalies largely disappear in the three-factor model.

Many of the recent studies on long-run return suggest market inefficiency, specifically, long-run under-reaction or over-reaction to information. Fama (1998) gives 'the suggestion a solid no. He addresses the issue that the evidence does not suggest that market efficiency should be abandoned. Market efficiency survives from the challenge of the studies on long-run return anomalies, and the anomalies are chance results. The most important is that long-run return anomalies are fragile and they may disappear by a reasonable change in the method of measurement.

Lewllen (1999) examines the time-series relationships among expected return, risk, and book-to-market (B/M) at the portfolio level. Lewellen (1999) finds some evidence that an industry's book-to-market ratio predicts changes in its expected return, but the

high variance of monthly returns reduces the precision of the estimates. Further, B/M is strongly relative to changes in risk, as measured by the Fama and French (1993) three-factor model. After controlling for changes in risk, B/M just contains little additional information about expected return. Finally, the evidence shows that the three-factor model explains time-varying expected returns better than a characteristic-based model.

Loughran and Ritter (2000) employ the Fama and French three-factor model to re-examine the long-run underperformance of IPOs with logical arguments, simulations and sensitivity tests. Firstly, they argue that the magnitude of abnormal returns depend on the methodology used and on the weighting schemes confirmed by Kooli and Suret (2004). In their simulations, there are more severe mis-valuations among small firms and in high-volume periods. When the Fama and French three-factor model is used with value-weighted portfolios, only about half of the abnormal returns are captured. In their sensitivity tests, they re-examine the underperformance of firms conducting IPOs and seasoned equity offerings, the empirical analysis shows that after purging the factors of new issues, the new issues reliably underperform on both an equally weighted and a value-weighted basis. This underperformance is more severe in high-volume periods than in low-volume periods. Once size and book-to-market effects are accounted for, IPOs appear to underperform only in a high-volume period.<sup>3</sup> Consistent with the windows of opportunity framework, the underperformance of SEOs is more severe following high-volume markets.

Wu and Kwok (2007) provide an empirical investigation of the long-run performance of global IPOs by employing a comprehensive sample of IPOs made by the United States industrial companies between 1986 and 1997 to examine the window of opportunity hypothesis. They compute the buy-and-hold abnormal returns and cumulative abnormal returns up to three years after issuing and adopt the

<sup>&</sup>lt;sup>3</sup> The studies on FF3FM are continuing. Some scholars are trying to improve this model. Ferguson and Shockley (2003) provide a theoretical rationale for the Fama and French (1993) three-factor model.

Fama-French factor model to overcome cross-correlations of event-firm abnormal returns. Based on the Fama-French factor model regression results of calendar monthly portfolio returns, global IPOs firms not only underperform in the market but also underperform in relation to their domestic counterparts in the three year after issuance. Within the global sample, issues with a larger global tranche are more prone to long-run return shortfall than others. In fact, the overall results show that global IPOs underperformance is primarily driven by those with a large global tranche. The results are consistent with the window of opportunity hypothesis.

#### 2.4 Chinese Scholars' Studies on IPOs and CAPM

The anomalies associated with the process of initial public offerings are common phenomena both in the developed stock market and emerging stock market, although the degree of these anomalies varies from country to country. These anomalies have attracted lots of researchers' attention. China's stock market is new, but it also faces these anomalies. Chinese scholars are examining the anomalies and relevant hypotheses in China's stock market and trying to look for more suitable explanations for these anomalies using methodologies widely used in the literature.

Su (1998), joint with Fleisher, might take a lead in exploring the IPO underpricing phenomenon in China's stock market using the IPO underpricing theories. Su and Fleisher (1999) examine several hypotheses on the cross-sectional underpricing of initial public offerings in China's stock market, using data from 308 firm-commitment Chinese IPOs from January 1, 1987 through December 31, 1995. Their empirical study shows that the signalling hypothesis can be used to explain the underpricing rather well, and various lottery mechanisms for allocation of IPO shares exacerbate underpricing. They also find that the differences between Chinese A-share and B-share are mainly due to differences in investors' opinion and opportunity. Chinese scholars started their IPOs long-run underpricing level in Shanghai stock market is far higher than findings in other stock markets, and explore the issue that the so-called

long-run underperformance exists in A-share and B-share stock markets in Shanghai by testing the speculative bubble hypothesis. In their empirical study, the pattern of the cumulative average excess market return (MACR) is used to test the implication of speculative bubble hypothesis which is that large initial positive excess returns would be followed by large negative excess returns. The results from testing are that on the first few trading days, the MACR of different sub-samples of IPOs were negative; the MACR of the 60 underpriced A-share IPOs was negative for the first 75 trading days, and then fluctuated within a narrow band of a few percent above the market return for the rest of the 350-day holding period; the MACR of B-share IPOs remained positive until the end of 350 trading days but it peaked at about 18 percent at 154 days, and then declined slowly towards the market return. In 1997, Chinese scholars, Liu Bo and Zhao Xiaoping 1997, took the lead in using the standard CAPM to do an empirical analysis on the relationship between returns and beta in China's stock market. It is quite understandable that their findings cannot point to a clear relationship between returns and beta due to the primitiveness of China's stock market. To the best of knowledge, using Fama and French three factor model (FF3FM) on China's stock market is still rare.

Chan, Wang and Wei (2004) study the underpricing and the long-run performance of A-share and B-share IPOs issued in China during the 1993 to 1998 period. Firstly, they find that the average underpricing for A-share and B-share IPOs are 178 percent and 11.6 percent, respectively. The underpricing of A-share is positively related to the period between the offering and the listing and the number of investors in the province from which the IPO comes, and negatively related to the number of shares issued. Secondly, they find A-share IPOs slightly underperform their non-IPO benchmarks with wealth relatives, while B-share IPOs outperform their non-IPO benchmarks with wealth relatives, which suggests that stock price performance is not purely driven by speculation, but is a reflection of a firm's operating performance.

Chen, Firth and Kim (2004) investigate the pricing of IPOs of A-share and B-share, using data of 701 A-share IPOs and 117 B-share IPOs listed from 1992 to 1997. The empirical work shows that the degree of A-share underpricing is 145 percent while the

degree of B-share underpricing is 10 percent, and the risk is strongly and positively associated with the underpricing of A-share. They also argue that B-share underpricing is positively related to seasoned equity offerings (SEOs) and government ownership. The results from the cross-sectional model show that the underpricing is a positive relative with price-to-book ratio and P/E ratio.

Su (2004) investigates the relationship between underpricing of IPOs and pre-IPOs information asymmetry in China's stock market by using data from 587 IPOs between January 1994 and December 1999. He finds that the underpricing is correlated to the size of offerings, insider ownership, market conditions and IPOs allocation mechanism. He argues that underpricing can be explained as a signal of a firm's value to a degree. His empirical results, to a great extent, are consistent with the "winner's curse" and signalling hypotheses.

Yu and Tse (2006) examine the degree of underpricing of IPOs for 343 online fixed-price offerings from November 1995 to December 1998. The initial return is on average 123.59 percent. Their results suggest that ex ante uncertainty has a very high explanatory power in explaining the Chinese IPOs underpricing, Winner's Curse Hypothesis exist in the Chinese IPO market, but the Signalling Hypothesis does not hold in the China's stock market, which is in contrast to the findings of Su and Fleisher (1999). Wang (2005) tests changes in operating performance of Chinese listed companies around their IPOs during 1994 to 1999. He argues that there is a sharp decline in post-issue operating performance measured by return on assets, operating income to assets and sales to assets, and legal person ownership or concentration of non-state ownership is associated with performance changes, whereas state and individual ownerships play no role in the performance of IPO firms. Moreover, firms with low or high levels of legal person ownership (concentration of non-state ownership) have positive relationships between ownership and performance changes, while firms with intermediate levels of legal person ownership (concentration of non-state ownership) have negative relationships between ownership and performance changes. Chi and Padgett (2005) employ cross-sectional analysis to study the short-run performance of Chinese initial public offerings, using data on 668 new issues on both the Shanghai and Shenzhen Stock Exchanges from January 1, 1996 to December 31, 2000. The empirical analysis shows that the average underpricing of Chinese IPOs is 129.16 percent. They find that IPO underpricing is primarily explained by the high demand caused by the quota system and the high proportion of uninformed individual investors. Information asymmetry hypothesis is supported by estimating results while the signalling hypothesis does not. This is in contrast to the findings of Su and Fleisher (1999) and consistent with the finding of Yu and Tse (2006).

Since then more Chinese scholars have started similar studies in this area, but generally speaking, the relevant studies of China's stock market are under-researched. There is a long way for Chinese scholars to intensify their studies and hence contribute to the literature by examining the hitherto unexplored matter of the investment performance of China's stock market including both the primary stock market and secondary stock market. The systematic research applying the latest theories of IPO underpricing, IPO underperformance, CAPM testing as well as Farm-French three-factor model testing with China's stock market are rather important and timely.

### Chapter 3

# China's Stock Market: Establishment and Development

### 3.1 A Brief Review of China's Stock Market Development

There had been no such things as "stock market" and "capital market" in the Chinese financial vocabulary since the takeover of power by the Communist Party in 1949 until the beginning of the 1980s when the construction of the stock market was initiated in order to deepen Chinese economic reform.

Because of ideological reasons or theoretical confusion, Chinese policy-makers used to take it for granted that stocks clash with socialist theories mandating the state's public ownership of production facilities; hence the development of a stock market is a restoration of capitalism and the stock market should not be allowed to emerge in socialist China. But with the increasing need to reduce state subsidies and make enterprises more efficient and competitive, China first began to accept the concept of developing a shareholding system, and then proceeded to develop China's stock market. This decision raised ideological issues concerning the ownership structure of state-owned enterprises (SOEs), profit making, and the balance between socialist and capitalist principles and institutional behaviour. Facing this great pressure of opposition to the development of a stock market, China cautiously launched its stock market experiment after intense debate again and again. In practice, the first step was to build up several regional stock markets in selected cities and their operations were administered by local government. The experiment of issuing stocks started first with small private or collective enterprises. State-owned enterprises (SOEs) did not take the initiative because they had to avoid being involved in a politically sensitive area.

#### 3.1.1 Two Stock Exchanges

By 1990, while the regional stock markets achieved considerable success, the central government found it difficult to monitor and control share issuance and trading. Then, Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) were established on the 26th of November 1990 and the 1st of July 1991 respectively. The establishment of two stock exchanges provided national issuance and trading markets, subject to central government regulation and administration, where national economic objectives and considerations would be the basis for development.

From the beginning, both exchanges were organized as non-profit and self-regulatory organisations with the membership system. The number of members in both exchanges increased very fast. SSE had 171 members and SZSE had 177 members in 1992. In 1993, the total number of members in both exchanges more than doubled to 907 members, SSE had 481 members and SZSE had 426 members.<sup>1</sup> At end of 2006, the number of members in SSE was 153 and SZSE had 176.<sup>2</sup> SSE and SZSE adopted centralised clearing and completely trading system, а the paperless automatic-matching system. A nationwide computerised quotation system linking regional trading centres and securities firms by satellite was launched in 1992. The quotation system is called the National Securities Trading Automated Quotation System (STAQS).<sup>3</sup> The establishment of two national exchanges marked a new era for China's stock market development. It made it possible for stock transactions to be conducted on a much more professional basis and to rule out the possibilities of black market trading. In many respects, the nature and operation of SSE and SZSE are similar, so the following detailed account of SSE will apply to SZSE as well.

<sup>2</sup> Source: http://www.sse.com.cn/ps/zhs/yjcb/ybtj/sse\_stat\_monthly\_200612pdf.

<sup>&</sup>lt;sup>1</sup> Source: http://www.sse.com.cn/sseportal/webapp/datapresent/queryyearlytrade?prodType=9 http://www.sse.org.cn/main/marketdata/wbw/marketstat/

http://www.sse.org.cn/main/images/2006/12/30/989688926837.html.

<sup>&</sup>lt;sup>3</sup> Source: Zhongguo Jinrong Zhanwang 1992 (China Financial Outlook 1992), the People's Bank of China (1992).

#### 3.1.2 Two Regulatory Organizations

More importantly, in 1992, a two-tier regulatory structure was established. The first level is the State Council Securities Commission (SCSC) affiliated to the State Council of China, while the second is the China Securities Regulatory Commission (CSRC).<sup>4</sup> Since then, the People's Bank of China (PBOC) gradually delegated its regulatory and administrative jurisdiction powers over security industry to the SCSC and the CSRC. The SCSC, the decision-making body, was made responsible for formulating unified acts, policies and regulations about stock market and co-coordinating two stock exchanges. It reports to the State Council of China, the ultimate governing body of China's stock market.<sup>5</sup> The CSRC, as an authorised executive body of the SCSC, is in charge of supervising the activities of the stock markets and imposing penalties according to the laws.<sup>6</sup> In April 1998, according to the State Council Reform Plan, the SCSC and the CSRC merged together into a large commission that retained the name of the CSRC directly under State Council. The power and functions have been strengthened following the reform. A centralised security supervisory system was thus established.

#### 3.1.3 Two Stock Markets

Before 1992, China's stock market was a domestic market. Shares named A shares were available only to Chinese investors and were traded only in its own currency, Renminbi (RMB). Since 1949, China has been in short supply of foreign exchange capital for a long time. In order to raise foreign funds and avoid weakening foreign exchange control, China set up special kinds of shares, B shares for foreign investors in 1992. Relative to A shares that are available only to domestic investors, B shares are common shares issued by Chinese enterprises especially for foreign investors (including those from Hong Kong, Macao and Taiwan) in terms of foreign exchange. B shares in terms of US dollars are listed in SSE and B shares in terms of HK dollars

<sup>&</sup>lt;sup>4</sup> See Gazette of the PRC State Council No. 1414 (1992).

<sup>&</sup>lt;sup>5</sup> See CSRC Charter, *supra* note 8, Art 1.

<sup>&</sup>lt;sup>6</sup> Also see CSRC Charter, *supra* 26, Art 2.

are listed in SZSE. The Shanghai Vacuum Electronic Component Cell Co., Ltd. issued China's first B share in November 1991 and other enterprises quickly followed. When the B share of Shanghai Vacuum Electron Co., Ltd. was listed in the SSE on Feb 21st, 1992, China's B share market began to operate.<sup>7</sup> Since then, there have been two parallel markets, one for domestic investors and the other for foreign investors. In 1990s, China's stock market had taken shape. China's stock market grew rapidly in aggregate scale and market function and began to open to the world. More and more SOEs were encouraged to go public and list on China's stock market.

The A-share market started to become quite active in the early 1990s after years of preparing and warming up during the late 1980s. By 1993, the A-share market including primary market and secondary market has achieved the highest level. Tables 3-1 and 3-2 show that there were 177 A shares listed in both SSE and SZSE compared to 14 A shares listed in 1991; the total volume of issuing has risen to 42.59 billion shares from 5 billion shares in 1991 and total raised capital has soared to 194.83 billion RMB Yuan from 5 billion RMB Yuan in 1991. The expanding scale of the A-share market still could not meet the demand of investors, stock prices rose quickly. Table 3-3 shows that stock prices in both SSE and SZSE composite index reached to 1558.95 while SZSE composite index reached to 359.44.

Compared to the development of the A-share market, the B-share market was small and less active. By the end of 1993, the B-share market had slightly improved. In tables 3-1 and 3-2, total listed B-share increased to 41 from 18 listed in 1992. The volume of issuing totalled 12.79 billion shares compared to 10.75 billion shares in 1992. Unfortunately, the total raised capital has been slightly reduced from 44.09 billion RMB Yuan in 1992 to 38.13 billion RMB Yuan in 1993.

A principal reason that China's stock market achieved great success by 1993 was a shift of balance in the ideological debates in China. At the 14<sup>th</sup> Chinese Communist Party Congress in November 1992, the Chinese government officially made it clear

<sup>&</sup>lt;sup>7</sup> Source: Zhongguo Jinrong Zhanwang 1993 (China Financial Outlook 1993), The People's Bank of China, Beijing, China.

that China would develop a "socialist market economy" that let market forces serve as a basic means of regulating the flow of resources and gave a credible commitment to continuing the policy in the future.<sup>8</sup> In part the commitment to such a model, with stock markets having a major role, was the fact that the Chinese government had to adopt a realistic way to revitalize the state-owned enterprises. That shift in the ideological debate was, in one sense, the true impetus for the great expansion of China's stock market, particularly the primary stock market. China's stock market acted as a vehicle to convert socialist planned economy to a market economy.

China's stock market dropped dramatically since the late 1993, then experienced more than two years stagnation and recovered after early 1996. Since 1996, the government expanded the scale of stock issuance so as to meet the capital demand of the large- and medium-sized state-owned enterprises. Since then, a great number of key state-owned enterprises, especially enterprises related to the strategic and pillar industries began to issue their own stocks.

#### 3.1.4 Share Structures in China's stock market

Before looking at the further development of China's stock market, it is time for us to introduce a unique feature about share structure in China's stock market. Shares in China's stock market, in addition to its universal classification as common share, preference share, etc, is also defined by the status and identities of investors. Since China's stock market emerged in the middle of 1980s, Chinese shareholding companies have issued different shares to different shareholders. Roughly speaking, shares in China's stock market are categorised into five different types based on the identities of investors. They are state shares, legal person shares, employee shares, individual shares, and foreign capital shares (Chan, Wang and Wei, 2004).

State shares refer to shares held by governmental agencies or authorised institutions on behalf of the state. According to Company Law, Security Law and relevant regulations, it shall include: (1) the shares converted from the net assets of SOEs

<sup>&</sup>lt;sup>8</sup> See JingJi RiBao, "Zhonggong Shisi Jie San Zhong Quan Hui Gong Bao (Communique of the 14<sup>th</sup>, CPC Third Plenum)", Nov. 15 1992, P1.

which have been transformed into joint stock companies. (2) Shares initially issued by companies and purchased by governmental departments investing on behalf of the state. (3) the shares originally issued by companies and purchased by the investment companies, assets management companies, and economic entity companies authorised to make investment on behalf of the state. <sup>9</sup>

Legal person shares are the shares obtained by a company or institution with a legal person status. The legal person shares can be indirectly held by the states if the shareholders are state-owned companies.<sup>10</sup> Basically, legal person shares include state-owned legal person shares, collective enterprise legal person shares, private enterprise legal person shares, foreign invested enterprise and institutional legal person shares.

Employee shares refer to shares held by corporate employees. Employee shares account for only a small part of the total issuance. According to provision regulations concerning share issuance and trading, the employee shares cannot be traded until six months after the initial public offering has been listed on the SSE or SZSE, and the amount of employee shares issued may not exceed ten percent of the total outstanding shares.

Individual shares are those shares that represent the capital contribution to a corporation made by an individual Chinese person, whether an individual member of the public, or an employee of the issuer.<sup>11</sup> Basically, those shares have the full function born by classic stock and can be freely traded and transferred in domestic markets.

Foreign capital shares include domestically listed foreign person shares, and overseas-floated and listed foreign person shares. Domestically listed foreign person shares are denominated in Chinese currency, and are purchased and sold in a foreign currency. Likewise, the dividend and other payments on the shares are denominated in

<sup>&</sup>lt;sup>9</sup> See the Provisional Measures on the Regulation of State-Owned Share Rights Issued by Companies Limited by Share, Art.2

<sup>&</sup>lt;sup>10</sup> See the Provisional Measures on the Regulation of State-Owned Share Rights Issued by Companies Limited by Share, Art.3.

<sup>&</sup>lt;sup>11</sup> See Trial Measures on Shareholding System, supra note 20, Art. 5.

Chinese currency and paid in a foreign currency. Such foreign person shares must be listed and traded on a Chinese securities exchange. <sup>12</sup> "Overseas-floated and listed foreign person shares" are shares: issued in registered form by a Chinese company limited by shares; floated overseas to overseas investors defined to include foreigners and investors in Hong Kong, Macau, and Taiwan; listed overseas in the form of shares, depository receipt certificates, or other derivative forms of the shares; and traded in the overseas public securities trading place. As in the case of the domestically listed foreign person shares, the overseas-listed foreign person shares are denominated in Chinese currency and payable in a foreign currency. The dividend and other payments on the shares are also denominated in Chinese currency and payable in a foreign currency and payable in a foreign currency. <sup>13</sup>

Briefly, the state shares, legal person shares, employee shares and individual shares together are called the A shares. Relative to the A shares, the domestically listed foreign person shares are called the B shares. As for the overseas-floated and listed foreign person shares, if they are traded in the Hong Kong stock market, they are called the H shares. If they are traded in New York stock market, they are called the N shares. Because the number of shares listed overseas except in Hong Kong is pretty small, H shares are sometimes referred to as all the shares listed overseas.

It is worth noting that among the A shares, only Chinese individual shares are allowed to be traded in Shanghai or Shenzhen Stock Exchange. In other words, the individual shares of A-share, B-share, H-share and N-share are also called tradable shares while the rest of them, the state shares, legal person shares, and employee shares are called non-tradable shares. The proportion of the tradable A shares to the A shares outstanding or all shares outstanding is obviously very small; around 60-70% of the A shares outstanding are not allowed to be traded.<sup>14</sup> Table 3-4 shows that the ratio of

<sup>&</sup>lt;sup>12</sup> See Regulation on Domestically Listed Foreign Person Shares, supra note 68, Arts. 2-4.

<sup>&</sup>lt;sup>13</sup> See Essential Clauses for Articles of Association of Companies Listed Overseas, *supra* note 92. Art.
3.

<sup>&</sup>lt;sup>14</sup> We would like to add that the proportion of the tradable A shares is getting enlarged because Chinese policy-makers are fully aware of the limitations of so-called compartmented share structure and take actions to encourage to change non-tradable shares into tradable.

tradable shares to total shares was around 35 percent. When China shares are divided into five types of shares, China's stock market is also divided into two submarkets so that the A-share market is for trading Chinese individual shares and the B-share market is for trading the B shares, the domestically listed foreign person shares. The reason why China shares structure are divided in such a way and two submarkets are set up for the different shares is two-fold: partly because the Chinese government aims to preserve the dominance of the socialist public ownership in the overall shares structure and partly because the Chinese government are worried that the frequent inflows and outflows of foreign funds might destabilise its stock market and foreign exchange control.

#### 3.1.5 The Development of China's stock market

The development of China's stock remains active, even more active in the 21st century. The great progress of Chinese A-share stock market is shown in Tables 3-1, 3-2, and 3-3. The number of listed A shares reached 1,060 in 2000 and increased to 1,411 in 2006; total capital raised through A-share market nearly tripled, from 993.8 billion RMB Yuan in 2000 to 2,459.38 billion RMB Yuan in 2006; total market capitalization of A shares increased to 88,113.96 billion RMB Yuan in 2006 from 47,456 billion RMB Yuan in 2000; while total turnover of A shares has increased from 60,279 billion RMB Yuan in 2000 to 89,217.11 billion RMB Yuan in 2006.

Compared to the A-share market, the development of the B-share market was unsatisfactory. The total volume of issuing of B-share surged to 7.1 billion shares in 2000 from 1.8 billion shares in 1999, and raised capital also increased to 13.94 billion RMB Yuan in 2000 from 3.79 billion RMB Yuan in 1999, but the volume of issuing B shares and the raised capital in 2001, 2002, 2005 and 2006 dropped to zero. Although the B-share market developed over ten years until 2006 and served as the window for the internationalisation of the Chinese securities market, the market size was small and played a weaker role in raising funds, compared to other financing channels. On June 1, 1999, the State Council cut the stamp tax rate of B-share trading from 0.4 percent to 0.3 percent in order to boost the B-share market. On February 19,

2001, with the approval of the State Council, the CSRC promulgated the "Notice on Several Issues Regarding Investment in Domestically Listed Foreign Investment Shares by Individuals Residence in China", which allowed domestic individual investors to invest in B shares with their legal foreign exchanges. This decision was made mainly based on the notable changes that had taken place in the macro situation of the foreign exchange capital flow in China, except for the reasons we mentioned above, small market size and the weak function of raising funds. The foreign exchange deposits of domestic residents have witnessed a rapid growth and most of these were loaned overseas or used for purchasing bonds by the domestic banks. At this stage, it is necessary to attract legal foreign exchange capital held by domestic residents to the B-share market in order to boost the B-share market and support national economic development. As of the end of December 2006, Tables 3-2 and 3-3 show that there are 109 B shares listed on the market with a total issued capital of 238.34 billion B shares and total market capitalisation of 1,289.93 billion RMB Yuan. As China's stock market has rapidly grown, the share structure (one third tradable shares and two thirds non-tradable shares in A-share market) has been a major counterforce against the development of China's stock market. By the end of 2004, Table 3-4 shows that the non-tradable shares accounted for 64 percent of the total shares in China's stock market. The negative impacts of such a share structure are multi-fold; it distorted the price mechanism, caused resource allocation inefficiency, failed to synergise the common interest of shareholders for corporate governance of listed companies and limited the function of the stock market as a mechanism to evaluate the performance of listed companies; the price discrepancy between negotiable shares and non-negotiable shares has resulted in unbalanced interests between tradable shareholders and non-tradable shareholders, etc.

Thus, these disadvantages of share structure call for action for changes. According to company law and the securities law of PRC, the reform on the share structure of listed companies which was designed to float the former non-negotiable shares for the purpose of unloading state-owned shares through the open market and protecting interests of shareholders, led by state council, was launched in 2005. A pilot

programme was introduced in late April 2005, and the non-tradable shares reform for all listed companies has been completed, by and large, by the end of 2006.<sup>15</sup> It is obvious that the historical hangover which has been afflicting China's stock market for years has been unshackled.

With China joining the WTO, thereby introducing more competition in all industries in the PRC, there are more PRC-based finance, telecommunications, energy, logistics and other companies coming into the stock market. More companies with businesses all over China will be ready to tap into the stock market. By the end of 2006, as Tables 3-2 and 3-3 show, a total of 1,434 companies were listed in both of SSE and SZSE with a total issued capital of 12,655.38 billion A shares and B shares; total market capitalization of A-share and B-share have reached 89,403.89 billion RMB Yuan and total trading volume of A-share and B-share were 16,145.22 billion shares. Meanwhile, to comply fully with China's Commitments in joining WTO, China's stock market is opening wider to the outside world. The CSRC and the People's Bank of China jointly promulgated "the Interim Administrative Measures of Domestic Securities Investment by Qualified Foreign Institutional Investors (QFII)" which took effect on December 1, 2002. The QFII scheme aims to perfect the investor structure of China's stock market by introducing foreign investors into the domestic stock market, to bring in the investment strategies and philosophies of developed markets, and to lead to more effective allocation of resources. Since 2002, foreign institutions have been allowed to invest directly in China's A-share market via QFII scheme, and foreign companies are also allowed to take over Chinese listed companies.<sup>16</sup> At the end of 2006, a total of 52 QFII has been licensed following the approval of the first OFII on May 23, 2003.

<sup>&</sup>lt;sup>15</sup> See "Guidance Notes on the Split Share Structure Reform of Listed Companies" issued by the CSRC, August 23, 2005

<sup>&</sup>lt;sup>16</sup> See "China's Securities and Futures Markets" issued by the CSRC, April 2004, p28-p30.

# 3.2 Additional Specifications about IPOs in A-share market

#### 3.2.1 Public Offerings of A-share

The Chinese State Council and the CSRC have made the best efforts to encourage and standardise IPO activities on the principles of "transparency, fairness, and justice". The Company law of PRC, the first law that regulated corporations and listed companies as well as share issues, became effective on July 1, 1994. The Securities Law of the PRC, that is the first comprehensive national law on securities in China, came into effect on July 1, 1999. Since then, a comprehensive law framework for stock issuance, listing and information disclosure has been formed with such administrative regulations, rules and bylaws based on Company Law and Securities Law of PRC. According to article 14 of Securities Law, Public Offering Review Committee (PORC) was also established in September 1999. PORC is composed of 25 members, including 5 CSRC staffs and 20 external experts and is responsible for making recommendations on stock issuance and listing applications to the CSRC. In practice, the recommendations by PORC should be accepted by CSRC. Therefore, the PORC is the de-facto decision-making body for public offering applications. Since the State Council and the CSRC took a series of important actions in 2001, there is now more transparency, fairness and justice in the course of stock issuance and listing. The Exchanges committed priority resources to encourage more listings from blue-chip companies while providing an excellent follow-up service to post-listing companies. They also made efforts to improve regulations and rules related to IPOs, trying to create a favourable market environment for new listings.

Currently the process of IPOs in China is quite similar to western practice except for the approval procedures of IPOs. In the approval procedures, the issuers must be under qualified sponsors' guidance for at least a year. After the guidance period, with the recommendation of sponsors, these companies may submit the application documents to the CSRC for approval. Then the issuers must disclose information to the public if the application has been accepted by the CSRC. Before the CSRC makes a decision, PORC will first carry out detailed verification and in turn submit their recommendations to the CSRC. The final decision will be made by the CSRC in accordance with the comments from PORC.<sup>17</sup> Table 3-5 shows that 70 companies made IPOs in 2006, raising 1,572.24 RMB Yuan in total.

#### 3.2.2 Significance of Pricing New Share in the Process of IPOs

Initial public offerings are the first step for new shares to float on the stock market. It will affect resource allocation and in turn significantly influence the whole economy. Pricing new shares is a critical step in the course of IPOs, because new share price will influence the efficiency of resource allocation in stock market. Given the offering cost, low new share prices will reduce the proceeds raised from IPO. On the other hand, too high IPO prices will discourage the interest of investors, increase offering cost, and enhance the risk of offering failure, although more funds can be raised. As far as investors are concerned, an extra profit will be obtained post-market by the investors who subscribe shares in a primary market given a low offering price. The pricing efficiency in a primary market means the rationality of IPO pricing, which can be testified by the divergence of offering price in primary market and market price in second market after listing. If the closing price on the first listing day is below the offering price, it signifies overpricing; at the same time, if the condition reverses, tremendous extra income can be earned on the first dealing day. This implies that the offering price is undervalued, which is also called underpricing, which is prevalent in the stock market according to research done by scholars abroad and domestically.

Generally speaking, the price of IPO has a strong relationship with offering modes, pricing methods and supervision system related to shares issuance and listing, all of which affect or even decide the IPO price in the primary market, influence the efficiency of the primary market and in turn makes a crucial impact on the whole economy.

<sup>&</sup>lt;sup>17</sup> See "China's Securities and Futures Markets" issued by the CSRC, March 2005, P8.

The development of IPOs of A-share in China, or put differently, the development of issuance and listing system in China has made a successful transition from an administrative approval system to approval system and is making great efforts towards a register system. At all levels, the features of each stage are directly related to the general government management capability and stock market development of the time.

# 3.3 The Evolution of Stock Issuance and Listing System in China's Stock Market

#### 3.3.1 Administrative Approval System (1993-2000)

The Administrative Approval System for securities issuance and listing was founded at an early stage in the development of China's stock market which came into being as the period of economic transition from the planned economic system to the market economic system. In practice, this Administrative approval system included the administrative quota control and enterprises recommended by government.

During a long period of time, the aggregate amount of new shares to be listed every year was determined by the quota. Chan, Wang and Wei (2004) state that under the quota control, the approval of share issuance and listing involves two stages. At the first stage, the quota for the following year was set jointly by the State Planning Committee, the Central Bank and the CSRC in terms of macroeconomic financial circumstances, development of state-owned enterprise reform and stock market operation situations. The State Planning Committee implemented the overall balance of the quota allocation. The quota was then distributed to each province and relevant ministry that owned key state-owned enterprises. At the second stage, each province or ministry chose the firms in light of certain criteria that reflected the regional development needs and differences in industrial and production structure. Within each regional quota, the local Securities Regulatory Authorities invited enterprises that wished to go public, and then made a selection based on criteria that combined good performance as well as sector development objectives. The local Securities Regulatory Authorities then forwarded the applications of the chosen enterprises to the CSRC for

final approval, though this was usually a routine matter. However, in practice, the quota for IPO often went to state-owned enterprises regardless of their performance and profitability. The merit of this system was the balance mechanism in dealing with the interests of different provinces and industries, and fitted to the macroeconomic circumstance and stock market operation situation at the early stage of China's stock market. Following the further development of China's stock market, more and more weaknesses in this system were exposed, such as the lacking of transparency and justice in the process of chosen issuers; inefficient resource allocation; weak self-discipline conception in the market; imperfect market mechanism etc. Those weaknesses have shown that the administrative approval system failed to meet the demands of development of China's stock market.

China first announced plans to scrap the decade-old IPO quota control system in June 1998, but full implementation was delayed because local Securities Authorities were slow to use up the outstanding quotas allotted to them in previous years following the onset of the Asian financial crisis in late 1997 which made equity fund raising less attractive to enterprises. Part of the quotas allotted for 1997 and 1998 remained in the hands of the local Securities Authorities and were allocated to enterprises in 2000.<sup>18</sup> The Administrative approval system including quota control and enterprises recommended by government was completely abolished in March 2001.<sup>19</sup>

#### 3.3.2 Approval System (2001-Now)

### 3.3.2.1 The Primary Stage of Approval System (2001-2003)

In March 2001, the CSRC, according to the provisions of the Securities Law and with the approval of the State Council, established and implemented the approval system for stock issuance and listing. The new system changed the practices of former administrative approval system for stock issuance and listing.

Compared to the administrative approval system, there were three differences between

<sup>&</sup>lt;sup>18</sup> See "Circular on the questions concerning stock issuing quota of the year 1997" issued by the CSRC, June 7, 2000.

<sup>&</sup>lt;sup>19</sup> See "the CSRC monthly bulletin white book" issued by the CSRC, 2, 2005.

them. Firstly, this new system stressed that securities firm acting as the lead underwriter were responsible for selecting and recommending enterprises for the approval of the CSRC. In practice, the securities companies should tutor the issuer for one year before submitting their application documents to the CSRC for approval. This action reduced the interference of government, especially reducing the impact of regional protectionism. Secondly, the quota control system stopped completely. The volume of new share issuance would be determined by the needs of enterprise growth and market operation situation. Market mechanism started to be respected. Thirdly, the issuers must disclose information to the public after their application documents were accepted by the CSRC which was compulsory, and the public offering review committee took preliminary verification and voted on the issuance applications. Those measures made the selection of listing firms more transparent and decreased information asymmetry between insiders and outsiders. It also helped to ensure that companies listing on the stock exchanges were of higher quality and investment funded by the equity financing was more efficient and profitable. The move, from quota control system to approval system was a significant step towards market economy. Due to an imperfect market mechanism and the lack of consciousness of self-discipline under specific application of this new system, some securities companies defaulted in recommending enterprises. They failed to disclose the hidden risks during investigation; some profit-hungry underwriters took actions of falsification with the enterprises to deceive investors and supervisory departments; some underwriters concentrated on helping the enterprises to be listed on the exchange, but they ignored the necessity to supervise the operation and growth of enterprises after being listed.<sup>20</sup> However, to correct the above weaknesses and to further perfect the new system, the CSRC carried out the Securities Issuance and Listing Sponsor System in 2004, which was an important action to strengthen stock issuance system reform.

#### 3.3.2.2 Sponsor System (2004-Now)

The securities issuance and listing sponsor system was officially promulgated on December 28, 2003 by the China Securities Regulatory Commission (CSRC) according to NO.18 Decree of Chairman of the CSRC, "Interim Measures on

<sup>&</sup>lt;sup>20</sup> See "The Target of Reform on Stock Issuance System---speech by Gao XiQing, Vice-Chairman of CSRC" issued by CSRC, May 14, 2000.

Securities Issuance and Listing Sponsor System", and was officially put in force on February 1, 2004. The main aim of the sponsor system was to introduce a market constraint mechanism in the primary market to deepen IPOs operation in China's stock market. Under this system, the registration administration system was established for sponsors. The securities firms which met the requirements set by CSRC could be registered as official sponsor institutions with CSRC, and the practitioners of securities companies could be registered as sponsor representatives after passing the examination set by CSRC. Companies going public should be "sponsored" by a sponsor institution and a qualified sponsor representative. Sponsoring could be divided into two stages. The first stage for sponsors was to help companies to finalise the listing application and go public. The sponsoring process had not finished after companies were listed. In fact, the second stage for sponsors was to carry on their continuous supervision for listed companies for more than two accounting years. This system was intended to intensify the responsibilities of sponsors, mainly, securities firms, in the process of issuing and listing of securities. Any misconduct of sponsors would be punished and recorded by the CSRC, which would be disclosed to the public. In a word, the sponsor system emphasised the duties and responsibilities of sponsors to assure credibility and accuracy of the information disclosed by companies to be listed.<sup>21</sup>

The implementation of the sponsor system further perfected the approval system and built up a solid foundation for the transition of the stock issuance and listing system from approval system to registration system.

# 3.4 The Changes of IPO Pricing and Allocation Mechanism in China's Stock Market

3.4.1 Major IPOs Pricing and Allocation Methods in the World The three major pricing and allocation methods in the IPOs process, fixed price public

<sup>&</sup>lt;sup>21</sup> See Decree of Chairman of the CSRC No.18 "Interim Measures on Securities Issuance and Listing Sponsor System" issued by the CSRC, December, 28, 2003.

offering, book building and auction, have been documented in the literature. They have advantages and disadvantages of their own, so they are adopted in different stock markets with different environments.

In fixed price public offering, the offering price was decided by negotiations between underwriters and issuers. Fixed price public offers is a kind of very simple IPO method with low cost of issuance and usually used in the emerging stock market or suitable to the small scale of issuance, as Busaba and Chang (2002) and Sherman (2004) point out that the issuers prefer a fixed price offer because it is cheaper for the firm to sell its offerings through the fixed price method, and Chowdhry and Sherman (1996b) explain that in fixed price public offering, information acquired during the subscription period arrives too late to be used in pricing the offering, so it is better for small orders to reduce the risk that the offering will fail. This method has become uncommon in recent years due to its weakness. Under fixed price public offering, Benveniste and Wilhelm (1990) argue that underwriters have no way to give investors the incentive to accurately report their information. The offering price cannot reflect the demands of market. As Ritter (2003) put forward, the offering price is set relatively early by underwriters and issuers before a lot of information about the state of demand is known. Chemmanur and Liu (2003) also demonstrate how fixed price public offers do not allow the offering price to reflect the information collected. At the same time, the underwriters and issuers do not have discretion to allocate the IPO shares according to their preference which was discussed by Chemmanur and Liu (2003). They argue that the issuers are allowed to control price but not allowed to control allotment in fixed price public offers. Biais and Faugeron-Crouzet (2002) suggests that fixed price public offers lead to inefficient pricing and winner's curse. This fixed price public offers method was adopted in Singapore, Finland and the UK before the early 1990 that is supported by Koh and Walter (1989) and Levis (1990). Sherman (2002) defines that auction method is a "one size fits all" approach. Underwriters set an amount of issuing share, but do not set offering price. The offering

bidding to listing lasts about one month. Sherman (2004) explains that there are two

price and allocation of shares are determined solely by bids and this process from

types of auction, one is a discriminatory price auction which is to pay what you bid, and the other is uniform price auction. Compared to other methods, because of the quality of investors, the price may be set too high or too low. There is no communication between issuers and investors; the issuers do not know how many bidders will choose to participate when making decisions. Levin and Smith (1994) point out that auctions cause too little or too much evaluation and too much remaining uncertainty that brings out increasing risks to both issuers and investors. On the other hand, there is no allocation flexibility in auction method that underwriters cannot allocate shares by their preference, and issuers just wait to see what happens after bidding, so auctions sell fewer shares on average. Biais and Faugeron-Crouzet (2002) sets the mode to analyse that Dutch auctions lead to inefficiencies, to the extent that they are conducive to tacit collusion by investors. This auction method was used in Italy, Sweden and the UK in the 1980s and Malaysia, Singapore and Turkey in the 1990s.

Ritter (2003) argues that book building precedes pricing and allotment in IPOs, which has been the prevailing US IPO distribution method for decades and began to be adopted in the UK in the early 1990s for privatizations, and is now predominant throughout Europe and Asia. The principle of this pricing method is that offering price and quantity of issuance are decided by the demands of investors and other collected information from the market. At the initial stage of book building, the underwriter sets an indicative price range on the issuer's behalf, then starts a "road show", which discloses information regarding an issuer's performance, and invites investors to bid for a price and an amount of shares. The bids may carry a price limit, such as within the indicative price range, or have no price limit. Thereafter, the underwriter collects bids from investors. At the end of the book building process the underwriter, on the issuer's behalf, fixes a price and allocates the shares according to the underwriter's preference. In the process of book building, two key features have been shown. One is that the share price is based on the bids from investors, especially qualified institutional investors and the other is that shares are mainly allocated to institutional investors.

Book building has become popular and is widely accepted in the US market, the Japanese market and the UK market because of its three major advantages:

There is a well communicated channel between issuers and investors in book building, which reduces the level of information asymmetry between issuers and investors. Pre-marketing and road show are very useful ways for investors to collect information from issuers and for issuers to gain a more accurate issue price from the information investors given (Sherman 2004);

Allotment flexibility and discretion in book building is useful for the issuer to choose an optimal structure of shareholders for their company. At the same time, this method reduces the level of information asymmetry between underwriters and investors. It also reduces the level of information asymmetry between institutional investors and individual investors, because individual investors can take a free ride from institutional investors taking part in the bidding process if they do not have better knowledge of evaluation;

A very short time lag between price setting and share listing in book building reduces sale risk for underwriters. In book building, the offering price will not be affected by the changes of demand from the market because the offering price is based on investors' demand and finally set just one day before issuing. This method with low risk is beneficial to investors, issuers and underwriters and is now widely used in most of the stock markets in the world.

## 3.4.2 The IPO Pricing and Allocation Mechanism in China's Stock Market

3.4.2.1 1984-1995: Fixed Price Public Offering In the mid 1980s, the capital market and shares were not popular in China. Share issuing was administratively allocated by the Chinese Government. Shares were offered at par value even with the guarantee of minimum yields and the offering price was undervalued. However, at the initial stage of the establishment of the stock market, a low offering price and high expected return stimulated the enthusiasm of investors to invest in China's stock market.

In October 1992, the SCSC and CSRC were founded which is a symbol of the establishment of a unified market supervision system. Under the quota control system, the quantity of issuance, offering price and P/E ratio were decided by the CSRC. The CSRC also took charge of the timing of IPOs according to the stock market situation and capacity (Chi and Padgett, 2005). At that time, the fixed price public offering, a simple pricing and allocation method, was introduced to China's stock market. But, in practice, the fixed price public offering was very different from other international

stock markets. It was an administrative pricing method. The formula of offering a price could be described as fixed P/E ratio multiplied by after tax earning per share that came from issuers' annual reports (Chi and Padgett, 2005). In this pricing formula, underwriters and issuers were not involved in the pricing process because the fixed P/E ratio was set by the CSRC and hence this offering price could not reflect the information of demand and supply from China's stock market. At this stage, the lottery method and online auction method as parts of fixed price public offers in China's stock market were used to allocate the new shares to Chinese investors. In 1992, shares allocation was based on a lottery mechanism. A fixed number of lottery forms was issued, such as limited quantity of lottery forms for each individual investor and fixed quantity of shares per lottery form. The chance of winning for each investor was unknown in advance. In 1993, the way of limiting the quantity of lottery forms were abolished and it was replaced by an unlimited number of lottery forms; individual investors could buy as many lottery forms as they liked, but each investor was required to put a certain amount of money into a special saving account when submitting applications for new shares, which could not be withdrawn until the process of lottery was completely finished. In 1994, online auction, as an experiment, was also introduced to bid for the price and the quantity of IPOs. Due to the small scale of the market and imbalance of supply and demand, the experiment failed. Online auction has only been used to bid for quantity of shares since 1994 (Chan, Wang and Wei, 2004).

Considering the basic market environment, the quality of investors and the structure of investors, the fixed price public offering was suitable for China's stock market at its early stage but, with the development of China's stock market and deepening of economic reform, its disadvantages became obvious. New share price determined by the government neglected market mechanism. This pricing method induced the undue "package" of issuers, brought false accounts and other actions of falsification, decreased the quality of information disclosure and increased the risks in the operation of issuers and investors after being listed. In a word, the defects of pricing by the government became obvious and obstructed the improvement of China's stock market.

## 3.4.2.2 1996-1999 Fixed P/E Pricing Method

Before the Security Law came out in 1999, a relative fixed P/E ratio was adopted in the formula set by CRSC to price new shares. During this period, the formula for calculating the offering price still consisted of after tax earning per share and P/E ratio. The P/E ratio was maintained by CSRC from 13 to 16, the upper limit was 16. The allocation method did not change over this period (Chan, Wang and Wei, 2004).

Under this method, the offering price still could not reflect the relationship between demand and supply in the stock market, which brought out a huge gap between offering price and market price. The offering price was underpriced while the market price in the secondary market could be more than doubled. Investors showed extreme enthusiasm for the stock market and forgot the increasing investment risk; some issuers even started to make false profit reports in order to raise more capital. Considering the fact that the market was dominated by a huge number of individual investors with only the barest knowledge of capital investment, the CSRC started to amend the measure of earning per share after tax to reduce the gap between offering price and market price.

1. In December 1996, the CSRC issued "Notice Concerning Several Provisions on Share Issuance", which stipulated that the after tax earning per share would be based on the arithmetic means of earnings per share in the past three years instead of expected earning per share. The aim of this amendment was to reduce the possibility of making a false profit report and improve the quality of information disclosure. However this amendment ignored the issuer's performance potential in the future.

2. In September 1997, a new notice was issued by CSRC, in which a further correction on the measure of after tax earning per share was required. The after tax earning per share was calculated by earning per share after tax one year before issuance and expected earning after tax per share in the current year. The new formula showed that consideration had been given to both past profit and expected profit, to some extent, this adjustment made the measure of earning per share much fairer than before.<sup>22</sup>

3. In March, 1998, the CSRC issued "Supplementary Circular Concerning Several Issues on Share Issuance". It was the third attempt to amend the measure of earning per share, which was calculated as expected earnings in the current year divided by weighted shares outstanding in the current year. This new formula actually considered

<sup>&</sup>lt;sup>22</sup> See "Circular on stock issuance of year 1997" issued by the CSRC, September 10, 1997.

the company's performance in the current year.<sup>23</sup>

During this period, the CSRC amended the pricing formula three times, and some problems were sorted out by the adjustment. Unfortunately, the essence of the administrative pricing method had not been changed at all. Underwriters and issuers still had no rights to decide the offering price according to demand and supply of the market. This administrative pricing method with uniform P/E ratio could not meet the requirements of a market-oriented stock market. Many weaknesses were explored in practice, especially the following two.

For one thing, underwriters' capabilities at sale and valuation were not actually reflected under this method; and investors didn't have the chance to be involved in pricing IPOs. Even worse, both underwriters and investors found that IPOs could bring high expected return without risk in China's stock market. On the other hand, due to the P/E ratio set by the CSRC, the offering price did not reflect any difference among issuers, and hence it couldn't help investors to distinguish between out-performing issuers and under-performing issuers. There was no way to reduce the information asymmetry between issuers and investors. At the same time, under the quota control system, the issuers didn't have rights to change the scale of issuing IPOs, and driving up the offering price was the only way to raise extra funds from the stock market. According to the pricing formula, P/E ratio was fixed by the CSRC, so earning per share manipulation was the only way to make issuers' dreams come true. This weakness induced some issuers to make a false profit report, therefore it reduced the quality of information disclosure in the stock market and hindered the development of China's stock market.

3.4.2.3 1999-2004: Various Allocation Methods and Book Building Pricing Method Based on "Security Law" implemented in July 1999, the offering price should be decided by negotiations between issuers and underwriters, and institutional investors would also be involved in the pricing process. A new change in the pricing method came out though the offering price should still have been approved by the CSRC. During this stage, the determination of offering price was allowed to exceed the interval of the offering price and also to break through the limitation of P/E ratio set before by the CSRC.

<sup>&</sup>lt;sup>23</sup> See "Supplementary Circular Concerning Several Issues on Share Issuance" issued by the CSRC, March 17, 1998.

On February 22, 1999, "Guidance on Trial Implementation of IPO Pricing Analysis Report" was issued by the CSRC. It required the issuers to submit a pricing analysis report signed by the issuers and underwriters in the application process. The measures of pricing, negotiated offering price and P/E ratio were required to be described in the report.

On July 28, 1999, CRSC issued "Circular on Further Perfecting Share Issuance Methods". There were three main points. Firstly, a new concept, strategic investors such as long term institutional investors, was introduced to China's stock market, and endowed with priority in purchasing IPOs shares. Secondly, the CSRC divided issuers into two groups according to their total shares outstanding; each group was required to employ different allocation methods for allocating IPOs shares. For group one, issuers with total shares outstanding less than 4 billions RMB, were required to apply an online auction and various lottery methods for allocating IPOs to investors; for group two, issuers with total shares outstanding over 4 billions RMB, a new method was provided by the CSRC. Under this new method, about 25-75 percent of total IPOs shares set by the CSRC was required to be allocated to long term institutional investors without an online auction, in the meantime, an online auction was also adopted for allocating IPOs shares to non-institutional investors. Lastly, book building, as a very popular means of pricing and allocating IPOs in the developed stock market, was introduced to China, which could be regarded as a significant step for Chinese IPOs mechanism reform.

On April 4, 2000, the CSRC announced a new notice as a supplement to the "Circular on Further Perfecting Share Issuance Methods" issued on the 28th of July 1999. In this new notice, firstly, the limit on issuance methods caused by total share outstanding was removed by the CSRC. Every issuer, no matter that its total shares outstanding were less than 4 billions RMB or over 4 billions RMB, could choose any issue method they want. Secondly, the allocation ratio ranging from 25 percent to 75 percent of total IPOs shares for long-term institutional investors was removed by the CSRC. The CSRC gave more rights to underwriters and issuers to make decisions on their own in accordance with the market situation and stock liquidity after being listed<sup>24</sup>.

<sup>&</sup>lt;sup>24</sup> See "Circular on Concerning amending correlative Provisions to the Circular on Further Perfecting stock Issuance Methods dated on July 28, 1999" issued by CSRC, on April 4, 2000.

"Notice" dated on July 28, 1999 plus "Amended Notice" dated on April 4, 2000 was the milestone in the course of Chinese IPOs reform.

1. Issuers, underwriters and institutional investors jointly decide the offering price in light of the demand and supply from the stock market for the first time, pre-marketing, "road show' and information disclosure, which could reduce the level of information asymmetry among investors, underwriters and issuers, and make an offering price in the primary market much closer to market price in the secondary market.

2. Cultivation and expansion of long-term institutional investors are useful in improving the structure of investors in China's primary market and assuring the bids from investors are more real, more veracious and reflect the demand of investors.

On the February 14, 2000, "Circular on Concerning Relative Issues on Placing New Shares to the Secondary Market Investors" was issued by the CSRC. In the new "Notice", a preferential allocation method for secondary market investors was introduced by the CSRC to China's stock market. The new Notice prescribed that a certain proportion of IPOs shares was allocated to secondary market investors. Investors with their own tradable shares in the secondary market could purchase certain amount of IPOs shares. The amount of IPOs shares investors could buy depended on the market values of A-shares they possessed. They could not place new shares if their market value was less than 10,000 RMB Yuan. There were three purposes to the launch of this method. Firstly, compared to the secondary market, there was expected high return with low risk in the primary market. This method led the secondary market investors to share expected high returns from the primary market with primary market investors, and helped to improve investors' interests and confidence in the secondary market. Secondly, the new method encouraged investors to keep shares and focus on long-term investment. Lastly, this method tried to encourage capital inflow from the primary market to the secondary market to stabilise the secondary market.

On August 21, 2000, "A Guidance Concerning Placing New Shares to Institutional Investors" was issued by the CSRC. The volume of issuance and the base offering price were determined by the issuer and the lead underwriter, and asked institutional investors to take part in a price inquiry. The offering price was finally decided by institutional investors' subscription. Two points were stressed. Firstly, the priority in purchasing IPOs shares for institutional investors was adjusted by the CSRC. For the amount of issuance less than 8 millions shares, underwriters and issuers weren't

allowed to allocate a certain ratio of IPOs shares to institutional investors; for the amount of issuance over 8 millions shares, underwriters and issuers were allowed to allot a certain ratio within 50 percent total new shares to institutional investors; for the amount of issuance over 20 millions shares, underwriters and issuers had the right to increase the allocation ratio for long-term institutional investors. Secondly, the CSRC strengthened its management on the qualifications of the institutional investors in their prospectus and each issuer could choose only two long term institutional investors. A special group was founded by the CSRC to examine and approve the qualifications of long term institutional investors.

## 3.4.2.4 2005-present: Price Enquiry System and Book Building

On August 28, 2004, the Amendment of Company Law and Securities Law was passed by the Standing Committee of the National People's Congress. China introduced a new pricing system for IPOs, also known as an IPOs enquiry system and which took effect on January 1, 2005. This represented one of the major efforts made by the CSRC to improve transparency in the pricing process and protect the interest of investors.

Under the new pricing method, investors had voices in the pricing process. It gave institutional investors the opportunity to influence major decision in the listed company they invested in. The issuers are required to disclose more information in addition to offering price and P/E ratio, such as the issue P/E ratio based on the earning forecast, price to book ratio, etc. The issuers and their sponsors have to publish their letter of intent to the public, commence promotion and price inquiry after their application is approved by the CSRC.

Price inquiry shall be divided into two stages, namely, preliminary price inquiry which is used to determine the range of offering price and P/E ratio and book-building price inquiry which is used to make a more rational final offering price. The preliminary price inquiry must be conducted in writing among at least 20 qualified institutional investors; (if 400 million shares or more are offered, the number of institutional investors must exceed 50). The range of the offering price and P/E ration will be determined according to the result of the preliminary price inquiry. Thereafter, issuers and their sponsors shall conduct a book-building price inquiry within the range of offering prices among qualified institutional investors. A final offering price will be determined by the result of the book-building price inquiry. Finally, the range of offering price, the final offering price with the basis of determination, and P/E ratio shall be reported to the CSRC for records and disclosed to public. As for allocation of new shares, the allocation preference is towards institutional investors who participated in the book-building price inquiry. The placing shares shall not exceed 20 percent of the total number of shares offered if less than 400 million shares are offered to the public; the placing shares shall not exceed 50 percent of the total number of shares or more are offered to public. In practice, the issuers and their sponsors have the right to adjust the above ratio in accordance with the market situation after approval of the CSRC.

This new amendment represents a milestone in the history of China's stock market, indicating the establishment of a market-oriented IPO pricing system. The enquiry system helped to improve the efficiency of resource distribution and facilitated healthy development of China's immature stock market.

It is worth mentioning that since the "Security Law" carried out in 1999, the CSRC has not given up the lottery method to allocate new shares. It is still applied to most cases especially in the cases of oversubscription, though many other methods were introduced, changed and even abolished with the development of China's stock market.

### 3.5 Present Status of China's Stock Market

Basically, there are three noticeable status quo in China's stock market.

### 3.5.1 Small Market Size

At present, China's stock market has already entered a new stage of development, but the scale of stock market is not large enough to compare with other stock markets.

In financial literature, generally the level of stock market development is measured by two indicators which are the size of the stock market and the liquidity of the stock market (Korajczyk, 1996). We use the ratio of market capitalisation divided by gross domestic product (GDP) to calculate the size of the stock market. Market capitalisation equals the total value of all listed shares. The assumption underlying the use of this variable, as an indicator of stock market development, is that the size of the stock market is positively correlated with the ability to mobilise capital and diversify risk.

Table 3-6 has shown that the size of China's stock market in terms of market capitalisation relative to GDP is far smaller than that in other stock markets, not to mention those mature markets such as the United States Market, United Kingdom market etc, although the ratio of market capitalisation and GDP is increasing. In 2005, China's market capitalisation-to-GDP ratio was 34.94 percent. Compared to other emerging markets, at the same time, Singapore and Malaysia were 178.39 percent and 139.06 percent, respectively. India was 68.6 percent 4, and Korea was 91.18 percent. The indicator of size not only represents the degree of the stock market development, but also represents the level of country economic development.<sup>25</sup>

## 3.5.2. High Speculation

Another indicator, the liquidity of the stock market, is employed to measure the degree of the stock market development. This liquidity measure complements the measure of the stock market size since markets may be large but inactive. Our measure of liquidity equals the ratio of the total value of trades on the major stock exchanges divided by market capitalisation and is frequently called the turnover ratio. The turnover ratio also represents the degree of activity in the stock market.

China's stock market liquidity in terms of the turnover ratio has decreased compared to when it started, but it is still much higher than other stock markets. As Table 3-7 shows, the total value of tradable shares-to-GDP ratio in China's stock market was the lowest. It did not increase although the Chinese GDP was raised. This situation was caused by the special Chinese shareholder structure in whereby 60-70 percent state-owned shares and legal person owned shares cannot be traded in the stock market. Compared to the same developing market, at the end of 2004, the ratio of total value of tradable shares-to-GDP was 38.74 percent India, Malaysia and Singapore were 54.48 percent, 50.55 percent and 75.64 percent, respectively. At the end of 2005,

<sup>&</sup>lt;sup>25</sup> Source: http://devdata.worldbank.org

China was 26.24 percent; India, Malaysia and Singapore were 55 percent, 38.27 percent and 102.62 percent, respectively. The fluctuation of Chinese turnover ratio was sharp compared to other countries. In Table 3-8, during the 14 years, from 1993 to 2006, China's gap between the highest level (329 percent) and lowest level (81.3 percent) of turnover ratio was highest (247.7 percent); India's gap between the highest and the lowest turnover ratio was 180.9 percent; the gap in Malaysia was 76.8 percent and the fluctuation of turnover ratio in Singapore's market was the smoothest in the four countries we discussed above - the gap was a mere 42.4 percent. Superficially, it seems that the turnover ratio of China's stock market is not abnormal, and the turnover ratio started to reduce after 2001 while China's stock market was developing and perfecting. However, if we take into account that approximately 60-70 percent of shares outstanding is not allowed to be circulated, China's stock market might have an extremely high turnover ratio of over 300 percent, which could be the highest in the world. Summing up these measures, it is not very difficult for us to argue that China's stock market at the moment is small yet highly active compared to other markets. To some extent, this high activity has turned out to be speculative.

### 3.5.3 Market Segmentation

A share and B share markets are segmented: price movements in the two markets are hardly related. The problem of market segmentation is a derivative of the compartmentalized share structure. At the beginning of experimentation with the B-share market, there were valid socio-political reasons and macroeconomic justifications for Chinese policy-makers to separate the A-share market from the B-share market. Chinese policy-makers did not want to weaken its strict capital control though they had been fully aware of the importance of foreign funds to Chinese economic reform. An integration of China's A-share market with B-share market would demand in effect the immediate realization of full convertibility of the Chinese currency on the capital account for which macroeconomic conditions in China were not ripe. More importantly, if the A-share market merged with the B-share market, it would aggravate the ideological debate on how not to erode public

ownership in the shareholding system, which has been the most difficult yet unsolved issue, and the B-share market would perhaps not be allowed to exist. The disappointing performance of the B-share market stems from its congenital deficiencies, which are gradually exposed when the A-share market and the H-share market expand steadily. Relative to the A-share market, the B-share market lacks liquidity and is very small. The non-convertibility restriction effectively rules out any arbitrage between A-shares and B-shares. Recently, the B-shares have traded at a discount. In addition, investing in China's B-share market is not easy. Owing to the low degree of transparency and legal framework in China's market, coupled with inadequate information dissemination, foreign investors are discouraged. Compared to the H-share market, the B-share market has no advantages in attracting foreign investors. There is a tendency for foreigners to buy the H-shares listed in Hong Kong rather than the B-shares listed in Shanghai or Shenzhen. This is because the listing requirements of the well-established stock markets such as the Hong Kong Exchange give more confidence to foreign investors.

If we agree with the argument that splitting up the national market into several markets reduces liquidity and increases uncertainty and volatility, and the greater the number of players in an efficient market, the more financial liquidity and depth will result, it is not very difficult for us to understand that the fundamental solution to the B share market is to merge with the A share market. Chinese policy-makers are fully aware of the above limitations of China's stock market development. Nowadays, they have been taking action, trying to perfect relevant regulations and laws to curb the speculation and bubbles while enforcing non-tradable shares conversion into tradable to tackle the compartmentalised share structure problem. In the near future, we should see Chinese policy-makers finding the solution to segmented A and B share markets and merging them together to form a united Chinese stock market.

All of us know that China's stock market is still in the primitive stage. But the development of the stock market is one of the most important elements of China's economic and financial reform. In around 15 years, China's stock market has emerged from virtually non-existence to being an important segment of the country's financial

sector. The establishment and development of China's stock market make great contribution to the Chinese SOEs ownership reform, to economic model transition and more importantly to changes in the ideology.

Table 3-1: Summary of Stock Issuing (A-share & B-share) (1991-2006)

Item / Year	1991	1992	1993	1994	1995	1996	1997	1998
Total Volume of Issuing (Billion Shares)	5.00	20.75	95.79	91.26	31.60	86.11	267.63	105.56
A Shares	5.00	10.00	42.59	10.97	5.32	38.29	105.65	82.80
B Shares	1	10.75	12.79	10.40	10.90	16.05	25.10	06.6
H Shares, N Shares	I	I	40.41	69.89	15.38	31.77	136.88	12.86
Total Raised Capital (Billion Yuan)	5.00	94.09	375.47	326.78	150.32	425.08	1293.82	841.52
A Shares	5.00	50.00	194.83	49.62	22.68	224.45	655.06	443.05
B Shares	1	44.09	38.13	38.27	33.35	47.18	80.76	25.55
H Shares, N Shares	I		60.93	188.73	31.46	83.56	361.03	37.95
Right Issue (A&B)		1	81.58	50.16	62.83	69.89	198.00	334.97
Source: Finance China Database, Development Research Centre of the State Council of P.R.China.	se, Developm	ent Research	Centre of the	State Council	of P.R.China.			

http://www.drcnet.com.cn/DRCNET.Channel.Web/FE\_data/fv\_index.aspx?subject=金融数据&version=normal

China Securities and Regulatory Committee, http://CSRC.gov.cn/cn/tongjiku/report/200012/c/8070305M200012\_1.htm

Continue: Table 3-1: Summary of Stock Issuing (A-share & B-share) (1991-2006)

Item / Year	1999	2000	2001	2002	2003	2004	2005	2006
Total Volume of Issuing (Billion Shares)	150.78	539.86	168.19	729.97	2191.09	1806.35	595.37	1459.26
A Shares	84.29	117.18	79.60	117.15	83.64	54.88	13.80	351.11
B Shares	1.77	7.10	0.00	00.0	0.01	1.53	0.00	0.00
H Shares, N Shares	23.07	359.25	46.54	589.01	2085.51	1712.00	452.74	905.72
Right Issues (A&B)	41.65	56.34	42.05	23.81	21.93	37.94	128.83	202.42
Total Raised Capital (Billion Yuan)	944.12	2089.20	1251.63	961.38	1357.24	1509.97	1882.51	5594.29
A Shares	572.47	993.87	750.79	723.07	744.67	731.10	335.51	2459.38
B Shares	3.79	13.94	0.00	0.00	3.56	27.15	0.00	00.0
H Shares, N Shares	47.07	562.00	70.25	181.75	534.30	647.24	1544.38	3130.59
Right Issues (A&B)	320.79	519.40	430.59	56.56	74.71	104.49	2.62	4.32

Source: Finance China Database, Development Research Centre of the State Council of P.R.China.

China Securities and Regulatory Committee, http://CSRC.gov.cn/cn/tongjiku/report/200012/c/8070305M200012\_1.htm http://www.drcnet.com.cn/DRCNET.Channel.Web/FE\_data/fv\_index.aspx?subject = 金融数据&version=normal

Table 3-2: Summary of Listed Companies and Listed Shares (A & B) (1991-2006)

Item \ Year	1991	1992	1993	1994	1995	1996	1997	1998
A Shares Only	14	35	140	227	242	431	627	727
B Shares Only	0	0	9	4	12	16	25	26
A&B Shares	0	18	34	54	85	69	92	80
A & H Shares	0	0	3	9	II	14	17	18
Total Number of Listed Companies	14	53	183	162	323	530	745	851
Number of Listed A-share	14	53	177	287	311	514	720	825
Number of Listed B-share	0	18	40	28	70	85	101	106
Total Number of Listed A&B Shares	14	72	217	345	381	599	821	931

Source: Finance China Database, Development Research Centre of the State Council of P.R.China. http://www.drcnet.com.cn/DRCNET.Channel.Web/FE\_data/fv\_index.aspx?

China Securities and Regulatory Committee. http://www.csrc.gov.cn/n575458/n775121/index.html

Continue: Table 3-2: Summary of Listed Companies and Listed Shares (A & B) (1991-2006)

Item \ Year	1999	2000	2001	2002	2003	2004	2005	2006
A Shares Only	822	955	1025	1085	1146	1237	1240	1293
B Shares Only	26	28	24	24	24	24	23	23
A & B Shares	82	86	88	87	87	86	86	. 86
A & H Shares	19	19	23	28	30	30	32	32
Total Number of Listed Companies	949	1088	1160	1224	1287	1377	1381	1434
Number of Listed A-share	923	1060	1136	1200	1263	1353	1358	1411
Number of Listed B-share	108	114	112	111	111	110	109	109
Total Number of Listed A & B Shares	1032	1174	1248	1311	1374	1463	1467	1520

Source: Finance China Database, Development Research Centre of the State Council of P.R.China.

http://www.drcnet.com.cn/DRCNET.Channel.Web/FE\_data/fv\_index.aspx?

China Securities and Regulatory Committee. http://www.csrc.gov.cn/n575458/n775121/index.html

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(1992-2006)	
Trading	
of Shares	
Summary of	
Table 3-3: 9	

Year	1992	1993	1994	1995	1996	1997	1998	1999
Total Issued Capital ( Billion Shares)	73.21	328.67	639.65	765.63	1771.42	1942.67	2345.35	2908.85
A Shares	61	300.18	592.63	704.08	1025.01	1646.13	2203.96	2757.88
B Shares	12.21	28.49	47.01	61.55	85.49	125.29	141.37	150.96
Negotiable Capital (Billion Shares)		81.62	185.63	234.98	560.82	671.44	740.94	952.34
A Shares	-	57.13	144.40	178.98	267.14	443.24	607.01	810.45
B Shares		24.48	41.22	45.99	78.41	117.57	133.91	141.88
Total Market Capitalization (Billion Yuan)	1048.00	3531.00	3690.61	3474.00	9842.00	17529.00	19506.00	26471.00
A Shares	978.00	3319.00	3516.00	3311.00	9449.00	17154.00	19299.00	26168.00
B Shares	70.00	212.00	175.00	164.00	394.00	375.00	206.00	304.00
Negotiable Market Capitalization (Billion Yuan)		862.00	969.00	938.00	2867.00	5204.00	5746.00	8214.00
A Shares		683.00	814.00	791.00	2514.00	4856.00	5550.00	7937.00
B Shares		179.00	155.00	147.00	353.00	348.00	196.00	276.00
Total Turnover (Billion Yuan)	681.00	3627.00	8128.00	4036.00	21332.00	30722.00	23544.00	31319.60
A Shares	650.00	3562.00	8003.00	4319.00	21052.00	30295.00	23418.00	31050.00
B Shares	31.00	105.00	125.00	78.00	280.00	427.00	127.00	270.00
Total Trading Volume (Billion Shares)	37.95	226.56	101.33	705.31	2533.14	2560.02	2154.11	2932.39
A Shares	33.37	209.17	98.80	681.07	2464.93	2471.30	2092.50	2809.75
B Shares	4.59	17.40	25.32	24.24	68.21	89.49	61.60	122.64
Shanghai Composite Index Low	292.76	750.46	325.89	524.43	512.83	870.18	1043.02	1047.83
High	1429.01	1558.95	1052.94	926.41	1258.69	1510.18	1422.98	1756.18
Shenzhen Composite Index Low	107.08	203.91	96.56	112.63	105.34	305.81	317.10	310.65
High	312.20	359.44	242.06	169.66	473.02	517.91	441.04	525.14
Source: Shanahai Stock Evchange http://www.s	t/up mob	httn://www.sse.com.cn/ns/zhs/vich/vhti/sse_stat_monthly_200612.ndf	ti/sse stat 1	nonthly 200	612.ndf			

Source: Shanghai Stock Exchange. http://www.sse.com.cn/ps/zhs/yjcb/ybtj/sse\_stat\_monthly\_200612.pdf

Continue: Table 3-3: Summary of Shares Trading (1992-2006)

Commue. Ladie 3-3. Summary of Shares Hauing (1772-2000)	TOTI SIIINE I	(0007-					
Year	2000	2001	2002	2003	2004	2005	2006
Total Issued Capital ( Billion Shares)	3613.39	4838.35	5462.99	5997.93	6714.74	7163.54	12655.38
A Shares	3 139.60	4650.45	5283.64	5808.31	6505.83	6936.08	12417.04
B Shares	173.79	187.90	179.34	189.62	208.91	227.47	238.34
Negotiable Capital (Billion Shares)	1233.32	1480.88	1679.94	1897.32	2194.15	2498.87	3431.38
A Shares	1078.33	1315.21	1508.43	1717.93	1996.65	2280.84	3202.42
B Shares	154.99	165.67	171.51	179.39	197.50	218.05	228.96
Total Market Capitalization (Billion Yuan)	48091.00	43522.00	38329.00	42458.00	37056.00	32430.00	89403.89
A Shares	47456.00	42246.00	37527.00	41520.00	36309.00	\$1811.00	88113.96
B Shares	635.00	1277.00	803.00	937.00	746.00	620.00	1289.93
Negotiable Market Capitalization (Bil Yuan)	16088.00	14463.00	12485.00	13179.00	11689.00	10631.00	25003.64
A Shares	15524.00	13345.00	11719.00	12306.00	10998.00	10028.00	23731.26
B Shares	564.00	1118.00	766.00	873.00	690.00	602.00	1272.38
Total Turnover (Billion Yuan)	60827.00	38305.00	27990.00	32115.00	42334.00	31665.00	90468.89
A Shares	60279.00	33242.00	27142.00	31270.00	41576.00	31099.00	89217.11
B Shares	548.00	5063.00	848.00	845.00	758.00	565.00	1251.78
Total Trading Volume (Billion Shares)	4758.36	3152.28	3016.19	4163.08	5827.73	6623.73	16145.22
A Shares	4558.00	2463.41	2859.49	3992.28	5672.91	6470.87	15808.62
B Shares	200.36	688.88	156.70	170.80	154.83	152.86	336.60
Shanghai Composite Index Low	1361.21	1514.86	1339.20	1307.40	1259.43	998.23	1161.91
High	2125.72	2245.44	1748.89	1649.60	1783.01	1328.53	2698.90
Shenzhen Composite Index Low	414.69	439.36	371.79	350.74	315.17	237.18	278.99
High	654.37	664.85	512.38	449.42	470.55	333.28	552.93
Common Chandra Ctarls Fuchance Httm://	on/Incilo	00C/871/400	/ 4 # 2002 / 1 / 4 / 8 / 2007 / 01 / 01 / 1 / 01 3 3 2 9 0 7 html	22007 html			

Source: Shenzhen Stock Exchange. http://www.szse.cn/UpFiles/Attach/1468/2007/01/04/1404332997.html

Table 3-4: Summary of capital Structure (1991-2006) (Billion Shares)

Year	1992	1993	1994	1995	1996	1997	1998	1999
Total Nonnegotiable Shares	47.69	279.85	458.50	546.96	789.69	1271.19	1664.85	2009.31
Sponsor's Legal Person Shares	40.35	229.28	377.86	475.69	671.63	1078.24	1429.34	1747.09
State-owned Shares	28.50	190.22	296.47	328.67	432.01	612.28	865.51	1116.07
Domestic Legal Person Shares	9.05	34.79	73.87	135.18	224.63	439.91	528.06	590.51
Foreign-funded Legal Person Shares	2.80	4.09	7.52	11.84	14.99	26.07	35.77	40.51
<b>Private Placement of Legal Person Shares</b>	6.49	41.06	72.82	61.93	91.82	130.40	152.34	190.10
Employee Shares	0.85	9.32	6.72	3.07	14.64	39.62	51.70	36.71
Others	00.0	0.19	1.10	6.27	11.60	22.87	31.47	35.41
Total Negotiable Shares	21.18	107.88	226.04	301.46	429.85	671.44	861.94	1079.64
A Shares	10.93	61.34	143.76	179.94	267.32	442.68	608.03	813.18
B Shares	10.25	24.70	41.46	56.52	78.65	117.31	133.96	141.92
H Shares	00.00	21.84	40.82	65.00	83.88	111.45	119.95	124.54
Total Shares	68.67	387.73	684.54	848.42	1219.54	1942.67	2526.79	3088.95
Ratio of Negotiable Shares to Total Shares	30.75%	27.82%	33.02%	35.53%	35.25%	34.56%	34.11%	34.95%
Others include Placing Issue, Former OTC Nonnegotiable Shares,	gotiable Shares		to funds and ir	Shares placed to funds and institutional investors, etc	stors, etc			

Source: Development Research Centre of the State Council of China.http://www.drcnet.com.cn/DRCNET.Channel.Web/FE\_data/fv\_index.aspx?

Continue: Table 3-4: Summary of capital Structure (1991-2006)

Year	2000	2001	2002	2003	2004	2005	2006
<b>Total Nonnegotiable Shares</b>	2437.43	3404.86	3838.54	4160.76	4572.24	4714.74	9259.78
Sponsor's Legal Person Shares	2163.87	3119.58	3491.20	3805.71	4171.82	4079.65	5221.34
State-owned Shares	1473.92	2410.61	2773.43	3046.53	3344.20		
Domestic Legal Person's Shares	643.75	663.17	664.51	699.95	757.32	I	
Foreign-funded Legal Person's Shares	46.20	45.80	53.26	59.23	70.30		-
Private Placement of Legal Person's Shares	214.20	245.25	299.70	309.71	345.03	407.58	115.83
Employee Shares	24.29	23.75	15.62	10.98	8.94	3.97	2.46
Others	35.07	16.28	32.02	34.36	46.45	223.54	3920.15
Total Negotiable Shares	1354.28	1813.16	2036.91	2267.70	2577.19	2914.77	5637.79
A Shares	1078.17	1318.13	1509.22	1714.73	1992.54	2281.16	3300.85
B Shares	151.57	163.09	167.61	175.35	197.01	218.08	229.00
H Shares	124.54	331.94	360.08	377.62	387.64	415.53	2107.94
Total Shares	3791.71	5218.02	5875.45	6428.46	7149.43	7629.51	14897.57
Ratio of Negotiable Shares to Total Shares	35.72%	34.75%	34.67%	35.28%	36.05%	38.20%	37.84%

Source: Development Research Centre of the State Council of China.http://www.drcnet.com.cn/DRCNET.Channel.Web/FE\_data/fv\_index.aspx?

Table 3-5: Summary of Capital Raised by A-share (1991-2006) (Billion RMB Yuan)

Year	1991	1992	1993	1994	1995	1996	1997	1998
Total Capital Raised by A -Share	5.00	50.00	276.40	99.78	85.51	94.34	825.92	778.02
Via: IPOs	5.00	50.00	149.83	49.62	22.68	224.45	555.06	409.09
Right Issues			1			,		30.46
Re-Issued of shares		-	81.58	50.16	62.83	69.89	170.86	334.97
<b>Convertible Bond</b>			1					3.50
Year	1999	2000	2001	2002	2003	2004	2005	2006
Total Capital Raised by A -Share	893.60	1527.03	1182.13	779.75	819.56	835.60	338.11	2463.70
Via: IPOs	497.88	812.37	534.29	518.96	453.51	353.42	56.72	1572.24
Right Issues	59.75	166.70	217.21	164.68	110.56	168.66	278.77	847.10
Re-Issued of shares	320.97	519.46	430.63	56.61	74.79	104.49	2.62	4.32
<b>Convertible Bond</b>	15.00	28.50	00.0	41.50	180.60	209.03	0.00	40.04
Number of IPOs	86	154	84	69	66	86	15	70
			-					

Source: China Securities and Regulatory Committee http://www.CSRC.gov.cn/cn/tongjiku/report/200701/c/8070201M200701\_1.htm

Table 3-6: Market Capitalization of Listed Companies (% of GDP)

Country\Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	45.07	65.50	61.52	63.84	73.05	69.02	86.14	102.75	93.28	98.57	80.08	107.69	118.42	109.77
Brazil	11.60	22.68	34.60	20.97	28.00	31.63	20.42	42.48	37.58	36.63	26.87	46.38	54.70	59.62
Canada	42.61	58.87	56.67	62.98	80.46	90.44	89.53	122.99	117.77	99.39	79.43	104.59	120.55	132.96
China	4.38	9.22	7.78	5.78	13.29	21.66	22.69	30.53	48.48	39.55	31.85	41.51	33.12	34.94
France	25.59	35.31	33.06	33.25	37.55	47.30	67.32	101.35	108.94	87.66	66.35	75.31	90.16	80.41
Germany	16.88	23.12	21.92	22.89	27.52	38.19	50.08	66.81	66.85	56.68	34.24	44.19	43.42	43.70
Hong Kong, China	165.38	321.15	198.84	210.57	282.69	234.43	205.74	373.02	369.41	303.87	282.87	450.93	519.45	566.24
India	26.66	35.77	39.68	35.81	31.81	31.36	25.42	40.98	32.17	23.08	25.80	46.38	55.74	68.64
Japan	63.71	69.38	78.15	69.93	66.85	52.36	64.96	104.58	67.90	55.09	54.45	71.86	80.23	104.47
Korea, Rep.	32.44	38.38	45.34	35.19	24.89	8.92	35.07	88.83	33.54	45.66	45.64	54.20	62.99	91.18
Malaysia	158.91	328.88	267.18	250.73	304.58	93.45	136.55	183.76	129.47	136.37	130.17	161.91	160.40	139.06
Singapore	98.16	228.24	190.32	175.59	162.30	110.90	114.65	240.17	164.83	137.06	115.18	157.37	159.59	178.39
<b>United Kingdom</b>	86.51	119.67	116.21	124.18	146.09	150.42	166.60	200.24	178.60	150.87	118.64	136.25	132.07	139.08
United States	71.42	TT.TT	72.21	93.40	93.40 109.30	137.06	154.71	180.50	154.68	137.50	106.53	130.66	139.77	136.90
Source: The World Bank Group, World Development Index (WDI) Online. http://devdata.worldbank.org/data-query/	ık Group,	World De	velopmen	t Index (V	WDI) Onl	ine. http:/	/devdata.v	vorldbank	.org/data-	query/				

Table 3-7: Stocks Traded, Total Value (% of GDP)		
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Country/Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	14.23	21.65	26.63	25.68	34.05	40.03	42.18	46.69	56.63	63.24	69.28	68.03	78.44	84.11
Brazil	5.26	13.10	20.05	11.25	14.47	25.06	18.62	16.26	16.83	12.80	10.46	11.95	15.49	19.37
Canada	14.63	25.64	28.97	31.58	43.91	46.99	54.46	53.99	88.84	65.46	56.06	54.74	66.95	75.87
China	4.00	9.85	17.44	6.84	29.90	38.79	27.93	34.81	60.20	33.89	22.93	29.06	38.74	26.24
France	8.88	13.49	22.54	23.22	17.60	28.24	40.15	54.10	81.57	80.41	64.14	55.30	63.68	69.38
Germany	21.63	15.12	21.46	22.73	31.53	24.80	34.88	38.01	56.26	75.07	61.08	46.98	51.11	63.08
Hong Kong, China	75.57	109.66	108.57	74.11	104.69	277.56	123.37	151.53	223.92	117.91	128.68	209.26	264.69	258.93
India	8.48	7.95	8.49	6.18	24.95	38.64	35.82	61.90	110.78	52.13	38.82	47.32	54.48	55.00
Japan	16.86	22.07	23.56	23.48	27.10	29.57	24.69	42.53	57.94	44.68	40.29	53.72	74.82	110.22
Korea, Rep.	35.19	58.46	67.56	35.81	31.79	33.32	42.14	185.41	208.73	146.08	144.84	112.26	93.89	152.73
Malaysia	36.74	229.71	169.79	86.48	172.10	153.03	41.41	61.29	64.77	23.60	29.03	48.21	50.55	38.27
Singapore	28.33	140.35	114.68	71.73	46.18	66.71	61.57	118.61	98.67	74.04	63.44	94.76	75.64	102.62
<b>United Kingdom</b>	35.74	44.01	44.56	45.00	48.56	62.48	81.91	94.06	127.20	129.71	121.53	122.48	173.88	189.51
United States	33.11	50.80	50.79	69.58	91.74	123.82	151.23	201.54	326.30	288.22	243.54	142.40	165.72	173.24

Source: The World Bank Group, World Development Index (WDI) Online. http://devdata.worldbank.org/data-query/

Table 3-8: Stocks traded, turnover ratio (%)

2006	:	42.5	:	136.4	:	:	96.4	:	173.7	33.2	:	:	:
2005	78.0	38.3	63.6	82.5	82.7	146.0	94.2	118.8	209.8	26.9	63.1	141.9	129.1
2004	75.5	34.8	63.1	113.3	81.7	123.7	115.5	103.5	168.5	33.4	51.2	140.5	126.5
2003	76.5	32.4	63.7	83.3	85.7	130.0	138.5	88.0	236.8	34.3	71.1	100.6	122.8
2002	77.2	35.0	68.2	85.7	88.0	140.5	225.8	71.0	303.3	17.5	39.3	135.4	202.5
2001	67.0	34.5	60.3	81.3	84.6	124.7	191.4	67.9	380.3	17.5	46.9	78.4	201.3
2000	56.5	43.5	77.3	158.3	74.1	79.1	133.6	6.69	233.2	44.6	52.1	66.6	200.8
1999	28.0	53.0	54.2	134.2	62.4	107.5	84.4	52.5	355.8	39.8	6.99	51.9	123.5
1998	51.9	70.9	67.0	130.1	68.7	144.9	56.0	40.3	184.7	30.9	50.5	53.4	106.2
1997	52.2	77.2	67.5	244.2	64.1	137.6	27.1	47.2	140.6	72.6	49.9	44.4	103.2
1996	52.2	61.1	62.2	329.0	49.8	123.2	17.4	37.1	110.3	66.0	28.7	36.8	92.8
1995	43.2	47.8	53.5	115.9	146.6	211.4	10.5	30.9	97.8	35.9	42.2	77.1	85.7
1993 1994	:	83.4	:	235.2	:	:	24.1	:	174.1	58.7	:	:	:
1993	:	32.6	:	164.0	:	:	27.5	:	172.2	94.3	:	:	:
Country	Australia	Brazil	Canada	China	France	Germany	India	Japan	Korea, Rep.	Malaysia	Singapore	UK	SU

Source: The World Bank Group, World Development Index (WDI) Online. http://devdata.worldbank.org/data-query/

## Chapter 4

# IPO Underpricing: Evidence from China's Stock Market

### **4.1 Introduction**

IPOs are the firm's first offerings of shares to the public for raising equity capital in the stock market. The best-known anomaly associated with the process of the Initial public offering (IPO) and which has been documented is the IPO underpricing. The IPO underpricing, namely the large initial returns, is measured from the offering price to the market price at the end of the first trading day. In 1963 the US Securities and Exchange Commission first empirically found there were positive average initial returns on companies going public. The discovery was based on casual observations and no explanations were offered, but academic studies followed. Logue (1973) and Ibbotson (1975) are among the first to use US data to document this anomaly in their academic literature. Ibbotson (1975) finds that the distribution of initial return is highly skewed, with a positive mean and a median near zero. Using data from the 1970s and 1980s, numerous studies have confirmed the underpricing anomaly. For instance, Ibbotson, Sinderlar and Ritter (1988) find that the average first-day IPO returns are 16.3 percent in the years 1960-1987. Ibbotson, Sindelar and Ritter (1994) report that for 2,439 US IPOs in 1975–1984, the average initial return on IPOs with an offering price of less than US\$3.00 is 42.8 percent whereas the average initial return on IPOs with an offering price of US\$3.00 or more is only 8.6 percent. Koh and Walter (1989) test the underpricing anomaly in the Singapore stock market and confirm its existence. Loughran, Ritter and Rydqvist (1994) not only confirm the existence of the anomaly but also argue that this anomaly is a common phenomenon both in the developed stock markets and in the emerging stock markets on the basis of his cross-country studies. The findings are robust throughout all 25 economies including the US, UK, Hong Kong and Taiwan China, the average premium ranging from 4 percent in the French study to 80 percent in the Malaysian study.

The anomaly has already been well documented and many different IPO underpricing hypotheses have been developed, but satisfactory explanations have not yet been

found. Economists continue to be haunted by these questions: why the shares are "abnormally" discounted to the outside investors both systematically and statistically? Why would a firm willingly underprice its shares at the cost of limiting the equity capital received? Though IPO underpricing anomaly has been highlighted and studied for a very long time, unfortunately this topic has barely been touched upon by Chinese scholars. Su (1998), in conjunction with Fleisher, might take a lead in exploring the IPO underpricing phenomenon in China's stock market using the IPO underpricing theories. They constructed their sample with two data sets: one is a sample of 308 Ashare IPOs and the other is a sample of 57 B-share IPOs during the period of 1988M12-1996M1 and their findings were rather astonishing: the mean IPO initial return was 948.59 percent, which is much higher compared to those that have been reported in other country studies conducted by Loughran, Ritter and Rydqvist (1994). In other words, the first-day market closing price is on average almost eleven times as high as the initial price offered to the domestic investors. But generally speaking, the topic of IPO underpricing in China's stock market is under-researched. The empirical tests of the existence of the underpricing anomaly in China's stock market are seldom seen, let alone systematic research applying the latest IPO underpricing theories with China's stock market.

The aim of this chapter is to investigate if the underpricing anomaly exists in China's stock market and look for the explanations of this phenomenon. This study is going to relate IPO initial returns to variables either widely used in studies of IPO underpricing in literatures or elaborately selected to take into account some special factors, which might also influence IPO underpricing in China's stock market, hoping to make a valuable contribution to better understanding of IPOs' anomalies in China's stock market. At the same time, I would like to compare my findings with those from similar studies in the literature.

A brief literature review will be conducted to review the developments of the IPO theory and practice in section 2. Section 3 introduces an institutional background regarding China's stock market in order to have a better understanding the methodology put forward in section 4. On the basis of empirical studies, conclusions will be drawn in section 5.

#### **4.2 Literature Review**

Since the IPO underpreing anomaly was discovered, it has been well documented in the literature. To provide answers to this anomaly, many IPO underpricing theories have been developed to address why the shares are "abnormally" discounted to outside investors both systematically and statistically, in other words, the sudden wealth earned by outside investors. Many different theories based on microeconomic uncertainty and information asymmetry focus on various aspects of the relationships between investors, issuers and the investment bankers taking the firms public.

## 4.2.1 The Winner's Curse Hypothesis<sup>1</sup>

An important rationale for the underpricing of IPOs is the "winner's curse" explanation introduced by Rock (1986), incorporating the information asymmetry and rationing. On the basis of rationing due to oversubscription to a fixed number of shares sold at a fixed offer price, Rock (1986), for simplicity, assumes that all investors are grouped into two categories: completely informed, and completely uninformed, with respect to knowledge of the future market price of the share being sold. In his winner's curse hypothesis, informed investors will attempt to buy shares only when an issue is underpriced. Uninformed investors thus face an adverse selection or a winner's curse: if they get all of the shares they demand, it is because the informed investors do not want the shares. Faced with this adverse selection problem, uninformed investors will only submit purchase orders if, on average, IPOs are underpriced sufficiently to compensate them for the bias in the allocation of new issues. The IPOs must be underpriced to induce uninformed investors to join the bid. Put differently, prior knowledge of the absence of the informed investors could reduce the winner's curse problem and consequently the need for underpricing. Using Rock's framework, Carter and Manaster (1990) model the role of the investment banker's role in the IPO underpricing. They show that more prestigious investment bankers are associated with less risky IPOs. To preserve its reputation, the prestigious underwriter screens the firms that go public and selects the less risky ones, using information unavailable to the general public. This, in turn, reduces the uncertainty and

<sup>&</sup>lt;sup>1</sup> The term "winner's curse" is from the auction literature: In a sealed bid auction with bidders who have some independent private information on the value of the item being auctioned, the highest bidder at the auction finds out ex post that her valuation was probably too high. Thus, the person who wins the auction may be cursed by learning that s/he overpaid.

information asymmetry between informed and uninformed. Investors know that by subscribing to issues of reputable investment banks they face less risk, and, consequently, the initial day return is lower for these issues.;

Besides, a report from the World Bank (1995) argues that the choice of offering mechanism adopted for the new issue affects the degree of underpricing. Chowdhry and Sherman (1996) compare some key features between the US Firm Commitment method and the UK Open Offer for Sale. They find the UK-style offering tends to lead towards greater underpricing and further argue that the winner's curse or the adverse selection could be reduced by the allocation method. In addition, they also find that IPO underpricing is positive related to the time period between IPO date and first trading date.

The basic idea behind the winner's curse is quite simple. Firstly, underpricing should decrease as information becomes less heterogeneous across investor groups. At the extreme, when all outside investors possess the same information about the firm, there should not be any underpricing. Secondly, through the choice of the underwriter, the firm can reduce some of the uncertainty about its prospects and therefore reduce the need for underpricing.

Yu and Tse (2006) use 343 online fixed-price offerings from November 1995 to December 1998 to examine the degree of underpricing and investigate if the winner's curse hypothesis, the ex ante uncertainty hypothesis and signalling hypothesis exist in China's stock market. Empirical results show that the level of underpricing is high, on average 123.59 percent. They find that the winner's curse hypothesis and the ex ante uncertainty hypothesis have very high explanatory power to underpricing in China's stock market, but the signalling hypothesis is not valid in China's stock market. Chi and Padgett (2005) test the degree of underpricing and seek explanations of IPOs underpricing in China's stock market using data on 668 new shares from 1996 to 2000. They find the initial return is 124.95 percent which is similar with the finding of Yu and Tse (2006).

### 4.2.2 The Signalling Hypothesis

As for the signalling hypothesis, underpricing is an equilibrium outcome for an issuer to signal its quality to the investors. Various signalling mechanisms have been advocated in order to help convey entrepreneurs' private information about the value of the firm to potential stockholders and in order to add credibility to the information given in the prospectus. Allen and Faulhauber (1998), Grinblatt and Hwang (1989), and Welch (1989), argue that "good" firms try to distinguish themselves from "bad" firms by incurring a cost that less successful firms cannot profitably sustain. This cost is the underpricing of the initial issue. In other words, the better firms will underprice more and will have higher earnings, dividends and payout ratios. Ritter (1991) confirms that there is a significant negative relationships between IPO underpricing and the past information for the firms such as the earnings per share prior to going public and the age of the firm going public.

Welch (1989) formalises the notion that good firms underprice to "leave a good taste in investors' mouths." The hypothesis is that the owner's incentive to leave a good taste is the possibility of coming back to the market for the sale of additional securities on more favourable terms. The cost of the underpricing could then be covered in the aftermarket by selling the shares retained at the IPO, or by issuing further shares through seasoned equity offers (SEOs).

Grinblatt and Hwang (1989) also argue that firms employ two signals to convey the mean and variance of their future cash flow: the degree of underpricing and the fraction of shares held by insiders. The intuition is that entrepreneurs who retain a large investment stake in the company only do so if they are very confident about the firm's prospectus. Investors recognize this commitment by the entrepreneur and accordingly place a higher valuation on the IPO.<sup>2</sup> There is another signal that cannot be failed to notice: IPO underpricing could be used as a means of privatisation of the State-owned enterprises (SOEs). Privatisations of the larger state-owned enterprises are usually accomplished through the capital markets via public share offerings, or share issue privatisations. IPO underpricing of state-owned enterprises, therefore, could be regarded as a strong signal for a government to be committed to pro-market privatisation policies.

Perotti (1995) argues that the government's dual role, both the issuer and the regulator, puts it in a position to affect the value of the firm after the sale. This

<sup>&</sup>lt;sup>2</sup> This suggests that IPO underpricing is an increasing function of insider ownership for a high quality issuer. Howere, Hughes (1986) argues that, other things equal, the greater is the fractional insider ownership, the less is the information asymmetry, and the lower the need to underprice a new issue. In addition, for a given amount of funds to be raised, if the firm issues few shares (i.e., retains a larger insider ownership), the offer price will be higher and underpricing will be lower.

exposes private investors to an information asymmetry, not about the value of the SOE's assets but regarding a government's commitment to privatisation.

Perotti (1995) presents a model of IPO underprice with government policy uncertainty, where a government retains a large stake of the state-owned enterprises and underprices partial sales to signal its intent to commit credible future privatisation policies. He further argues that a populist government's motives for privatisation are to raise money and to acquire the politically valuable option to redistribute firm value after privatisation because the populist government cannot support privatisation in the future for political reasons and will choose to sell a large portion of an SOE but underprice little at all. On the contrary, a committed government values the benefits of privatisation more than the lost proceeds due to IPO underpricing and is motivated to signal its identity. The committed government is willing to accept the lower proceeds because signalling commitment immediately initiates the economic benefits of privatisation. Under policy uncertainty, a committed government may choose to retain a large stake of the state-owned enterprises and underprice a partial sale to signal its intent to credibly commit to future pro-market privatisation policies.

In short, the signalling hypothesis argues that underpriced new issues leave a good taste with investors, allowing the firms and insiders to sell future offerings at a higher price than would otherwise be the case. Issuers with larger IPO underpricing are more likely to issue subsequent equities and more likely to issue larger amounts of subsequent equities because a high value issuer can afford to underprice its IPO. Earnings and dividend policy after the IPO help the market revise its views about the firm's quality. In addition, insider holdings as well as underpricing signal the firm's value. As for a government issuer, IPO underpricing could be used as a means of privatisation of its SOEs.

Chen, Firth and Kim (2004) employ 701 A-share IPOs and 117 B-share IPOs in the period 1992-1997 to investigate the degree of underpricing and the explanations of IPOs underpricing. They find the initial return of A-share is 145 percent, much higher than the initial return of B-share which is just 10 percent. The main reasons for IPOs underpricing in A-share stock market are twofold, firstly it is for future equity offerings which is consistent with the argument of Welch (1989), and secondly is the ownership structure of the company. A large proportion of shares owned by state and legal persons leads to greater underpricing which is consistent with Mok and Hui (1998). The results from Chi and Padgett (2005) and Yu and Tse (2006) show that the

signalling hypothesis is not valid in China's stock market. Su (2004) adopts 587 IPOs from January 1994 to December 1999 to examine the degree of underpricing of IPOs in China's stock market and seek explanations for underpricing to China's stock market. He finds that "winner's Curse" hypothesis and signalling hypothesis can be used to explain underpricing phenomena in China's stock market.

## 4.2.3 The Ownership Dispersion Hypothesis<sup>3</sup>

Brennan and Franks (1995), Mello and Parsons (1998) and Booth and Chua (1996) develop a new explanation of the underpricing anomaly: the ownership dispersion hypothesis. They argue that an issuing firm may intentionally underprice their shares in order to generate excess demand and be able to have a large number of small shareholders. There are at least two reasons for firms to do so. For one thing, dispersed ownership may improve liquidity, and this strategy would tend to make for a lower rate of return required by investors and thus a higher equilibrium price for the firm's shares. For another, IPO underpricing would lead to oversubscription, which allows the issuer both to ration the allocation of shares and to discriminate between applicants so as to reduce the individual size of new block-holdings post-IPO. The greater dispersion of outside holdings reduces incentives for the new shareholders to monitor the current management. Presumably, the managers of some firms are willing to underprice for control reasons, to the detriment of shareholders. Other managers may want to underprice in order to enhance liquidity, to the benefit of shareholders.

This dispersed ownership will both increase the liquidity of the market for the stock, and make it more difficult for outsiders to challenge managements. Issuer's demands for broad ownership dispersion and a liquid secondary market for the shares determine the equilibrium level of underpricing.

Maug (1998) provides a model that links underpricing to market liquidity, rationing and discrimination against large investors in the IPO.<sup>4</sup> Chan, Wang and Wei (2004)

<sup>&</sup>lt;sup>3</sup> The IPO underpricing anomaly has already been well documented and many different IPO underpricing hypotheses have been developed. This chapter aims to test these three hypotheses using the data generated from China's stock market. Besides these three hypotheses, several others have also been developed to give explanations for this anomaly such as the costly information acquisition hypothesis (Benveniste and Spindt 1989) and the cascade hypothesis (Welch 1992). For details, please refer to Roger G. Ibbotson and Jay R. Ritter, Chapter 30, *Initial Public* Offerings, R. Jarrow et al., Eds, Handbooks in Operations Research And Management Science, Vol. 9, Netherlands: Elsevier Science B.V., 1995. We might carry on to test them in our future research.

present that IPOs underpricing is positive to the number of days between offering and listing which is consistent with the finding of Mok and Hui (1998); is negative to the number of shares being issued and is also positive to the number of stock investors in the province from which the IPOs come. Mok and Hui (1998) argue that high equity retention by state, a long time-lag between offering and listing and ex-ante risk of new shares are key determinants of market-adjusted IPOs underpricing.

## 4.3 Methodology

In this chapter, we would like to integrate the winner's curse hypothesis, signalling hypothesis and ownership dispersion hypothesis to empirically test the existence of the underpricing anomaly in China's stock market and explore the causes for this phenomenon, using factors either documented in the literature or representing the special status of China's stock market. At the same time, we would like to compare my findings with those from similar studies in the literature as well.

## 4.3.1 Empirical Study of Underpricing Anomaly

Stage 1: At the first stage, we are going to set up a univariate model to test the hypothesis that the underpricing anomaly does exist in China's stock market on the basis of two measures of the IPO underpricing extent. If the hypothesis cannot be statistically rejected, we then go to the second stage.

4.3.1.1 Measurement of the IPO underpricing

To measure the extent of IPO underpricing, two measures are calculated for each initial public offering as follows:

1) A simple IPO return: 
$$SR_i = \frac{P_{i1} - P_{i0}}{P_{i0}}$$

where  $SR_i$  is defined as the simple IPO return of the *i*th company going public,  $P_{i0}$  the initial offer price for the *i*th company and  $P_{i1}$  the closing price for the *i*th company on the first trading day.

<sup>&</sup>lt;sup>4</sup> In contrast, Stoughton and Zechner (1995) provide a model where rationing in the IPO is used to favour large rather than small shareholders so as to obtain an ownership structure that improves monitoring of the firm by outsiders and thereby raises firm value.

And then the average simple return  $(ESR_i)$ , the mean of *n* IPOs, could be measured

as: 
$$ESR_i = \frac{1}{n} \sum_{i=1}^n \frac{P_{i1} - P_{i0}}{P_{i0}}$$

The simple return for an individual stock is a measure of the stock's performance during its IPO and may fluctuate in response to shocks affecting either itself solely or the stock market as a whole. In order to concentrate on the extent of IPO underpricing for each individual IPO precisely, an alternative measure, a market-adjusted simple return, is introduced controlling the impact of those shocks related to the whole market.

2) A market-adjusted simple IPO return: 
$$MSR_i = \frac{P_{i1} - P_{i0}}{P_{i0}} - \frac{P_{m1} - P_{m0}}{P_{m0}}$$

Where  $MSR_i$  is defined as the market-adjusted simple IPO return of the *i*th company going public,  $P_{m1}$  is the closing price of the appropriate benchmark on the first trading day of the new issue *i* and  $P_{m0}$  is the closing price of the benchmark corresponding to the last offering day of the new issue *i*. In this study, the Shanghai A-share Price Index is used as a proxy for the benchmark when the new issue will be listed on the Shanghai Stock Exchange while the Shenzhen A-share Price Index is used as a proxy for the benchmark when the new issue will be listed on the Shenzhen Stock Exchange.

And then the average market-adjusted simple IPO return  $(EMSR_i)$ , the mean of n

IPOs, could be measured as: 
$$EMSR_i = \frac{1}{n} \sum_{i=1}^n \left( \frac{P_{i1} - P_{i0}}{P_{i0}} - \frac{P_{m1} - P_{m0}}{P_{m0}} \right).$$

In order to avoid spurious empirical results, natural logarithm is introduced to transform financial data in the hope of stabilising the mean and variance of a variable and simplifying the calculation. Therefore,  $SR_i$ ,  $ESR_i$ ,  $MSR_i$  and  $EMSR_i$  could be re-expressed respectively as follows:

$$SR_{i} = \frac{P_{i1} - P_{i0}}{P_{i0}} \approx \ln P_{i1} - \ln P_{i0}$$

$$ESR_{i} = \frac{1}{n} \sum_{i=1}^{n} \left( \frac{P_{i1} - P_{i0}}{P_{i0}} \right) \approx \frac{1}{n} \sum_{i=0}^{n} \left( \ln P_{i1} - \ln P_{i0} \right)$$

$$MSR_{i} = \left( \frac{P_{i1} - P_{i0}}{P_{i1}} \right) - \left( \frac{P_{m1} - P_{m0}}{P_{m1}} \right) \approx \left( \ln P_{i1} - \ln P_{i0} \right) - \left( \ln P_{m1} - \ln P_{m0} \right)$$

$$EMSR_{i} = \frac{1}{n} \sum_{i=1}^{n} \left[ \left( \frac{P_{i1} - P_{i0}}{P_{i1}} \right) - \left( \frac{P_{m1} - P_{m0}}{P_{m1}} \right) \right] \approx \frac{1}{n} \sum_{i=1}^{n} \left[ \left( \ln P_{i1} - \ln P_{i0} \right) - \left( \ln P_{m1} - \ln P_{m0} \right) \right]$$

4.3.1.2 IPO Underpricing Univariate Model

The model could be expressed as follows:

 $IPORENT = \alpha + \beta RCIPIPO + \varepsilon$ 

In this model, we would like to test the hypothesis: there is a positive relationship between the reciprocal of IPO price and the IPO initial returns, that is, the smaller the IPO price, the larger the IPO initial returns, that is to say, the IPO underpricing anomaly does exist in China's stock market.

Dependent variable *IPORETN:* either the natural logarithm of the simple IPO return  $SR_i$  or the natural logarithm of the market-adjusted simple IPO return  $MSR_i$ , which have been defined above. We use these two measures of return in our empirical work to generate more accurate results (Campbell, Lo and Mackinlay, 1997).

Incidentally,  $\alpha$  and  $\beta$  are coefficients and  $\varepsilon$  is a stochastic error term in the model.

Explanatory variable:

*RCIPIPO:* the reciprocal of IPO price; IPO initial return is measured by the price of IPO( $P_0$ ) and the first day market closing price( $P_1$ ), it means that the IPO initial return includes the offering price and they may be spuriously negative correlated. To correct for this possible spurious correlation, we use the reciprocal of IPO price (RCIPIPO) as an explanatory variable.

Stage 2: We are going to launch univariate analysis to respectively test the validity of the winner's curse, signalling hypothesis and the ownership dispersion hypothesis. Besides, we also examine a relationship between the IPO returns and those variables elaborately chosen to represent the special status of China's stock market.

Dependent variable: *IPORENT*, as defined earlier, is either IPO simple return or IPO market-adjusted simple return and prospective explanatory variables are as follows:

*METHODS*: the choice of share allocation method. This dummy variable will take a value of unity if the shares are allocated by the network bidding and zero if by a local issuing agency testing which of the allocations will lead to greater/less underpricing and increase/reduce the adverse selection or the winner's curse, namely, testing the winner's curse hypothesis: the allocation method could affect the adverse selection problem.

*LNAGE*: the age of the firm, the reason for selecting this variable is nearly the same as the reason for selecting EPS, testing if there is a significant positive/negative relationship between IPO underpricing and the past information for the firms to support the signalling hypothesis or winner's curse hypothesis.

*LNDAYS*: number of days elapsed between the announcement of an IPO and the firstday market trading, testing if IPO underpricing is positively related to the time period between IPO date and first trading date.

*LNEPS*: the earnings per share prior to the IPO issue, ratio of the profit a year before the IPO date divided by the outstanding shares at the time of the IPO. The reason for selecting this variable is that it could be regarded as a signal of the quality of the firm going public. Allen and Faulhaber (1989) argue that the better firms having higher earnings and will underprice more while Rock (1986) argues that the degree of information asymmetry is a decreasing function of earnings per share. We would like to examine if there is a significant positive or negative relationship between IPO underpricing and the past information for the firms to support signalling hypothesis or winner's curse hypothesis.

LNINSIDER: the natural logarithm of  $\frac{Insideownership}{Totalshares}$  standing for the ownership

structure and the degree of the ownership dispersion is used to test if underpricing and insider ownership are positively related to each other.

*LNIPOSZ*: natural logarithm of IPO size. We use the gross amount of outside capital raised as a proxy for firm size, testing the signalling hypothesis: the smaller the IPO size, the Larger the IPO initial returns.

*LNLOTTERY:* as an indicator of oversubscription to the IPO offer. A small value lottery signifies that the outside shares are more dispersed and are allocated more evenly, testing if there is a negative relationship between the IPO return and the lottery.

*LNMKGDP*: natural logarithm of the ratio of the IPO capitalization to GDP, which is a proxy for the aggregate supply for shares relative to the aggregate demand for shares. We argue that underpricing is partially due to a relatively small aggregate supply of shares.

*LNSEOSZ*: natural logarithm of subsequent equity offerings size, testing the signalling hypothesis: there is a positive relationship between IPORENT and LNSEOSZ, that is, issuers with larger IPO underpricing are more likely to issue subsequent equities and

more likely to issue larger amounts of subsequent equities. There is a positive relationship between IPORENT and LNSEOSZ.

*LNSHRPP*: logarithm of the average number of tradeable shares each shareholder possesses, representing the degree of the ownership dispersion.

*LNSTATE*: logarithm of the size of single large shareholder (state shares and stateowned legal person shares), standing for government policy uncertainty regarding the privatisation.

Stage 3: According to the general to specific economic modelling approach in the sense that one starts with a model with several regressors and then whittles down to a model containing only the "important" variables (Gujarati, 1995). On the basis of the univariate analysis a finally augmented multivariate model will be set up, integrating the winner's curse hypothesis, the signalling hypothesis, the ownership dispersion hypothesis and adding some new variables standing for China's stock market features to see if they make contribution to the underpricing of Chinese IPOs and better explanations of the underpricing of Chinese IPOs.

Throughout the empirical work in this chapter, two statistical estimation methods will be employed. One is the method of ordinary least squares (OLS) and the other is the robust regression method. Certain assumptions such as errors are normally, independently, and identically distributed (normal *i.i.d.*), OLS has some very attractive statistical properties that have made it one of the most powerful and popular methods or regression analysis. Unfortunately the flip side of this statement is often overlooked: if errors are not normal, or not *i.i.d.*, in other words, one of the assumptions of OLS is not held, then other unbiased estimators might outperform OLS. As an alternative to OLS, we also apply the robust regression estimation method. This method aims to achieve almost the efficiency of OLS with ideal data and substantially better-than-OLS efficiency in non-ideal (for example, non-normal errors) situations (Gujarati, 1995).

### 4.3.2 Sample Description and Data Collection

Our sample firms are obtained from the 1991-2000 editions of the *Shanghai and Shenzhen Stock Exchange Statistics Annual.* The sample data set contains 698 firms going public and subsequently listed either on Shanghai or Shenzhen Stock Exchange during the sample period from January 1994 to December 2000 (72 months). Firms are selected from the list of listed firms if

1) They make a firm commitment offering of at least ¥1 Chinese currency per unit,

2) The unit contains only a single share of stock (no warrants attached),

3) The issue is an initial public offering, and

4) The firm is, of course, subsequently listed on either the Shanghai Stock Exchange or Shenzhen Stock Market.

As at the end of 1993, there were 183 firms going public and 106 firms were listed in the Shanghai Stock Exchange and 77 firms listed in Shenzhen Stock Exchange.<sup>5</sup> These firms are not included in our sample set. There are two reasons for this. China's stock market started at the end of 1990. During the period between 1991 and 1993, stock price volatility in China's stock market was rather high and there was a rather high positive correlation among all the stocks, despite the fact that the listed companies had quite different attributes and business performance. Therefore, the data, especially the first-day market closing prices prior to 1994 are full of speculative bubbles and cannot be used. Another reason for this is related to the Chinese accounting system. The traditional Chinese accounting system was brought from the former Soviet Union in the early 1950s for a highly centralised economy and was quite different from the generally accepted accounting principle in the market economies. Different industries had different accounting regulations enforced by different government departments, and therefore, the financial report formats from different industries were quite different and led to lack of comparability. On July 1 1993, the new "Enterprise Accounting Standards" and "Enterprise Financial Accounting Principle" came into effect and brought Chinese accounting practices closer to international standards. We exclude those 183 firms before January 1994 so that the variables regarding listed company financial ratios are constructed under the new accounting standard. During the period of 1994M1 to 1999M12, there were 766 firms going public and then listed in either Shanghai or Shenzhen stock exchanges.<sup>6</sup> Another 78 firms are also rejected either because they have been listed for less than two years or because they do not have enough data points or because they have some data gaps.

The study uses mainly data from the Shanghai and Shenzhen stock exchanges and the prospectus and the annual financial reports of the sample firms. Some data are also retrieved from Datastream, an on-line financial database, which is a subsidiary of

<sup>&</sup>lt;sup>5</sup> Source: China Stock Market Yearbook 2000.

<sup>&</sup>lt;sup>6</sup> Source: Chinese Stock Market Statistics 2000.

Primark Global Information Systems. Other resources from which data are collected include the Central Bank of China, the State Statistics Bureau of China and some financial consulting companies in Shanghai such as the Kingway Research and Development Centre.

Of course, the time length and the number of the sample might be extended in any further study.

#### 4.4 Empirical Results and Conclusions

#### 4.4.1 Empirical Results

1. In investigating the linkage between the IPO return and the reciprocal of IPO price, we find that there is a positive relationship between these two variables. In other words, the underpricing anomaly does exist in China's stock market.

i) Table 4.1 provides the definition of variables and Table 4.2 presents a brief descriptive statistics summary of these variables. It shows that the mean IPO simple return in our sample is 130.01 percent whereas the mean IPO market-adjusted simple return is 76.64 percent. This is similar to the result of Chi and Padgett (2005) which is 129.16 percent.

ii) The econometric results reported in Table 4.3 show that: no matter which IPO underpricing measure is used, simple return or market-adjusted simple return and no matter which estimation method is used, OLS or robust regression, there is a positive relationship between IPO initial return and the reciprocal of IPO price, with the coefficient being positive and the t-statistics being statistically significant. Put differently, the smaller the IPO price, the larger the IPO initial return. The empirical result denotes that the underpricing anomaly does exist in China's stock market.

iii) But the mean IPO initial return is 130.01 percent which is much smaller than 948.59 percent, the Su's finding in 1998. We argue that the difference is attributed to the different sample number and time length. Su's finding is based on 308 firm-commitment A-share IPOs between December 1986 and January 1996 while our sample comprises 698 A-share IPOs during the period of January 1994 and December 1999. A dramatic decrease in the extent of IPO underpricing could partly result from the fact that since 1994, more and more firms have gone public and been listed on the Shanghai and Shenzhen stock exchanges.

2. When looking at the relationship between the IPO return and deliberately selected variables on the basis of the univariate analysis, we find that IPO return is negatively related to the number of IPO days, the time gap between offering and listing dates (DAYS), earning per share (EPS), the ratio of insidership to total shares outstanding (INSIDER), the size of IPO (IPOSZ), the percentage of successful application for the offer (LOTTERY), the ratio of the IPO capitalisation to GDP (MKGDP) and the size of single large shareholder (STATE) and positively related to allocation methods (METHOD) and the size of SEO (SEOSZ). There is no significant correspondence between IPO return and AGE, the age of a firm. As for the relationship between IPO return with the exception of only using simple return as a dependent variable in the OLS regression. We will further test the validity of SHRPP in the multivariate analysis. The econometric results reported in Tables 4.4, 4.5, 4.6 and 4.7 show that:

i) There is a negative relationship between IPO return and IPOSZ and also a positive relationship between the IPO return and the size of the SEO. The smaller size of initial offering and the larger size of SEOs, the higher IPOs initial returns. The findings coincide with the signalling hypothesis (Allen and Faulhaber1989, Grinblatt and Hwang 1989, Welch1989) that argues that underpriced new issues leave a good taste with investors, allowing the firms and insiders to sell future offerings at a higher price than would otherwise be the case. Issuers with larger IPO underpricing are more likely to issue subsequent equities and more likely to issue larger amounts of subsequent equities because a high value issuer can afford to underprice its IPO. Besides, IPO initial return is negatively related to the earnings per share (EPS), the proxy for the firm's intrinsic value. Testing this implication is complicated by the lack of error-free measure of the firm's intrinsic value. We use the earning per share (EPS), which stands for the firm's intrinsic value, as an explanation variable. The higher a firm's intrinsic value, the higher IPOs prices, the lower IPOs initial returns. This finding is not consistent with the signalling hypothesis (Allen and Faulhaber 1989) that argues that the better firms having higher earnings and will underprice more, but it is consistent with Rock (1986), who argues that the degree of information asymmetry is a decreasing function of earnings per share.

We further argue that there might be two distinctive explanations for this. For one thing, Chinese investment banks usually employ the price-earnings-ratio method to help firms going public to decide their offer prices, using offer prices to those similar

firms which have gone public for reference, thus the higher EPS, the higher offer price. For another, being an emerging market, China's stock market is highly speculative. Chinese investors, generally speaking, do not pay much attention to value strategies; instead they focus on the short-term capital gain. That is to say, they do not care about the firm's intrinsic value; they are just interested in the activity of the shares they are trading. Hence, the shares with high EPS do not necessarily have a bigger percentage increase in price than those with lower EPS on the first trading day. In addition we find this is a negative relationship between IPO initial return and the variable STATE which is the size of a single large shareholder (state shares and stateowned legal person shares), representing government policy uncertainty regarding the privatisation. This is contrary to the finding of Chen, Firth and Kim (2004). The negative relationship shows that the Chinese government is a committed government, not a *populist* one. According to Perotti (1995) a committed government values the benefits of privatisation more than the lost proceeds due to IPO underpricing and is motivated to signal its identity. The *committed* government is willing to accept lower proceeds because signalling commitment immediately initiates the economic benefits of privatisation. Under policy uncertainty, a *committed* government may choose to retain a large stake of the state-owned enterprises and underprice a partial sale to signal its intent to credibly commit to future pro-market privatisation policies.

ii) We find that the allocation method (METHOD), the percentage of successful application for the offer (LOTTERY) and the IPO time gap between offering and listing dates (DAYS) make a statistically significant contribution to the IPO underpricing. In other words, our findings are consistent with the adverse selection or the winner's curse hypothesis such that the IPOs must be underpriced to induce uninformed investors to join the bid, the choice of offering mechanism adopted for the new issue affects the degree of underpricing and the IPO underpricing is positively related to the time period between IPO date and first trading date; there is a significant negative relationships between IPO underpricing and the past information for the firms;

iii) There is a negative correspondence between IPO return and LNLOTTERY. According to the Capital Asset Pricing Model (CAPM), available information about a firm and the expected future payoffs affect an investor's demand for shares. The number of investors bidding for an IPO affects the overall demand for shares and therefore affects the degree of IPO underpricing, given the fixed IPO pricing and the amount of initial sale. Our findings that the smaller the chances of shares allocation, the higher is the investors' rewards are consistent with the results of Brennan and Franks (1997) and Booth and Chua (1996) which argue that the issuers use IPO underpricing to attract oversubscription, with the intention of promoting a dispersed outside ownership and retention of control after the IPO.

iv) The time gap between offering and listing dates (LNDAYS) has a statistically significant negative effect on the IPO initial return, which is different from the results of Mok and Hui (1998), Chan Wang and Wei (2004) and Su and Fleisher (1998b). They find that the IPO return is positively related to the time gap between offering and listing dates. We argue that a shorter interval gives investors less time to collect information for the valuation of the IPO, so a shorter time gap imposes more risk and the investors should merit a higher IPO return.

v) The allocation method (METHODS) for the IPO offering has a positive, highly significant effect on IPO initial return. The IPO initial return will be higher when firms issue shares through local issuing agencies. The reason is that local investors lack sufficient information to value the shares, so they should be given a higher return to compensate. In addition, a national issuing network is likely to be more cost-effective and informational efficient, thus the investors should be given a lower return. vi) The variable AGE, the age of a listed firm, has no statistically significant effect on IPO initial return. One possible explanation is that Chinese listed firms have a very short history. China started its shareholding system experiment in the early 1980s; listed companies came out in the 1990s. At the end of 1990 there were only twelve listed companies in China's stock market.<sup>7</sup> Therefore, the listed companies are quiet young and their history is too short and the variable AGE could not be used to test if there is a negative relationship between IPO underpricing and the past information of the firms.

3. In examining the special ownership structure in China's stock market, we find the ownership dispersion hypothesis is valid. In other words, the IPO return is negatively related to the insider ownership (INSIDER), the size of single large shareholder (state shares and state-owned legal person shares, STATE) and the ratio of IPO capitalization to GDP (MKGDP), but positively related to the average number of tradeable shares each shareholder possesses (SHRPP).

<sup>&</sup>lt;sup>7</sup> Shanghai Stock Exchange Statistics Annual 1991.

i) We find that the IPO initial return is significantly affected by the special ownership in China's stock market. The IPO return is negatively related to INSIDER and STATE. Though our findings are different from Allen and Faulhaber (1989), Grinblatt and Hwang (1989) and Welch (1989), they are consistent with Hughes (1986) which argues that the greater the fractional insider, the less the information asymmetry, and the lower the need to underprice a new issue. In the context of Su's(1998b) finding: extremely high mean simple return, 948.59 percent, for 308 IPOs during December 1986 to January 1996, a plausible explanation is that China's stock market structure radically changed in 1994. Prior to 1994, the experimental times of China's stock market, most of the companies going public were non-state-owned and small-sized state-owned enterprises. But since 1994, more and more medium, large and even super-large-sized state-owned enterprises have been going public and the highly centralised ownership structure has taken shape. Enterprises with more than 60 percent shares outstanding are not allowed to trade. In the meantime, the mean IPO simple return in our sample - 698 IPOs from January 1994 to December 1999 - has decreased to 130.01 percent, that is to say, the extent of IPO underpricing has been mitigated.

ii) We find the IPO initial return is negatively related to rationing of the capitalisation of IPO to GDP (MKGDP), which confirms our hypothesis that IPO underpricing is partially due to a relatively small aggregate supply of shares (Su and Fleisher1998). For one thing, Chinese investors lack access to alternative investments. Besides bank deposits and government bonds, the only option left perhaps is investing in the stock market. For another, the size of China's stock market in terms of market capitalisation relative to GDP is rather small, not to mention the fact that less than 40 percent outstanding shares are allowed to be tradable.<sup>8</sup> The excess demand for shares over share supply in the secondary market usually pushes the share price level up which leads to expansion of the difference between IPO price and the first-day market closing price. The result implies that the smaller the ratio of IPO capitalisation to GDP, the higher is IPO initial return.

<sup>&</sup>lt;sup>8</sup> At the end of 2000, China's market capitalization-to-GDP ratio was round 31.82 percent while those of Singapore, Hong Kong and Taiwan, China were 352.99 percent 383.26 percent and 130.72 percent, respectively.

Source: The World Bank Development Indicator CD-ROM 2001

iii) IPO market-adjusted return is positively and significantly related to the average number of tradable shares each shareholder possesses (SHRPP). This finding is consistent with Booth and Chua (1996) who argue that investors will be willing to price a stock using a lower discount rate if they expect a liquid market for their shares. Thus, the aftermarket price depends upon the dispersion of ownership. If we use turnover, the ratio of the total value of trades on the major stock exchanges divided by market capitalisation to measure the liquidity of China's stock market, the present status of China's stock market confirms Booth and Chua (1996)'s argument. Table 4.8 reveals that China's stock market liquidity measured by turnover ratio is much higher than that of Singapore stock market, yet much lower than those in other emerging markets. At the end of 1999, the ratio for China's market was 118.32 percent, while those of Singapore, South Korea and Taiwan China were 40.68 percent, 248.04 percent and 237.57 percent respectively. We have to pay more attention to the results. Superficially, it seems that the turnover ratio of China's stock market is not abnormal. However, if we take into account that approximately 60-70 percent of share outstanding is not allowed to be circulated, China's stock market might have an extremely high turnover ratio of over 300 percent, which could be the highest in the world. We, therefore, could further argue that due to immaturity of China's stock market and massive ownership dispersion of tradable shares, most Chinese investors pay little attention to value strategies and are just lured by short-term capital gains between offer price and first day trading price and between short buy and short sale in the stock market.

4. When doing univariate analysis, we have found that variable AGE is nothing to do with the IPO initial return, but the results about the validity of variable SHRPP are contradicted using OLS estimation and robust estimation when using IPO simple return as dependent variable. With the help of the multivariate analysis, we will address this problem, and then, an augmented multi factor model will be set up.

i) In a preliminary multifactor analysis using both estimation methods, we find that SHRPP and AGE are not statistically significant. In other words, these two variables cannot be used to describe the behaviour of IPO initial return and should be dropped. Tables 4.9 and 4.10 show the empirical results and we find that without these two variables, the goodness of fit, in fact, increases slightly. As we have explained before, the listed companies are quiet young and their history is too short, the hypothesis that there is a negative relationship between IPO return and the history of a firm going

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public has been rejected. As for the invalidity of SHRPP standing for ownership dispersion, one explanation is that due to the special ownership structure in China's stock market, around 60-70 percent of A shares outstanding, which mainly consists of the so-called state shares and state legal shares, is not allowed to be tradable.<sup>9</sup> That is to say, other variables standing for highly centralized ownership such as STATE, INSIDER might have fully overshadowed the significance of SHRPP representing the dispersion of the tradable shares accounting for less than the 40 percent outstanding shares.

ii) An augmented multifactor model integrating winner's curse, signalling hypothesis and ownership dispersion hypothesis emerges:

 $\ln IPORETN =$ 

 $\alpha + \beta_1 METHOD + \beta_2 \ln DAYS + \beta_3 \ln EPS + \beta_4 \ln INSIDER$ 

+  $\beta_5 \ln IPOSZ + \beta_6 \ln LOTTORY + \beta_7 \ln MKGDP + \beta_8 \ln SEOSZ + \beta_9 \ln STATE + \varepsilon$ 

We cannot fail to notice that in Tables 4.9 and 4.10, except AGE and SHRPP, INSIDER, MKGDP AND STATE which are statistically significant in univariate analysis are not valid in the multivariate analysis. The main reason is that this model is vulnerable to multilinearity, namely, there is a very high correlation among LNINSIDER, LNIPOSE, LNMKGDP and LNSTATE.<sup>10</sup> Table 4.11 provides the correlation of those explanatory variables used to construct this multifactor model. If we recall the definition of these three variables, the multilinearity problem is not surprising. As mentioned before, around 60-70 percent A shares are directly or indirectly held by Chinese government and are not tradable, LNIPOSE, therefore, has a highly positive relationship with LNINSIDER. LNMKGDP is a ratio of the IPO capitalisation to GDP in which LNIPOSE is used as a part of the numerator. As for LNINSIDER and LNSTATE, since the largest insider is the Chinese government, they could be used as a proxy for each other. In fact, if we drop some of these four variables that stand for different hypotheses, the empirical results will be improving dramatically. Table 4.12 could confirm this. Unfortunately it is not a good idea for us to sacrifice economic theory just for an improvement in statistical properties. How to deal with multilinearity among financial data is a complicated yet unsolved work, which might be a further research topic for us to conduct. In any event we have tested

<sup>&</sup>lt;sup>9</sup> See Provisional Regulation on Stock Issuance and Exchange, *supra* note 29, Art.7.

<sup>&</sup>lt;sup>10</sup> Although still BLUE (Best Linear Unbiased Estimator), the OLS estimators have large variances and covariances, making precise estimation difficult due to multilinarity. There are several ways to detect multilinearity and deal with this problem. Please refer to Gujarati, 1995, 319-346.

several hypotheses regarding IPO underpricing anomaly, using the data generated from China's stock market. Several interesting conclusions could be drawn from our findings.

#### 4.4.2 Conclusions

1. IPO underpricing anomaly does exist in China's stock market. The mean IPO initial return in China's stock market is 130.01 percent. This is similar to the result of Chi and Padgett (2005) which is 129.16 percent, though it is much smaller than Su's (1998) findings, it is markedly higher than those that have been reported by Loughran, Ritter, and Rydqvist (1994) in their cross-country studies. Their findings are robust throughout all 25 economies including the US, UK, Hong Kong and Taiwan China, the average premium ranging from 4 percent in the French study to 80 percent in the Malaysian study (Longhran, Ritter and Rydqvist, 1994). Lured by such massive opening-day capital gains, no wonder Chinese investors snapped up IPOs and believed that subscribing to new issues was a sure way to earn a quick yet huge profit. As noted earlier, the majority of shares are not tradable. This extremely high IPO underpricing is due, at least partially, to surplus demand for the limited supply of tradable shares.

2. Our major findings are consistent with the winner's curse, signalling theory and ownership dispersion hypothesis. We find that IPO return is negatively related to the number of IPO days, the time gap between offering and listing dates (DAYS), earning per share (EPS), the ratio of insidership to total shares outstanding (INSIDER), the size of IPO (IPOSZ), the percentage of successful application for the offer (LOTTERY), the ratio of the IPO capitalization to GDP (MKGDP) and the size of single large shareholder (STATE) and positively related to allocation methods (METHOD), the size of SEO (SEOSZ) and average number of tradable shares per person possessed (SHRPP). History of the firm (AGE) is not significantly related to IPO initial return perhaps due to the shortness of Chinese enterprises going public.

3. IPO underpricing anomaly is also attributed to the special status of China's stock market. The imbalance between demand for shares and share supply and high speculation aggravates IPO underpricing. More importantly, the special ownership structure - the extremely centralised ownership - has a statistically and economically significant effect on IPO underpricing, which could be regarded as an important signal of the com.nitment of privatisation in China.

\_\_\_\_\_\_ Variables Description The earnings per share prior to the IPO issue EPS The choice of share allocation method. Dummy variable. **METHOD IPORETN** IPO initial return. Either  $SR_i$  or  $MSR_i$  due to different measurement  $SR_i$ A simple IPO return for the *i*th company going public A market-adjusted simple IPO return for the *i*th company going  $MSR_i$ public Natural logarithm of firm's age LNAGE Natural logarithm of time gap between offer and trade dates LNDAYS The natural logarithm of the ratio of the insidership to total LNINSIDER shares Natural logarithm of IPO size **LNIPOSE** Natural logarithm of the ratio of the IPO capitalization *LNMKGDP* to GDP Natural logarithm of seasoned equity offers size LNSEOSE Natural logarithm of the average number of tradable **LNSHRPP** shares each shareholder possesses Natural logarithm of the size of single large shareholder *LNSTATE* (state shares and state-owned legal person shares) An indicator of oversubscription to the IPO offer LOTTERY Reciprocal of IPO price RCIPIPO \_\_\_\_\_

Table 4.1. Definitions for Variables to Explain IPO Initial Returns

Variable	l	Obs	Mean	Std. Dev.	Min	Max
MSR	Ι	698	.7663931	.3279564	1546851	1.689329
SR	1	698	130.0138	78.34926	-15.30726	469.0909
method	l i	698	.2526767	.4350131	0	1
lnage	1	698	7.751429	.368183	6.984716	9.599676
lndays	1	698	3.117418	.5989544	1.609438	5.003946
lneps	L	698	9389266	.3267362	-1.994284	.1531545
lninside		698	9.525863	.7844139	8.517132	13.09539
lniposz	1	698	9.926066	.7208048	8.101678	12.38839
lnlotter	I	698	0196182	1.1122	-2.040221	4.553877
lnmkgdp	I	698	-9.099745	.7816516	-10.563	-6.327837
lnseosz		698	10.38718	.2597099	0	20.50539
lnstate	I	698	3.875845	.4119086	2.293068	4.442474
lnshrpp	I	698	8.140459	.7155859	6.837333	10.83165
rcipipo	1	698	.1781176	.0483503	.0677048	.4081632

# Table 4.2. Descriptive Statistics for Explanatory Variables

	Coef.				Adj R-squared
	346.1128	73.41247	4.715	0.000	0.0436
SR (ROBUST)					
rcipipo	177.8665	67.58237	2.632	0.009	-
					Adj R-squared
					0.0267
MSR (ROBUST)	Coef.	Std. Err.	t	P> t	
rcipipo	.993527	.3145868	3.158	0.002	

Table 4.3 Univariate Analysis of the IPO Underpricing Anomaly

# Table 4.4 Univariate Analysis of Explanatory Variables with SR Using OLS Estimation

SR		Std. Err.			Adj R-squared
+-					
method	22.8073	8.285064	2.753	0.006	0.0139
lnage	6.055088	9.864359	0.614	0.540	-0.0013
lndays	-21.10405	5.986704	-3.525	0.000	0.0239
lneps	-48.44468	10.89087	-4.448	0.000	0.0388
lninsider	-22.30884	4.514931	-4.941	0.000	0.0478
lniposz	-35.7077	4.760948	-7.500	0.000	0.1060
lnlottery	-15.35813	3.18824	-4.817	0.000	0.0455
lnmkgdp	-29.88755	4.436868	-6.736	0.000	0.0869
lnseosz	14.1361	6.46641	2.186	0.015	0.0105
lnshrpp	5.663857	5.070664	1.117	0.265	0.0005
lnstate	-24.87937	8.745012	-2.845	0.005	0.0150

Table 4.5 Univariate Analysis of Explanatory Variables with SR Using Robust Estimation

		Std. Err.		
method	19.67336	7.439185	2.645	0.008
lnage	3.738549	8.804171	0.425	0.671
lndays	-22.00024	5.318354	-4.137	0.000
lneps	-27.37134	9.996293	-2.738	0.006
lninsider	-18.48866	4.022634	-4.596	0.000
lniposz	-26.27819	4.388032	-5.989	0.000
lnlottery	-13.88993	2.851496	-4.871	0.000
lnmkgdp	-22.87726	4.04133	-5.661	0.000
lnseosz	11.80641	5.11214	2.309	0.009
lnshrpp	7.882063	4.505496	1.749	0.081
lnstate	-20.99019	7.8314	-2.680	0.008

# Table 4.6 Univariate Analysis of Explanatory Variables with MSR Using OLS Estimation

msr	Coef.	Std. Err.	t	P> t	Adj R-squared
method	.0858513	.0347338	2.472	0.014	0.0108
lnage	023336	.041293	-0.565	0.572	-0.0015
lndays	0737704	.0251604	-2.932	0.004	0.0160
lneps	1603855	.045949	-3.491	0.001	0.0234
lninsider	0874227	.0189599	-4.611	0.000	0.0417
lniposz	1268096	.0202634	-6.258	0.000	0.0757
lnlotter	0896404	.0130272	-6.881	0.000	0.0905
lnmkgdp	1166545	.0186899	-6.242	0.000	0.0753
lnseosz	1.097958	.2495672	4.399	0.000	0.0379
lnshrpp	.0395144	.0211742	1.866	0.063	0.0053
lnstate	1036936	.0366078	-2.833	0.005	0.0148

Table 4.7 Univariate Analysis of Explanatory Variables with MSR Using Robust Estimation

MSR	Coef.	Std. Err.	t	P> t
+-				
method	.0757214	.035108	2.157	0.032
lndays	0866667	.0251079	-3.452	0.001
lneps	1462394	.0464962	-3.145	0.002
lninside	0893844	.0190896	-4.682	0.000
lniposz	1245381	.0205597	-6.057	0.000
lnlotter	0875576	.0133811	-6.543	0.000
lnmkgdp	1164841	.0189216	-6.156	0.000
lnseosz	1.081492	.2515418	4.299	0.000
lnshrpp	.0434401	.0212775	2.042	0.042
lnstate	1115211	.0368049	-3.030	0.003

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Country Name	1993	1994	1995	1996	1997	1998	1999
China	164.03	235.18	115.86	329.03	244.17	130.12	118.32
Hong Kong, China	61	55	37.30	44.20	113.40	54.40	37.51
India	27.46	24.15	10.52	17.36	27.14	56.00	52.90
Japan	25.86	24.93	30.90	37.10	47.20	40.30	33.77
Korea, Rep.	172.18	174.15	97.76	110.35	140.55	184.73	248.04
Singapore	26.2	26.7	42.20	28.70	49.90	50.50	40.68
Taiwan, China	252.42	366.11	227.84	243.43	368.46	261.79	237.57
United Kingdom	80.5	77.1	77.10	36.80	44.40	53.40	74.90
United States	53	53	85.70	92.80	103.20	106.20	78.00

Table 4.8 Stocks Traded, Turnover Ratio (%)

Source: The World Bank Development Indicator CD-ROM 2000

Dependent Variable: SR	With AGE and	SHRPP	Without AGE	E and SHRPP
Regressors	OLS	ROBUST	OLS	ROBUST
METHOD				
	17.5562 <sup>b</sup>	18.4747 <sup>a</sup>	17.6505 <sup>b</sup>	18.6481 <sup>a</sup>
	(2.164)	(2.433)	(2.181)	(2.444)
LNAGE				
	0.5334	-0.5603		
	(0.053)	(-0.059)		
LNDAYS				
	-37.3106 <sup>a</sup>	-33.9255ª	-37.2806 <sup>a</sup>	-33.9024 <sup>a</sup>
	(-5.958)	(-5.789)	(-6.016)	(-5.802)
LNEPS				
	-39.2472 <sup>c</sup>	1364 <sup>c</sup>	-31.5947°	-32.8453°
	(-1.764)	(-1.732)	(-1.789)	(-1.773)
ININSIDER				
	28.9556	15.5074	27.609	13.7076
	(1.1257)	(0.644)	(1.084)	(0.571)
LNIPOSZ				
	-52.8509 <sup>a</sup>	-39.8471 <sup>a</sup>	-53.5087 <sup>a</sup>	-42.9302 <sup>a</sup>
	(-5.257)	(-4.235)	(-5.412)	(-4.604)
LNMKGDP				
	-23.1447	-12.1628	-21.4370	-9.0875
	(-0.813)	(-0.457)	(-0.765)	(-0.344)

Table 4.9: Multivariate Analysis with or without Variables AGE and SHRPP

LNSEOSZ				
LINDEGE	53.8836 <sup>a</sup>	45.9310 <sup>a</sup>	54.0809 <sup>a</sup>	47.7490 <sup>a</sup>
	(6.536)	(5.953)		
LNSHRPP	(0.000)	(5.755)	(6.680)	(6.254)
LINGTING	1 7457	4 70 7 1		
	1.7457	4.7971		
	(0.400)	(1.174)		
LNSTATE				
	-1.1855	-4.1698	-1.3124	-3.6907
	(-0.136)	(-0.509)	(-0.165)	(-0.492)
LNLOTTERY				
	-13.4129 <sup>a</sup>	-13.5491 <sup>a</sup>	-13.3864 <sup>a</sup>	-13.5392 <sup>a</sup>
	(-3.962)	(-4.277)	(-3.966)	(-4.254)
	10.45	15 (1	22.64	10.05
F-value	18.45	15.61	22.64	19.05
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Adjusted $R^2$	0.2917		0.2947	

Notes:

- 1. The dependent variable is IPO simple return, SR.
- 2. Figures in parenthesis under coefficients are t-values.
- 3. The levels of significance are shown as follows: a denotes 1% significance, b 5% significance and c 10% significance.

Dependent Variable: MSR	With AGE and SI	HRPP	Without AGE and	I SHRPP
Regressors	OLS	ROBUST	OLS	ROBUST
METHOD	.0981 <sup>a</sup>	.1033 <sup>a</sup>	.0997 <sup>a</sup>	.1058ª
	(3.023)	(3.091)	(3.074)	<i>(3.159)</i>
LNAGE	0331 (-0.819)	0298 (-0.715)		
LNDAYS	1696 <sup>a</sup>	1676 <sup>a</sup>	1660 <sup>a</sup>	1628 <sup>a</sup>
	<i>(-6.773)</i>	(-6.496)	(-6.683)	(-6.347)
LNEPS	1364	1577°	1426°	1662°
	<i>(-1.530)</i>	(-1.717)	(-1.709)	(-1.809)
LNINSIDER	1109	1364	1212	1520
	(-1.007)	(-1.202)	<i>(-1.108)</i>	<i>(-1.346)</i>
LNIPOSZ	1935 <sup>a</sup>	1818 <sup>a</sup>	1992ª	1935 <sup>a</sup>
	(-4.846)	(-4.420)	(-5.054)	(-4.753)
LNMKGDP	.1235	.1347	.1357	.1560
	(1.045)	(1.106)	<i>(1.160)</i>	<i>(1.292)</i>

Table 4.10: Multivariate Analysis with or without Variables AGE and SHRPP

LNSEOSZ	2.7659 <sup>a</sup>	2.9188 <sup>a</sup>	2.8430 <sup>a</sup>	3.0084 <sup>a</sup>
-	(8.227)	(8.428)	(8.578)	(6.254)
LNSHRPP	.0230	.0323		
	(1.319)	(1.174)		
LNSTATE	0212	0314	0085	0179
	(-0.607)	(-0.872)	(-0.267)	(-0.545)
LNLOTTERY	0835 <sup>a</sup>	0815 <sup>a</sup>	0837 <sup>a</sup>	0817 <sup>a</sup>
	(-6.172)	(-5.845)	(-6.187)	(-5.848)
F-value	23.87 (0.0000)	23.67 (0.0000)	28.87 (0.0000)	28.32 (0.0000)
Adjusted $R^2$	0.3506		0.3499	

Notes:

1. The dependent variable is IPO market-adjusted simple return, MSR.

2. Figures in parenthesis under coefficients are t-values.

3. The levels of significance are shown as follows: a denotes 1% significance, b 5% significance and c 10% significance.

Table 4.11: Correlation of Explanatory Variables

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	SR	MSR	method	lndays	LNEPS lninside		lniposz lnlotter		lnmkgdp	lnseosz	lnstate
+ + - - - - - - -						1 1 1 1 1		, , , , ,			
SR	1.0000										
MSR	0.9219	1.0000									
method	0.1266	0.1139	1.0000								
lndays	-0.1613	-0.1347	-0.3076	1.0000							
LNEPS	-0.2020	-0.1598	-0.0993	-0.0651	1.0000						
lninside	-0.2234	-0.2091	-0.1406	0.2134	-0.0469	1.0000					
lniposz	-0.3285	-0.2787	-0.1669	0.2313	0.3397	0.7574	1.0000				
Inlotter	-0.2180	-0.3040	0.3982	-0.3288	0.0022	0.0343	0.0668 1.(	1.0000			
lnmkgdp	-0.2982	-0.2780	-0.1668	0.1380	0.2625	0.9369	0.8325 0.0	0.0675	1.0000		
lnseosz	0.1121	0.1999	-0.1430	0.4395	0.0528	0.3842	0.5243 -0	-0.3002	0.3056	1.0000	
Instate	-0.1308	-0.1302	-0.1258	0.2239	0.0549	0.2903	0.2357 -0.	-0.0413	0.2968	0.1013	1.0000

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### Table 4.12:

Multivariate Analysis with and without LNIPOSZ, LNMKGDP and LNSTATE
Wall value 7 marysis with and without ENIPOSZ, ENMKGDP and ENSTATE

Dependent Variable: SR	With LNIPOSE, LNMKGDP and LNSTATE		Without LNIPOSE, LNMKGDP and LNSTATE	
Regressors	OLS	ROBUST	OLS	ROBUST
METHOD	17.6505 <sup>b</sup>	18.6481ª	22.2426 <sup>a</sup>	
	(2.181)	(2.444)	(2.6999)	20.8950 <sup>a</sup>
				(2.753)
LNDAYS	-37.2806 <sup>a</sup>	-33.9024 <sup>a</sup>	-39.3639ª	
	(-6.016)	(-5.802)	(-6.359)	-37.0934ª
				(-6.506)
LNEPS	-39.5947 <sup>c</sup>	-32.8453°	-56.6145ª	
	(-1.789)	(-1.773)	(-5.776)	-39.4697ª
				(-4.373)
ININSIDER	27.609	13.7076	-25.5488ª	
	(1.084)	(0.571)	(-5.682)	-22.0602ª
				(-5.327)
LNIPOSZ	-53.5087 <sup>a</sup>	-42.9302 <sup>a</sup>		
	(-5.412)	(-4.604)		
LNMKGDP	-21.4370	-9.0875		
	(-0.765)	(-0.344)		

8ª
)
1 <sup>a</sup>
2)
000)

Notes: 1. The dependent variable is IPO simple return, SR.

2.Figures in parenthesis under coefficients are t-values.

3. The levels of significance are shown as follows: a denotes 1% significance, b 5% significance and c 10% significance.

#### Chapter 5

Long-run Underperformance: Evidence from China's stock market

#### 5.1 Introduction

One of the puzzles regarding Initial Public Offerings (IPOs) is their poor long-run investment performance reported in Aggarwal and Rivoli (1990) and Ritter (1991). Aggarwal and Rivoli and Ritter examine the long-run performance of new issues in the US and report some degree of underperformance in the aftermarket. Aggarwal and Rivoli (1990), on the basis of a sample of 1,598 IPOs issued during 1977-1987, document an abnormal return of -13.73 percent for investors purchasing all IPOs in the open market at the close of the first trading day and holding each for a period of 250 trading days. Ritter (1991) examines the underperformance of US IPO firms categorised by adjusted initial returns using a sample of 1,526 IPOs issued during 1975-1984. He reports that there is a tendency for firms with high adjusted initial returns to have the worst aftermarket performance. The tendency is stronger for smaller issues than for large issues. Besides, Ritter's study also indicates that the underperformance of IPOs extends beyond the first year of trading. Loughran and Ritter (1993), for 4,753 US companies going public in 1970-87, document the underperformance of IPOs relative to seasoned firms with the same market capitalisation. Loughran and Ritter (1995) document the significant downward drift of IPO firms in the US three to five years subsequent to the offerings.

Various studies with international data generally suggest that the long-run underperformance of IPOs is a global phenomenon. Aggarwal *et al.* (1993) for Latin America, Keloharju (1993) for Finland, Levis (1993) for the UK, and Ljungqvist (1994) for Germany report average market-adjusted losses of 47.0 percent, 8.1 percent, 21.1 percent, and 8.6 percent, respectively, by the third anniversary of their first trade. Studies in Hong Kong (McGuinness, 1993) also report negative aftermarket performance with market adjusted prices falling by six or seven percent.

Investigation of the long-run underperformance of Chinese IPOs is interesting and timely. Chinese stock exchanges, the Shanghai Stock Exchange (SSE) and Shenzhen Stock exchange (SZSE), were only set up in December 1990 and January 1991 respectively.<sup>1</sup> China's stock market has been an important avenue for the investment of funds and for the growth of the private sector since then. The evidence of long-run underperformance has a huge effect on the functioning of the Chinese capital market and the cost of raising funds for individual Chinese firms. Accordingly, this study will contribute to the literature by examining the hitherto unexplored matter of the investment performance of Chinese IPOs.

This chapter has two main objectives. Firstly, we will examine and measure the extent of long-run underperformance of Chinese IPOs. According to our preliminary analysis, we do find the existence of the long-run underperformance in Chinese IPOs. Our second objective, therefore, is to empirically test the validity of three hypotheses: the divergence of opinion hypothesis (Miller 1977), the speculative bubble hypothesis (Tinic 1988, Shiller 1990) and the windows of opportunity (Ritter 1991). All hypotheses are widely used to explain the long-run underperformance phenomenon in the stock markets. In short, we empirically examine Chinese IPOs to provide one case of the international evidence on the long-run underperformance of IPOs.

The chapter proceeds by reviewing some of the international literature on IPO longrun performance in section two. Data and methodology are then described in section three, followed by the empirical analyses and findings in section four. Finally, the summary and conclusions are presented in section five.

#### **5.2 Literature Review**

Three hypotheses have been proposed to explain the phenomenon of the long-run underperformance of IPOs, the divergence of opinion hypothesis (Miller 1977), the speculative bubble hypothesis (Tinic 1988, Shiller 1990), and the windows of opportunity (Ritter 1991).

<sup>&</sup>lt;sup>1</sup> China's Stock Market Yearbook 1992. China Finance Publishing House, Beijing China.

## 5.2.1 The divergence of opinion hypothesis (Miller 1977)

Miller (1977) presents an explanation based on changes in the divergence of opinion among investors. According to him, an IPO is usually subscribed to by investors who are the most optimistic about the issue and its price is set by this group rather than the appraisal of the typical investor. Further, the greater the uncertainty about the value of the IPO, the higher the price that optimistic investors are willing to pay relative to pessimistic investors. In the long run, as more information about the issuing firm becomes available, the divergence of opinion between these two groups of investors will narrow and, consequently, the market price will drop. Thus, Miller predicts that IPOs will generate abnormal returns in the short-run but they will have smaller price appreciation than seasoned firms (i.e., underperformance) in the long run. He also expects an IPO's long-run return to be negatively related with its ex ante uncertainty. As surveyed in Loughran (1993), international evidence is generally consistent with Miller's prediction.

#### 5.2.2 The speculative bubble hypothesis (Tinic 1988, Shiller 1990)

Tinic (1988) proposes an alternative explanation. According to him, the market for IPOs is subject to fads or speculative bubble. Shiller (1990) adds that IPOs are underpriced by investment bankers to create the appearance of excess demand. According to them, the long-run performance of IPOs would be negatively related to the short-run underpricing due to the speculation of "those investors who would not get an allocation of the oversubscribed new issues from the underwriter at the offering price" and also due to "price manipulation", firms going public taking advantage of temporary improvements in performance to issue new shares when investors have overly optimistic expectations about firms' future prospects. Therefore, this hypothesis, in some way, is developed on the basis of Miller's hypothesis. With US data for the period between 1977-1987, Aggarwal and Rivoli (1990) found that, after adjusting for market movements, the return to the investors who purchased at the closing price of day 1 in the after market and held until day 250 (a one-year period) was significantly negative (-13.73 percent). They concluded a fad or speculative explanation for the long-run underperformance in the IPO market.

Lee, Taylor and Walter (1996) investigate long-run performance for 132 IPOs in the Singapore stock market. This is an important study because of the high levels of oversubscription in the Singapore stock market. The returns are based on two measures, one is raw wealth relatives, and the other is adjusted wealth relatives in which market index is used as the benchmark portfolio. Their empirical results show that the long-run returns are not abnormally poor and not relative to initial underpricing. The high oversubscription levels, which is a feature in the Singapore stock market are not associated with the speculative bubble or fad hypothesis. They argue that the high oversubscription levels are demand expansions from informed investors. Chan, Wang and Wei (2004) investigate the long-run performance based on 1 or 3-year A-share and B-share buy and hold returns and related benchmark portfolios, and wealth relatives. They find that A-share IPOs slightly underperforms their non-IPOs benchmarks with wealth relatives ranging from 0.90 to 0.98. They also find that post-issuance stock returns for A-share IPOs are positively related to changes in operating return on assets, changes in sales growth rate, etc. long-run performance is not purely driven by speculation, but is a reflection of a firm's operating performance

#### 5.2.3 The Windows of Opportunity Hypothesis

If there are periods when investors are especially optimistic about the growth potential of firms going public, the large cycles in volume may represent a response by firms attempting to "time" their IPOs to take advantage of these swings in investors' sentiment. The windows of opportunity hypothesis predicts that firms going public in high volume periods are more likely to be overvalued than other IPOs. It has the timetable implication that the high volume periods should be associated with the lowest long-run returns.

Ritter (1991) investigates long-run performance of IPOs in US stock market by using samples of 1,528 in 1975-1984. In his empirical work, he chooses a set of samples and a set of marching firms which are listed on the US stock market and are to some extent matched by industry and market capitalisation with each IPO. The returns are calculated for two intervals: the initial return period (normally one day), and the aftermarket period which is defined as 3 years after the IPOs exclusive of the initial return period. The long-run performance is measured by three factors, the first is the cumulative average adjusted returns which are computed by several different benchmarks, the second is 3-year but and hold returns for both the IPOs and a set of matching firms. The final one is the wealth relatives. After cross-sectional and time series analysis, he finds that investors are periodically over-optimistic about the

earnings potential of young growth companies and firms take advantage of these "windows of opportunity". Cai and Wei (1997) study long-run stock returns and the operating performance of 180 IPOs listed on the Tokyo Stock Exchange during the 1971-1992 period by using value-weighted and equally-weighted market portfolio. In contrast to evidence from the US, the post-issue deterioration in operating performance cannot be attributed to reduced managerial ownership. The windows of opportunity hypothesis is strongly supported by this study.

Yi (2001) employs 1,032 IPOs in the US between 1987 and 1991 and Ritter (1991)'s methodology to examine long-run performance in the US stock market. His study finds that IPOs firms, as a whole, underperformed a market index and control firms over a 3-year period after going public. Investors may have been too optimistic about future prospects of the IPO firms, especially those that had negative earnings. The finding is in general consistent with the finding of Ritter (1991).

In China's stock markets, the majority of shares are state-owned shares which are nontradeable, as the supply of tradeable A-shares is smaller relative to the number of investors, the marginal buyers will be over-optimistic because of the wide divergence around the estimates of the stock's true value. This may cause divergence of opinion, or speculative bubbles, or windows opportunity in the IPO market. Such explanations are very important in the Chinese context, which implies that markets are inefficient. Mok and Hui (1998) test the speculative bubble hypothesis by tracing the cumulative average excess returns over time. The excess market returns of the overpriced A-share IPOs, in particular, remained significantly positive over 350 days and this represents a real phenomenon, rather than a speculative conjecture. Chi and Padgett (2005) employ market adjusted returns, Shanghai index and Shenzhen index as corresponding benchmarks, and wealth relatives to examine long-run performance in China's stock market by using 668 IPOs from 1996 to 2000. Their results show that when there is an increase in the market index and market initial returns on IPOs, the CSRC launches more IPOs to the market. There is a close relationship between the index performance and issuing numbers. They argue that the CSRC did a good job in timing IPOs to catch the windows opportunity.

Ritter and Welch (2002) even argue that long-run performance may be the most controversial area of IPO research. In this chapter, we employ the methodology of Ritter (1991) to investigate long-run performance in China's stock market.

#### 5.3 Data Description and Methodology

#### 5.3.1 Data Description

According to prior research, Ritter (1991), Loughran and Ritter (1993) report that the period of long-run underperformance last 3 to 5 years in the US stock market. Compared to other developed markets, China's stock market is new. Some factors have to be considered when we started to choose data from A-share stock market. Firstly, the new "Enterprise Accounting Standards" and "Enterprise Financial Accounting Principle" came into effect on July 1993. Secondly, before 2000, the scale of IPOs was very small, and many IPO companies also placed shares to market within 5 years after their IPOs. After 2000, the scale of IPOs started to increase and the types of IPOs' industry became more diverse. For each matching firm, we choose non-issuing firms listed on SSE and SEZE that have not placed issues within 3 years. A total of 237 A-share IPOs are identified that have data available during the period 1997-2001. The main emphasis of this study is on the long-run investment performance of IPOs. To investigate long-run performance of all these IPOs, this study employs standard event study methodology similar to the one used by Loughran and Ritter (1993) and Ritter (1991) and Gompers and Lerner (2004). Long-run performance of IPOs in the sample will be statistically measured and empirically tested using various return measurements, horizontal periods and portfolio benchmarks to gain a better understanding of it.

#### 5.3.2 Methodology

To investigate the aftermarket performance of IPOs, this study employs standard event study methodology. Our return results are based on three measures, namely, buy-andhold abnormal return, the wealth relative and the cumulative abnormal return according to available data.

5.3.2.1 Buy-and-hold Abnormal Return

As in Ritter (1991), the holding period returns  $(R_i)$  are computed as:

$$R_i = \prod_{t=1}^{T^* 12} (1 + r_{it}) - 1$$

where  $r_{it}$  is the raw return on firm *i* in event month *t*. This measures the total return from a buy and hold strategy where an IPO is purchased at the first day of going

public and held until it's the *Tth*-year anniversary. T stands for three different periods such as 1-year, 3-year and 5-year which we have chosen. For example, the three-year HPR could be computed as:

$$R_i = \prod_{t=1}^{36} (1 + r_{it}) - 1$$

In addition to this event time analysis, we also launch the so-called calendar time analysis for our sample of IPO firms, which is employed by Gompers and Lerner (2004). In order to examine the calendar time performance, we calculate returns for all firms that were already public at the beginning of the year and do not celebrate the fifth anniversary of their IPO by the end of the year.

The market-adjusted or abnormal return (ar) for stock *i* in event period *t* is defined as:

$$ar_{it} = r_{it} - r_{mt}$$

where  $r_{it}$  is the raw return on stock *i* in event period t and  $r_{mt}$  is the return on the market index for event period *t*. In accordance with Ritter (1991), abnormal returns are calculated for two time intervals: the initial return period, defined as the offering price to the first closing price, and the aftermarket period, defined as 1 year after the offering exclusive of the initial return period. Return months are defined as successive 21-day trading periods relative to the offering. Thus, month1 consists of event days 2-22; month 2 consists of event days 23-43, and so forth.

As in Ritter (1991), this chapter utilises value weighted market indices rather than matching firms based on market capitalisation, the approach used by Loughran and Ritter (1995). Barber and Lyon (1997) document that test statistics based on abnormal returns with the use of a reference portfolio, such as an equally weighted market index may be mis-specified owing to new listing, rebalancing, and skewness bias. When calculating Shanghai A-share market-adjusted returns, we use the Shanghai A-share price index as the benchmark portfolio. The Shanghai A-share price index is the value-weighted price index.

The average abnormal return (AR) on a portfolio of *n* stocks for event period *t* is the equally weighted arithmetic average of the market-adjusted returns:

$$AR_t = \frac{1}{n} \sum_{i=1}^n ar_{it}$$

The statistical significance of the average abnormal return (AR) is determined by using the usual t-statistic, which is computed for each period as:

$$t(AR_t) = AR_t / SE(AR_t)$$

where  $SE(AR_t)$  is the standard error of the average abnormal return in period t and  $t(AR_t)$  is the t-statistic (with *n*-2 degrees of freedom) for the null hypothesis that the average abnormal return in any given period is zero.

5.3.2.2 The Wealth Relative (WR)

Alternatively, also as in Ritter (1991), performance measurement for a group of IPOs could also be assessed by the wealth relative (WR), which is defined as follows:

 $WR = \frac{1 + average T \ year \ total \ return \ on \ IPOs}{1 + average T \ year \ total \ return \ on \ matching \ firms}$ 

A wealth relative of greater than 1.00 indicates IPOs outperform the stock market price index, while a value below 1.00 indicates IPO underperformance.

5.3.2.3 The Cumulative Abnormal Return

Though Barber and Lyon (1997) argue that buy-and-hold returns provide reliable inferences because they mimic returns that an investor could actually have achieved, Fama (1998) argues that buy-and-hold returns, calculated above might provide an unreliable measure of performance. He argues that cumulative monthly returns provide a more reliable measure, especially when performance is measured over a long interval. The cumulative abnormal return (*CAR*) is calculated by cumulating the average abnormal returns from the beginning of the first full calendar month of trading to event month *t*:

$$CAR_t = \sum_{t=1}^t AR_t$$

The statistical significance of the cumulative average abnormal (CAR) is determined by using the t-statistic. The t-statistic for the cumulative abnormal return in month t is calculated as:

$$t(CAR_t) = \frac{CAR_t * \sqrt{n}}{\sqrt{t * \operatorname{var} + 2 * (t - 1) * \operatorname{cov}}}$$

where  $t(CAR_t)$  is the t-statistic for the null hypothesis that the cumulative average abnormal return over period *t* is equal to zero, *t* is the event month, *var* is the average (over 36 months) cross-sectional variance, and *cov* is the first-order autocovariance of the *AR<sub>t</sub>* series.

After the measurement of the long-run performance of IPOs, the next step is to test two hypotheses, the divergence of opinion hypothesis (Miller, 1977) and the speculative bubble hypothesis (Tinic 1988, Shiller 1990) that have been mentioned above, in other words, to see if these two hypotheses are valid in China's stock markets, or the long term underperformance of Chinese IPOs could be explained by these two hypotheses. A multiple regression is used to test these two hypotheses. The model is given as follows:

$$Return = \alpha_0 + \alpha_1 Ln(Size) + \alpha_2 Ln(1 + Age) + \alpha_3 IR + \alpha_4 Sub + \varepsilon$$

The dependent variable, *Return*, is measured using the market-adjusted buy and hold return over three different holding periods (1) the 1-year period inclusive of the first month (Regression 1); and (2) the 3-year period inclusive of the first month (Regression 2). *LN* denotes the natural logarithm. Variable LN(Size), which is a proxy for ex ante uncertainty, is measured by the natural logarithm of the book value of equity after the offering. The impact of an IPO's age on the long-run performance is examined by utilising LN(1+Age) as an explanatory variable where *Age* is measured by the difference between the year of going public and the year of founding. To be consistent with the divergence of opinion hypothesis namely, a negative relationship between the long-run performance and uncertainty), Regression 1 and 2 should yield positive coefficients for LN(Size) because the ex ante uncertainty is inversely related to a firm's size. Hence, LN(1+Age), the operating history of the firms going public could be regarded as another proxy for ex ante uncertainty and also gives a negative signal. To test the speculative bubble hypothesis, namely, the long-run performance of

IPOs should be negatively related to the short-term underpricing, the market-adjusted return on the first trading day, *IR*, is included in the model and a negative sign for *IR* is expected. Besides, explanatory variable *Sub*, the over-subscription ratio, representing the extent of the subscription, could be regarded as an alternative for over-optimism of investors and a negative sign is expected as well.

#### 5.4 Empirical Findings

As we have mentioned, firstly, we use buy-and-hold strategy, including event time analysis and calendar time analysis to calculate returns over four different periods to measure the returns of Chinese IPOs. The findings are presented in Tables 5.1 and 5.2. The long-run stock performance is measured by first computing 1-year, 3-year and 5 year holding period raw returns including the initial return. We use the Shanghai and Shenzhen A-share Price index as the benchmark to measure the long-run abnormal returns of IPOs. That is to say the adjusted returns are calculated by subtracting the corresponding 1-year, 3-year, and 5-year period returns of the Shanghai and Shenzhen A-share Price index from the IPOs' raw returns and on the basis of individually adjusted return we get average adjusted return (AR). Then, the cumulative average return (CAR), the summation of the average market-adjusted returns, is calculated to represent the gains/losses from a strategy of buying IPOs on the first day of listing to avoid potential problems with the buy-and-hold strategy. Table 1 shows the average returns and cumulative average returns of Chinese IPOs, using event time analysis. The CARs are shown for months 1, 2, 3, 12, 24, 36, 48, 60 and 72. The AR in the first month is negative. Month 12 also shows a negative abnormal return, reflected in the decline of the CAR. By month 36 the cumulative average return is -1.34 percent, showing a substantial decline in investment value. Although the Ibbotson (1975) results suggested underperformance ends after about four years, the results here indicate a continuing deterioration in performance for Chinese IPOs. By month 60 the CAR is -1.58 percent. Lastly, an alternative measure of long-run performance, the Wealth Relative, gives similar findings. Table 5.3 represents the long-run stock returns for Chinese IPOs categorised by the year of issuance and provides corresponding Wealth Relatives (WR). The performance of IPOs declined and the performance of matching firms also decreased. Wealth Relatives for IPOs made in the sample period vary. In most years, however, Wealth Relatives are less than one, confirming the widespread incidence of underperformance documented in the previous section. Two findings stand out: for one thing, consistent with other countries' empirical results, the Chinese evidence shows that the level of IPO underperfromance is economically and statistically significant; for another, the Chinese evidence also shows that a gradual but steady decline tendency in the long-run performance continues even after the fifth year anniversary of public listing. The result from table 5.3 is consistent with Chan, Wang and Wei (2004) and Chi and Padgett (2005)

The results of multiple regression tests of two hypotheses, the divergence of opinion hypothesis and the speculative bubble hypothesis, are provided in Table 5.4. Regression 1 and 2, employing different sample periods examines the validity of these two hypotheses in explaining the long-run underperformance. All t-statistic are represented in parentheses. Two findings emerge. On one hand, variable LN(1+Age), the natural logarithm of the number of years of the company before going public and variable Sub, the over-subscription ratio, do not have a significant impact on Return, the market-adjusted buy-and-hold return. Because most of the listing companies in China's stock market are converted from state-owned enterprises that had a very long history, the Age might not be a very sensitive proxy for the ex ante uncertainty for Chinese IPOs. As for over-subscription, which is frequently evident in Chinese IPOs, the reason why it is not associated with a "speculative bubble" is that oversubscription is better described as informed demand expansion following ex ante rational price setting in the prospectus in a market setting where investors demand for an IPO is not constrained by bias in the allocation methods used by issuers and underwriters. On the other hand, variables LN(Size), the natural logarithm of the book value of equity after IPO and IR, the market-adjusted return on the first trading day, both have a statistically significant effect on Return and have the right signs. Coefficient of variable LN(Size) is statistically significant and has a positive sign, which means the divergence of opinion hypothesis (Miller 1977) receives support in the case of Chinese IPOs. Similarly, Coefficient of variable IR is statistically significant and has a negative sign, which means the speculative bubble hypothesis (Tinic 1988 and Shiller 1990) also receives support in the case of Chinese IPOs. In other words, there is a negative relationship between market-adjusted buy-and-hold return and market-adjusted return on the first trading day, namely, in the short-run, Chinese IPOs are underpriced but in the long-run Chinese IPOs underperformed. In any event, both hypotheses could be employed to explain the long-run underperformance in China's stock market.

## 5.5 Summary and Conclusions

In this chapter, we empirically investigate Chinese initial public offerings to provide one case of the international evidence on the long-run performance of IPOs using a sample of 237 Chinese IPOs listed on the Shanghai Stock Exchange from 1997 to 2001. Although IPOs' long-run performance has been extensively examined in the finance literature, Chinese IPOs have received little attention. The present study advances the finance literature by investigating this matter. This study leads to a number of important conclusions.

Firstly, and similar to the US and UK initial public offerings in general, Chinese IPOs are not only underpriced in the short run but also underperform in the long run. The long-run performance is negatively related to the short-run underpricing. The finding is consistent with Aggarwal and Rivoli (1990) and Ritter (1991) and other economic scholars.

Secondly, the aftermarket, long-run downward drift is not only confirmed but also found to be large in magnitude relative to the stock market price index performance. Thirdly, the post-issue operating performance is also poor. Chinese evidence shows that the level of IPO underperfromance is economically and statistically significant. Moreover, Ibbotson (1975) and Ritter (1991), in their respective US studies, suggest poor performance ends after three or four years. Loughran and Ritter (1995) find the poor stock performance extends to 5 years after issue, with no further underperformance in the sixth year. Chinese evidence, however, shows that such a gradual but steady decline tendency in the long-run performance lasts more than three years and continues even after the fifth anniversary of public listing.

Lastly, the divergence of opinion hypothesis and the speculative bubble hypothesis are both valid in China's stock market. That is to say, the long-run underperformance of Chinese IPOs could be explained by these two mutually inclusive hypotheses. In short, due to the overoptimistic behaviour of investors towards the future prospects of new public firms (the divergence of opinion hypothesis, Miller 1977) and due to the speculation of "those investors who would not get an allocation of the oversubscribed new issues from the underwriter at the offering price" and also due to "price manipulation", firms going public take advantage of temporary improvements in performance to issue new shares when investors have overly optimistic expectations about firms' future prospects (the speculative bubble hypothesis, Tinic 1988 and Shiller 1990), long-run underperformance has existed in China's stock market and negative abnormal returns continue up to at least five years subsequent to listing.

Table 5.1Average Abnormal Returns (ARs) and Cumulative Abnormal Returns(CARs) for Chinese IPOs Using Calendar Time Analysis

The long-run stock performance is measured by first computing IPOs' raw returns excluding the initial return. Then the adjusted returns or abnormal returns are calculated by subtracting the corresponding market returns of China's stock market from the IPOs' raw returns. On the basis of individual abnormal returns, average abnormal returns will be calculated. Finally, the cumulative average returns (CAR), the summation of the average market-adjusted returns, are calculated to represent the gains/losses from a strategy of buying IPOs on the first day of listing.

Month of seasoning	AR(%)	t-statistic	CAR (%)	t-statistic
1	-0.68		-0.53	
2	0.0085	0.0485	-0.51	-2.9724
3		0.0778	-0.55	-1.0215
12	-0.32	-1.9436	-0.68	-3.6445
24	0.0032	0.2715	-1.28	-1.0762
36	0.0385	3.3381	-1.37	-2.1914
48	0.0029	0.5137	-1.50	-3.3327
60	-0.0032	-1.8987	-1.59	-24936
72	0.00401	0.7206	-1.65	-25118

The market-adjusted or abnormal return (ar) for stock *i* in event period *t* is defined as:

$$ar_{it} = r_{it} - r_{mt}$$

where  $r_{it}$  is the raw return on stock *i* in event period t and  $r_{mt}$  is the return on the market index for event period *t*.

The average abnormal return (AR) on a portfolio of *n* stocks for event period *t* is the

$$AR_t = \frac{1}{n} \sum_{i=1}^n ar_{it}$$

equally weighted arithmetic average of the market-adjusted returns:

The statistical significance of the average abnormal return (AR) is determined by using the usual t-statistic, which is computed for each period as:

$$t(AR_{t}) = AR_{t}/SE(AR_{t})$$

where  $SE(AR_t)$  is the standard error of the average abnormal return in period t and  $t(AR_t)$  is the t-statistic (with *n*-2 degrees of freedom) for the null hypothesis that the average abnormal return in any given period is zero.

Table 5.2Average abnormal returns (ARs) and Cumulative abnormal returns (CARs)for Chinese IPOs using calendar time analysis

The long-run stock performance is measured by first computing IPOs' raw returns excluding the initial return. Then the adjusted returns or abnormal returns are calculated by subtracting the corresponding market returns of China's stock market from the IPOs' raw returns. On the basis of individual abnormal returns, average abnormal returns will be calculated. Finally, the cumulative average returns (CAR), the summation of the average market-adjusted returns, are calculated to represent the gains/losses from a strategy of buying IPOs on the first day of listing.

Month of seasoning	AR(%)	t-statistic	CAR (%)	t-statistic
1 2 3 12 24 36 48 60 72	-0.57 0.01 0.01 -0.20 0.02 0.04 0.003 -0.003 0.003	0.0564 0.0859 -2.1183 0.1228 2.2206 0.4890 -0.4911 0.6851	-0.57 -0.56 -0.55 -0.71 -1.07 -1.34 -1.42 -1.58 -1.63	-1.9197 -1.2301 -2.7616 -1.9473 -2.5956 -1.8258 -2.3272 -2.2616

The cumulative abnormal return (CAR) is calculated by cumulating the average abnormal returns from the beginning of the first full calendar month of trading to

$$CAR_t = \sum_{t=1}^t AR_t$$

event month t:

The statistical significance of the cumulative average abnormal (*CAR*) is determined by using the t-statistic. The t-statistic for the cumulative abnormal return in month t is calculated as:

$$t(CAR_t) = \frac{CAR_t * \sqrt{n}}{\sqrt{t * \operatorname{var} + 2 * (t-1) * \operatorname{cov}}}$$

where  $t(CAR_t)$  is the t-statistic for the null hypothesis that the cumulative average abnormal return over period *t* is equal to zero. *t* is the event month, *var* is the average (over 36 months) cross-sectional variance, and *cov* is the first-order autocovariance of the *AR<sub>t</sub>* series. Table 5.3: Long-run Performance of Chinese IPOs Relative to the matching firms

All returns are measured by average 3-year, and 5-year buy-and-hold returns exclusive of the first trading day return. Wealth Relative (WR) is defined as:

$$WR = \frac{1 + average T}{1 + average T} year total return on IPOs$$

(Excluding initial return)

		Т	hree-year per	riod
Year	Sample size	IPOs HPR(%)	WR	Matching Firms HPR(%)
1998	26	-2.92	-3.77	-3.47
1999	55	3.6	0.43	-11.10
2000	75	-0.99	0.23	-2.72
2001	70	-0.93	0.26	-0.19
	Sample	I	ive-year peri	od
Year	size	IPOs HPR(%)	WR	Matching firms
1997	11	-2.75	0.42	-2.15
1998	26	6.48	0.48	-12.14
1999	55	-2.27	0.55	-9.47

Table 5. 4 Results of Multiple Regression for Chinese IPOs  $Return = \alpha_0 + \alpha_1 Ln(Size) + \alpha_2 Ln(1 + Age) + \alpha_3 IR + \alpha_4 Sub + \varepsilon$ 

where

*Return* = market-adjusted buy-and-hold return

*Size* = the natural logarithm of the book value of equity after IPO

*Age* = the number of years in operating before the offering

*IR* = market-adjusted return on the first trading day

*Sub* = the over-subscription ratio of shares offering

(Values in parentheses represent t-statistics. Significance at a 5% and 1% level is indicated by one and two asterisks.)

Holding	Regression 1	Regression 2
period	Month 1-12	Month 1-36
Constant	1.230	-0.778
	(1.663)	(-0.912)
LN(Size)	0.564	1.064
LIV(SIZE)	(2.704)**	(2.890)**
$IN(1+4\alpha\alpha)$	0.714	-0.613
LN(1+Age)	(0.883)	(-0.907)
Sub	-1.145	-2.193
540	(-1.682)	(-1.316)
ID	-0.497	-0.701
IR	(3.319)**	(2.956)**
No. of observations	221	136
Adj. R <sup>2</sup>	0.28	0.21

# Chapter 6

# CAPM and FF3FM: The Case of China's Stock Market

#### **6.1 Introduction**

Ritter and Welch (2002) put forward that "Long-run performance may be the most controversial area of IPO research, with some researchers lining up behind an efficient markets point of view. Kooli and Suret (2004) present that the existence of long-run systematic price patterns raises questions concerning aftermarket efficiency which makes the study of long-run performance of IPO important. Eckbo and Norli (2005) propound that this long-run return evidence challenges the efficient markets hypotheses. To some researchers, they have started to use the standard Capital Asset Pricing Model (CAPM) and Fama-French Three-factor Model (FF3FM) to investigate the long-run performance in the stock market.

In this Chapter, we are going to empirically examine the validity of the CAPM and FF3FM using data from China' stock market and try to find a better explanation of long-run underperformance in China's stock market.

The rest of the Chapter is organized as follows:

Methodology about the Fama-MacBeth approach used to test CAPM is explained in Section 2. The methodology towards testing FF3FM is also specified in this section. Section 3 reports the findings on the CAPM tests in China's A-share markets while Section 4 reports the findings on the FF3FM tests in China's A-share market. After the conclusions provided in Section 5, some additional explanations of the CAPM tests in China's stock market are added in the last section, Section 6.

### 6.2. Literature Review

Markowitz (1959) creatively casts the investor's portfolio selection problem in terms of expected return and variance of return and he further argues that investors would

optimally hold a mean-variance efficient portfolio; that is, a portfolio with the highest expected return for a given level of variance. On the basis of Markowitz (1959)'s research, Sharpe(1964), Lintner(1965) and Mossin(1966) independently developed the standard form of the capital asset pricing model, which is often referred to as the Sharpe-Lintner-Mossin model or the standard CAPM. The CAPM rests on eight assumptions as follows:

There are no taxes or transaction costs;

Assets are infinitely divisible;

An individual cannot affect the price of a stock by his buying or selling action. This is analogous to the assumption of perfect competition;

Investors are expected to make decisions solely in terms of expected values and standard deviations of the returns on their portfolios;

Unlimited short sales are allowed;

Unlimited lending and borrowing at the risk-free rate;

Investors have homogenous expectations of risk and return;

All assets are marketable (Edwin and Gruber, 1995).

Under such assumptions, the standard CAPM yields the following expression for the equilibrium expected returns,  $E(R_i)$ , on asset *i*:

$$E(R_i) = R_f + \left[ E(R_m) - R_f \right] \beta_i \tag{1}$$

where  $R_f$  is the riskless rate of interest;  $E(R_m)$  is the expected return on the market portfolio of all assets; and  $\beta_i = \operatorname{cov}(R_i, R_m)/\delta_{(Rm)}^2$ , the covariance between the return on asset *i* and the market return divided by the variance of the market return, is the measure of systematic risk of asset *i*.

The CAPM categorises risk into two types: one is the systematic risk and the other is non-systematic. It argues that volatility arising from specific events (called non-systematic risk) can be eliminated in a diversified portfolio while volatility resulting from general movements in stock price and the tendency of all stocks to fluctuate in the same direction (called systematic risk) cannot be diversified away. The main implications could be expressed as follows:

1) CAPM relates the expected return for any asset with the risk for that asset as measured

by beta.

2)  $\beta$ , the slope in the regression of an asset's return on the market, is the only risk that affects expected return, namely,  $\beta$  suffices to explain expected return. When this proposition holds, then

3) There is a positive price of risk in the capital markets.  $[E(R_m) - R_f]$ , the market risk premium in terms of excess returns, is positive.

Put differently, the essence of CAPM is that the expected return on any asset is a positive linear function of its beta and that beta is the only measure of risk needed to explain the cross-section of expected returns.

The development of the CAPM can be regarded as a revolution in the field of finance. There is, of course, a huge amount of literature to examine if the CAPM is valid since the CAPM was developed. The early empirical tests focusing on the relationship between return and the beta confirm the CAPM's prediction that the higher the risk, the higher the return such as the empirical findings of Fama and MacBeth (1973). But with the process of testing the CAPM, several anomalies in terms of firm characteristics such as the price-earnings-ratio and size emerged, challenging the CAPM's argument that the beta is sufficient to describe the cross-section of expected. That is to say, these firm characteristics might also have explanatory power for the cross section of the expected returns beyond the beta of the CAPM. The price-earnings-ratio effect was first documented in the academic literature by Basu in 1977. Basu (1977) describes it as such a phenomenon: firms with low price-earnings-ratio have higher expected returns, and firms with high price-earnings-ratio have lower expected returns.

Banz (1981) first documents the size effect, which refers to the fact that low market capitalisation firms have higher expected returns and vice versa. Banz finds that market capitalization (a stock's price times shares outstanding) adds to the explanation of the cross-section of average returns provided by market  $\beta$  s. Average returns on small (low market capitalization) are too high given their  $\beta$  estimates, and average returns on large stocks are too high.

Besides, Fama and French (1992) have found stronger evidence to cast doubt on the CAPM's implication that the beta is sufficient to describe the expected returns. Fama and

French look closely at the relationship between expected return and the beta in a large cross-section of equities, testing the joint roles of market beta, size, earnings-price ratio and book-to-market equity in the cross-section of average returns on NYSE, AMEX, and NASDAQ stocks. Their findings are: beta does not seem to help explain the cross-section of average stock returns, and the combination of size and book-to-market equity seems to absorb the roles of earnings-price ratio in average stock returns. Put differently, they explain the cross-section of average stock returns not by beta defined in the CAPM, but rather by two other factors, the size and the book-to-market equity. When these two factors are taken into account, beta adds nothing to the explanation.

Fama and French (1993) invent a famous three-factor model, arguing that many of the CAPM average-return anomalies can be captured by this model. They start with the observation that two classes of stocks have tended to do better than the market as whole: one is stocks with a small size, that is to say, small market capitalisation; the other is stocks with a high book-to-market ratio (customarily called "value" stocks: their opposites are called "growth" stocks). They then add two factors to CAPM to reflect a portfolios' exposure to these two classes and finally form their famous three-factor model, which is called Fama and French Three-factor Model (FF3FM).

The model says that the expected return on a portfolio in excess of the risk-free rate  $[E(R_i)-R_f]$  is explained by the sensitivity of its return to three factors: i) the excess return on a broad market portfolio  $(R_m - R_f)$ ; ii) the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB, small minus big); and iii) the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of high-book-to-market stocks and the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (HML, high minus low). In other words, SMB is meant to mimic the risk factor in returns related to size. HML is meant to mimic the risk factor in returns related to value (that is book-to-market ratios). Specifically, the expected excess return on portfolio i is,

$$E(R_i) - R_f = b_i [E(R_m) - R_f] + s_i E(SMB) + h_i E(HML)$$
<sup>(2)</sup>

where  $b_i$ ,  $s_i$  and  $h_i$ , are the factor sensitivities or loadings. Fama and French (1996) use this three-factor model to examine the simple monthly percent excess returns on 25 portfolios formed on size and BE/ME and listed on NYSE, AMEX and NASDAQ during 1963M7 to 1993M12. The results show that coefficient  $\alpha_i$  is (i) negative for portfolios located in the extreme quartiles of the stocks of small capitalisation and low ratio book to market and (ii) positive for portfolios located in the extreme quartiles of the stocks of big capitalisations and high book to market ratio. In addition to these results on the extremes, the coefficient is not significantly different from zero; which makes it possible to affirm that the three-factor model explains cross-section stock returns. Their results are consistent with their assumption that the anomalies largely disappear in the three-factor model.

Wu and Kwok (2007) investigate the long-run performance of global IPOs as compared to purely domestic ones made by US industrial companies. In their study, the coefficient estimate of intercept term,  $\alpha$ , from the time-series regressions are used as an indicator of risk-adjusted performance for each sample. They find that global IPOs not only underperform the market but also underperform their domestic counterparts in the three years after issuance. Their results are consistent with the window of opportunity hypothesis.

Although, in 1997, Chinese scholars (Liu Bo and Zhao Xiaoping 1997) took the lead in using the standard CAPM to do an empirical analysis on the relationship between returns and beta in Shanghai A-share market, Mookerjee and Yu (1999) subject the newly established stock markets in Shanghai and Shenzhen to test market efficiency, utilizing daily stock price data. Their study concludes that there are significant inefficiencies present on both exchanges. They analyse that the reasons for inefficiency in China's stock market are due to several factors. These include the restricted supply of stocks, excessive volatility because of abrupt policy changes by the authorities, and a scarcity of information that is a result of limited enforcement of disclosure regulations. In our study, we will attempt to compare the CAPM and FF3FM in explaining stock returns in the case of China. The first objective of my study is once again to test the validity of the standard CAPM in China's A-share markets with attempts to overcome some weaknesses of the 1997 study of Liu and Zhao such as the sample period of 1993 to 1997 when China's stock market was quite immature, and the negligence of the Shenzhen A-share market. That is to say, we will look at the returns and risk not only in the Shanghai A-share market but also in the Shenzhen A-share markets during 1998 - 2002.<sup>1</sup> The second objective is to use FF3FM in the hope of further assessing the asset pricing characteristics in China's A-share market, at the same time comparing my findings with those from similar studies in the literature.

## 6.3 Methodology

#### 6.3.1 Data Description

The sample data set contains 237 stocks traded in China's stock market, 147 were selected from the Shanghai A-share market and 90 from the Shenzhen A-share market during the sample period from January 1998 to December 2002 (60 months). The following monthly data was retrieved from DATA STREAM, which is a subsidiary of Primark Global Information Systems.

i) Monthly individual stock returns  $(R_i)$ ;

ii) Monthly value-weighted market returns ( $R_m$ );

iii) China interbank offer rates on one-month deposits as proxy for risk-free interest rates  $(R_f)$ ;

Besides, other data related to stock capitalisation and book to market ratios are from the Fin-China, a famous database in China.

#### 6.3.2 Fama-MacBeth Approach to testing CAPM

The CAPM's form is simple. Thus, it is vulnerable to two potential sources of error. The first potential problem is that the form of the model may simply be wrong. Instead of being linear, the actual risk-return relationship could be nonlinear; hence, the CAPM is misspecified. The second potential problem is austerity; the model may not include all the relevant factors. If so, the CAPM would be inadequate to describe the real behaviour of returns. In view of these two problems, in the first place, I employ the Fama-MacBeth

<sup>&</sup>lt;sup>1</sup>As for China's B-share market, its size is very small comparative to that of the A-share market. As of December 2006 Shanghai B-share and Shenzhen B-share markets have only 109 B-shares together whereas the Shanghai A-share market and the Shenzhen A-share market have 1411 A shares. Hopefully, we will conduct the similar tests on China's B-share market in the near future when there are more companies listed in the B-share market.

approach to test the applicability of the standard CAPM in China's stock market. In the second place, I would like to set up a multifactor model to describe the return behaviour in China's stock market. Meanwhile, I attempt to draw parallels between my findings and those from similar studies in the literature.

The basic idea of the approach that was first developed by Fama and MacBeth is the use of a time series (first pass) regression to estimate Betas and the use of a cross-sectional (second pass) regression to test the hypothesis derived from the CAPM. Implementation of the Fama-MacBeth approach involves two steps.

Step 1 (First-Pass Regression). Although the CAPM is formulated in terms of *ex ante* parameters, it is common to employ *ex post* data rather than *ex ante* value in empirical studies. Thus, for each of the *N* securities included in the sample, we first run the following regression over time to estimate beta, under the assumption that  $\beta_i$  is constant over time:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \eta_i \tag{3}$$

where  $R_{ii}$  and  $R_{mi}$  are the rates of return on the *ith* security and on the market portfolio (that is to say, the Shanghai Stock Exchange A share Price Index when looking at Shanghai A-share market, or the Shenzhen Stock Exchange A Share Price Index when looking at Shenzhen A-share market) in year *t*;  $\beta_i$  as noted elsewhere, is the Beta or market volatility coefficient of the *ith* security, and  $\eta_i$  are the residuals. In all, there are N such regressions, one for each security; therefore giving *N* estimates of  $\beta_i$ .

Step 2 (Second-Pass Regression). In order to examine the validity of the CAPM, we run a cross-section regression. That is to say, in this stage, we run the following regression over the sample period over the *N* securities:

$$\overline{R}_{ii} = \hat{\gamma}_{0i} + \hat{\gamma}_{1i} \beta_{i} + \hat{\gamma}_{2i} \beta_{i}^{2} + \hat{\gamma}_{3i} S_{ei} + \eta_{ii}$$
(4)

where  $\overline{R}_i$  is the average or mean rate of return for security *i* computed over the sample period covered by Step 1,  $\beta_i$  is the estimated beta coefficient from the first-stage regression.  $\overline{R}_i$  is used as estimators of  $ER_i$ .  $\eta_i$  is the residual term and  $S_{ei}$  is the residual standard deviation of the *ith* security from the first-stage regression. This form of the equation allows the test of a series of hypotheses regarding the CAPM.

The tests are:

i)  $\hat{\gamma}_3$  should not be significantly different from zero, or residual risk does not affect return;

ii)  $\hat{\gamma}_2$  should not be significantly different from zero, or there are no nonlinearities in the security market line;

iii)  $\hat{\gamma}_1$  must be more than zero, that is, there is a positive price of risk in the capital markets, that is to say, a positive relationship exists between systematic risk and expected return.

If the beta is not sufficient to describe the expected returns, namely, the CAPM is an incomplete specification of priced risk, the CAPM then should be replaced by other models such as FF3FM by adding additional risk measures beyond the CAPM beta to compensate for risk variable omitted. Therefore, after the two-stage procedure we have mentioned above, the following step, let's say step 3, is to employ the FF3FM for China's stock market, which hopefully can better describe the behaviour of expected returns in China's stock market.

#### 6.3.3 Tests of the FF3FM for China's Stock Market

On the basis of the following equilibrium model we have mentioned before,

$$E(R_i) - R_f = b_i [E(R_m) - R_f] + s_i E(SMB) + h_i E(HML)$$
(5)

tests of the FF3FM methodology could be expressed as follows:

in the time-series regression, variation through time in the expected premiums  $E(R_m) - R_f$ , E(SMB), and E(HML) in equation (5) is embedded in the explanatory returns,  $R_m - R_f$ , SMB, and HML. That is to say, the following econometric model converted from the above equilibrium model can be used to test the validity of the FF3FM:

$$R_i - R_f = a_i + b_i (R_m - R_f) + s_i SMB + h_i HML + \varepsilon_i$$
(6)

From this, we have three explanatory variables: Market, SMB and HML.

In June of each year t from 1998 to 2002, all the sample stocks are ranked on the basis of size (price times shares). The median sample size is then used to split the sample companies into two groups: small (S) and big (B). Book equity to market equity (BE/ME) for year t is calculated by dividing book equity at the end of financial year t by market equity at the end of financial year t. It may be noted that financial year closing in China is December for all companies every year. The sample stocks are broken into three BE/ME groups based on the breakpoints for the bottom 30 percent (low), middle 40 percent (medium) and top 30 percent (high) of the ranked values of BE/ME for the sample stocks.

We construct six portfolios (S/L, S/M, S/H, B/L, B/M, B/H) from the intersection of the two size and three BE/ME groups. For example S/L portfolio contains stocks that are in the small size group and also in the low BE/ME group while B/H consists of big size stocks that also have high BE/ME ratios. Monthly equally-weighted returns on the six portfolios are calculated from July of year t to June of year t+1, and the portfolios are re-formed in June of year t+1. The returns are calculated from July of year t to ensure that book equity for year t-1, i.e., December, is known to investors by the time of portfolio formation. The six size-BE/ME portfolios are constructed to be equally-weighted. Fama and French (1996) document that the three factor model does a better job in explaining LSV equally-weighted portfolios compared to value-weighted portfolios.

Two portfolios, HML and SMB, are formed from the six portfolios presented above. Indeed, the monthly stock returns of portfolio HML correspond to the difference between the average monthly stock returns of the two portfolios of high B/M ratios (HS and HB) and the average monthly stock returns of the two portfolios of low B/M ratios (LS and LB): HML={(HS+HB)-(LS+LB)}/2.

As for the monthly stock returns of portfolio SMB, it corresponds to the difference between the average monthly stock returns of the three portfolios of small capitalisation (HS, MS and LS) and the average monthly returns of the three portfolios of high capitalisation (HB, MB and LB): SMB={(HS+MS+LS)-(HB+MB+LB)}/3.

Due to the imperfection of Share price index system of China's stock market, we used just the Shanghai A-share Price Index as our market portfolios. This weakness in our study will disappear when various share price indices are set up in the future. For the dependent variables of our time-series, we consider stock portfolio returns. Indeed, we regress monthly returns of the following portfolios: the six portfolios HS, HB, MS, MB, LS and LB.

In addition, we would also use the combination of univariate analysis and multivariate analysis to test the explanation power of each individual explanatory variable and jointly test the explanation power of these three explanatory variables.

#### **6.4 CAPM and Its Findings**

According to the Fama-MacBeth approach, we first run time series regression on the equation (1) over the period 1998 to 2002 to get beta estimate (standing for the systematic risk) and standard deviation of residual (standing for the non-systematic risk) of every individual stock in the sample. These estimates are then used in the equation (2) to run a cross-section regression to test the validity of the CAPM. Table 6.1 is an empirical result abstract from all of the tests related to CAPM, from which we can draw a brief conclusion regarding the validity of CAPM in China's A-share market.

1) At the 1 percent level of significance, the positive linear relationship between expected return and beta exists is coincident with the hypothesis of the CAPM. The higher the stock's beta, the higher the return of the stock.

2) Also at the 1 percent level of significance, residual does have influence over returns, which is not consistent with the hypothesis of the CAPM. The goodness fit is only around 15 percent, which implies that  $\beta$  does not suffice to explain the expected returns;

3) Generally speaking, CAPM is not fully valid in China's A-share market, because beta is not sufficient to describe the behaviour of stock returns. As we mentioned before, Chinese economists (Liu and Zhao 1997) have used the standard CAPM to do an empirical analysis on the relationship between returns and beta in the Shanghai stock market. My study confirms the findings from Liu and Zhao.

4) It is because the testing of the CAPM validity in China's stock market suffers from a severe problem that the beta is not sufficient to describe the expected returns in the cross section in terms of the very low goodness fit. The next step, therefore, is that we have to employ FF3FM to further test China's stock market.

#### 6.5 FF3FM and Its Findings

In addition to Table 6.2, the summary of descriptive statistics on the portfolio returns and explanatory variables chosen according to the FF3FM, Tables 6.3 and 6.4 give overall empirical results about the FF3FM.

1) Compared to goodness of fit in the one-factor CAPM, which is around 15 percent, the goodness of fit in the FF3FM is much higher, ranging from 20.7 percent to 53.2 percent. The one-factor CAPM relationship for expected returns can be rejected; yet we cannot say that these findings from FF3FM are strong enough to support the validity of the FF3FM in China's stock market.

2) More importantly, our findings, as a whole, are not consistent with the main implications of the FF3FM. Generally speaking, we have no statistically significant evidence to support the hypothesis related to intercept driven by the FF3FM and we also find that HML, a proxy to mimic the risk factor in returns related to value has no contribution to the explanation of expected returns. Moreover, if we drop this explanatory variable, the goodness of fit will increase more or less.

3) It is worth stressing that we do find that SML, the proxy to mimic the risk factor in returns related to size, has a statistically significant power to the explanation of the expected returns, and its explanation power is intensified when HML is dropped. In other words, we do confirm that there has been size effect in China's stock market.

#### 6.6 Conclusions

In the context of the above findings from CAPM and FF3FM, we can draw several conclusions and inferences for China's stock market.

1. Strong evidence cannot be found to support the validity of CAPM, though there is a positive relationship between returns and beta, the systematic risk;

2. Strong evidence cannot be found to support the validity of the FF3FM in China's stock market, though there is the existence of so-called size effect

3. It is frustrating that both goodness of fit for the CAPM and FF3FM are too low to

adequately describe China's stock market. This could be regarded as further evidence to reject the validity of CAPM and FF3FM in China's stock market.

4. As an emerging and immature stock market, it is more difficult for China's stock market to be described by the CAPM in terms of either the single factor model or the multifactor model, in this case, the FF3FM, because these two hypotheses are both based on EMH, the Efficient Market Hypothesis (Fama 1991).

5. Hence one possible implication is that China's stock market does not satisfy the criteria for full information efficiency. Put differently, stock prices in China's stock market fail to reflect fully all available information and trading is based on investor sentiment, pseudo-signals, or non-information, which is regarded as "noise trading" in the language of Black (1986), and De long, Summers and Waldman (1990). Noise trading has been recognised as an important feature of the financial market: it not only exists, but can also have an impression on asset prices, causing systematic deviations from the efficient market hypothesis. China's stock market is inefficient in the weak form, which has been confirmed by many Chinese economists and scholars, and this could be regarded as a possible consequence of the presence of investor mood swings that are not based on economic fundamentals, or noise trading. High volatility, or speculation, therefore, is a concentrated expression of noise trading. Although Chinese investors start to pay attention to intrinsic values of listed companies there is still huge speculation in the stock market and share prices rise regardless of fundamentals.

6. The other explanation could be other factors having a strong influence on returns have not been considered. For example, Su (1998) reveals that Chinese policy-makers usually have an influence over the stock market. He argues that volatility is explained by reactions to Chinese government policy changes, particularly those that affect liquidity on China's market. Reactions to changes in underlying fundamentals of individual companies are insignificant in comparison.

These conclusions are really important not only because they have diagnosed the deficiencies in China's stock market development but they could also be used as guideposts to prescribe the right remedy for those deficiencies hindering China's stock market development.

	China's A-share Market (177 stocks)
Equ. 1	$R_{ii} = \hat{\gamma}_{0i} + \hat{\gamma}_{1i}\beta_i + \eta_{ii}$
$\hat{\gamma}_{1\prime}$	0.022141 (4.3339 [.000])
F-stat.	18.7825 [.000]
$\overline{R}^{2}$	0.15492
Еqи. 2	$R_{ii} = \hat{\gamma}_{0i} + \hat{\gamma}_{1i}\beta_{i} + \hat{\gamma}_{2i}\beta_{i}^{2} + \eta_{ii}$
$\hat{\gamma}_{1\prime}$	0.059327 (1.4289 [.156])
$\hat{\gamma}_{2i}$	-0.017160 (-0.90248 [.369])
F-stat.	9.7804 [.000]
$\overline{R}^{2}$	0.15329
Еqи. 3	$R_{it} = \hat{\gamma}_{0t} + \hat{\gamma}_{1t}\beta_{i} + \hat{\gamma}_{3t}S_{ei} + \eta_{it}$
$\hat{\gamma}_{1\prime}$	0.026035 (6.2098 [.000])
$\hat{\gamma}_{3i}$	0.21543 (7.0742 [.000])
	39.2112 [.000]
	0.44067
Equ. 4	$R_{it} = \hat{\gamma}_{0t} + \hat{\gamma}_{1t}\beta_{i} + \hat{\gamma}_{2t}\beta_{i}^{2} + \hat{\gamma}_{3t}S_{ei} + \eta_{i}$
	0.075549 (2.2478 [.027])
	-0.022829 (-1.4846 [.141])
	0.21774 (7.1857 [.000])
	27.2068 [.000]
	0.44767

Table 6.1: An Abstract of Testing Results for CAPM

	Mean	Standard Deviation	t-statistic
SL	1.010	2.22	2.850
SM	0.887	3.61	3.055
SH	0.821	3.89	1.954
BL	0.042	3.21	2.334
BM	0.050	4.96	1.885
ВН	0.041	3.64	3.405
MARKET	0.663	3.83	2.956
SMB	0.902	2.76	0.889
HML	0.435	3.92	1.632

Table 6.2:. Summary Statistics on the Portfolio Returns and Explanatory Variables

Table 6.3:

Regression of Size and Book-to-market Sorted Portfolio Excess Returns ( $R_t$ ) on Combinations of the Market (MKT), Size (SMB) and Value (HML) Factor Portfolios

$$R_{t} = a + bMKT_{t} + sSMB_{t} + hHML_{t} + \varepsilon_{t}$$

	Regressan					
Regressors	d	a	b	S	h	R squared
МКТ	SL	0.0031	0.495	-	-	0.319
	SM	0.0113	0.438	-	-	0.301
	SH	0.0142	0.464	-	-	0.277
	BL	-0.0101	0.471	-	-	0.208
	BM	-0.0263	0.415	-	-	0.235
	BH	0.0028	0.489	-	-	0.216
SMB & HML	SL	0.0322	-	1.8541		0.407
	SM	0.0105	-	0.6563		0.389
	SH	-0.0120	-	1.1257		0.350
	BL	0.0388	-	0.9146		0.296
	BM	0.0254	-	0.7549		0.315
	BH	0.0187	-	0.8710		0.229
MKT & SMB	SL	0.0017	0.9321	1.6640	-	0.648
	SM	0.0032	0.8547	1.1875	-	0.540
	SH	0.0107	0.8173	0.9432	-	0.513

	BL	0.0002	0.6452	1.4378	-	0.388
	BM	-0.0051	0.8344	0.8859		0.421
	BH	0.0022	0.9015	0.8603	-	0.405
MKT & HML	SL	0.0012	0.8091	-	0.3307	0.276
	SM	-0.0007	0.9408	-	0.2512	0.229
	SH	0.0030	0.7115	-	-0,4856	0,284
	BL	0.0018	0.8836	-	-0.4232	0.251
	BM	0.0024	0.8195	-	0.2174	0,188
	BH	-0.0031	0.6555	-	0.3890	0.191
MKT,SMB&H ML	SL	0.0048	0.3873	0.8012	0.2873	0.532
	SM	0.0037	0.4233	0.8735	-0.3319	0.393
	SH	0.0106	0.2208	0.7549	0.1554	0.337
	BL	0.0053	0.2910	0.7861	-0.2743	0.207
	BM	-0.0028	0.1884	0.6323	0.3715	0.289
	BH	0.0032	0.1077	0.7714	0.22.3	0.293

Regressors	Regressand	t(a)	t(b)	t(s)	t(h)
МКТ	SL	0.9854	4.8501	-	-
	SM	1.2629	2.1329	-	-
	SH	0.6032	2.9094	-	-
	BL	-0.5886	2.6296	-	-
	BM	-1.5567	2.4903	-	-
	BH	0.6905	3.5526	-	-
SMB & HML	SL	1.7654	-	3.8810	-1.6421
	SM	0.9610	-	1.7923	1.5136
	SH	-1.4571	-	2.2207	0.9423
	BL	0.8914	-	3.0175	0.9809
	BM	2.1149	-	1.9052	-1.1147
	BH	1.6742	-	1.5436	0.7246
MKT & SMB	SL	1.7084	2.5159	3.3723	-
	SM	1.5421	2.7185	2.3877	-
	SH	1.8753	2.3740	4.0471	-
	BL	0.8736	1.9807	3.7179	-
	BM	-0.9558	1.7873	2.7449	-
	BH	1.4785	2.766	2.6497	-
MKT & HML	SL	0.8204	2.2401	-	1.5432
	SM	-0.5159	-3.1677	-	1.2118

Table 6.4: t-statistics and F-statistics of the Estimated Coefficients

	SH	1.3513	2.2758	-	-0.8766
	BL	2.0312	2.3887	-	-0.9701
	BM	-1.3403	1.9859	-	0.7643
	BH	0.1796	3.9510	-	0.6334
MKT,SMB&HML	SL	0.2854	2.1677	4.2293	0.4007
	SM	1.9831	1.2426	2.5968	-0.3385
	SH	0.2842	1.7904	2.2101	1.3406
	BL	0.8936	0.4919	3.7540	-0.8547
	BM	-0.1856	1.8402	1.9082	1.2281
	BH	1.8807	0.8055	2.7476	0.8704

# Chapter 7

# **Conclusions and Policy Implications**

The development of the stock market is one of the most important elements of China's economic and financial reform. In around 15 years, China's stock market has emerged from virtual non-existence to being an important segment of the country's financial sector. Meanwhile we cannot fail to notice that it is still in a very early stage of development. This thesis conducts empirical studies on China's stock market using contemporary finance theories in order to get a better understanding of the historic development of China's stock market, and more importantly to explain the anomalies in China's stock market and then put forward some policy implications on the basis of the empirical research findings.

Like any other stock market in the world, China's stock market comprises the primary stock market and secondary stock market and hence, the thesis, under the guidance of finance theories, quantitatively analyses the primary market in the first place and then carries on testing the secondary market empirically. In other words, Chapter 4 focuses on the primary stock market whereas Chapters 5 and 6 concentrate on the secondary market.

## 7.1 Conclusions

By using cross sectional regression, we examine whether short run underpricing exists in China's stock market and the validity of a series of theories used in explaining this phenomenon, for instance, winner's curse hypothesis, signalling hypothesis and ownership dispersion hypothesis by univariant model. These are the findings:

1) IPO underpricing does exist in China's stock market, and the smaller the IPO price, the larger the IPO initial return. Since IPO initial returns have a positive and significant relationship with reciprocal of IPO price, they always hold whether in OLS method or robust regression.

2) Given three hypotheses stated before, they are all valid in China's stock market. Particularly, we find that IPO return is negatively related to the number of IPO days, the time gap between offering and listing dates (DAYS), earning per share (EPS), the ratio of insiderownership to total shares outstanding (INSIDER), the size of IPO (IPOSZ), the percentage of successful application for the offer (LOTTERY), the ratio of the IPO capitalization to GDP (MKGDP) and the size of the single large shareholder (STATE) and positively related to allocation methods (METHOD) and the size of SEO (SEOSZ).

The negative relationship between IPO return and IPOSZ as well as a positive relationship between the IPO return and the size of the SEO is quite consistent with the signalling hypothesis which implies that the smaller the size of initial offering and the larger the size of SEO, the higher the IPO initial return.

Besides, we also find that the allocation method (METHOD) is positively related to IPO return and the smaller the chances of shares allocation, the higher the investors' rewards. Moreover, the percentage of successful application for the offer (LOTTERY) as well as the IPO time gap between offering and listing dates (DAYS) have negative and statistically significant relationships with IPO return; all of these are consistent with the adverse selection or the winner's curse hypothesis

Taking special ownership structure in China's stock market into account, we find the ownership dispersion hypothesis is valid. In other words, the IPO return is negatively related to the insider ownership (INSIDER), the size of single large shareholder (state shares and state-owned legal person shares, STATE) and the ratio of IPO capitalization to GDP (MKGDP), which implies that IPO underpricing is partially due to a relatively small aggregate supply of shares and also the smaller the ratio of IPO capitalization to GDP, the higher the IPO initial return.

3) One of the objectives of this thesis is to seek the reasons causing short term underpricing of IPOs in China's stock market. Taking the special status of China's stock market into account, this thesis argues that the imbalance between demand for shares and share supply, speculation, the special ownership structure, and extremely centralized ownership have a statistically and economically significant effect on Chinese IPO underpricing.

Also based on standard event study methodology, we investigate whether long-run underperformance of IPOs exists in China's stock market, and to what extent. Since there are two theories employed to explain this phenomenon, the divergence of opinion hypothesis and the speculative bubble hypothesis, this thesis intends to discover whether these two hypotheses can be used to explain this phenomenon. The findings are:

1) By measuring three indicators such as: buy-and-hold abnormal return, wealth relative, and cumulative abnormal return, we find the IPO underperformance exists in China's stock market since evidence shows the level of IPO underperformance is economically and statistically significant;

2) In the long-run, the performance of IPO companies declines gradually and steadily, even after the fifth anniversary of public listing; moreover, the long run downward drift is large in magnitude relative to stock market price index performance; 3) By multiple regression test, book value of equity after IPO has a significant positive relationship with market-adjusted buy and hold return, which is consistent with divergence of opinion hypothesis, at the same time, the market-adjusted return on the first trading day correlated to market-adjusted buy and hold return negatively, which implies the long-run underperformance should be negatively related to short-term underpricing and is consistent with the speculative bubble hypothesis. In a word, both hypotheses receive support in the case of Chinese IPOs. However, the number of years before a company goes public and over-subscription do not have a significant impact on the market-adjusted buy and hold return, which is not consistent with these hypotheses. The underlying reason is related to Chinese IPO history. Since one of the most important objectives in building China's stock market is to help SOEs in financing, so most of the listed companies in China's stock market are converted from state-owned enterprises, and thus the conversion history is not very long. As a consequence, the number of years before a company goes public is not very sensitive to the ex ante uncertainty, which causes the insignificant influence on market-adjusted buy and hold return. Concerning over-subscription ratio which measures the extent of subscription and represents the over-optimism of investors, it is better described as informed demand expansion following ex ante rational price setting in the prospectus in a market setting, and investors' demand for IPOs is not constrained by bias in the allocation methods used by issuers and underwriters.

With the help of the Fama-MacBeth approach, we build a univariant model to examine whether CAPM and FF3FM hold in China's stock market, and obtain results as follows:

1) CAPM is not fully valid in China's A-share market. In the light of our model, at the 1% level of significance, residual does have influence over returns. This means other factors have critical impacts on expected return in addition to beta and the goodness fit is low at around only 15%, and hence  $\beta$  does not suffice to explain the expected returns. In other words, CAPM cannot explain the relationship between beta representing systematic risk and expected return in China's stock market, though we get a positive linear relationship between expected return and beta from the regression;

2) No strong evidence supports the validity of FF3FM in China's stock market. Although the goodness of fit is much higher, ranging from 33.2% to 51.1%, it is still not enough to statistically support the existing positive linear relationship. Moreover, statistic ratios for intercept, and HML which is a proxy to mimic the risk factor in returns related to value, are not significant, and is inconsistent with FF3FM. Only one factor, SML, the proxy to mimic the risk factor in returns related to size, is statistically significant, which implies the size effect can partially explain the expected return in China's stock market. What is worth mentioning is that there are some drawbacks concerning the model we have established:

Firstly, we regard inter-bank offer rates on one-month deposits as risk-free interest rate, which is a key proxy in both CAPM and FF3FM. So any error in estimating this rate will cause mistakes in assessing the expected return. Generally speaking, 90-day Treasury bill rate is used as proxy for risk free rate of return internationally, but it is not the case in China. Because there is no such financial instrument and the interest rate in China does not open fully, other than as decided by market, it is decided by the government to some extent. So it is a pity that we cannot find a proper proxy for risk-free interest rate. Besides, error in measuring beta and unobservability of market portfolio are also the barriers in estimating expected return and define the relationship between expected return and risk.

Secondly, special characteristics only possessed by China's stock market block the efficient share circulation, for example, segmentation in China's stock market and shares are defined as tradable shares and non-tradable shares, which also enlarges the difficulty in constructing the model and choosing the variables for empirical analysis in China's stock market.

Three conclusions could be drawn from this thesis:

1) The underpricing anomaly concerning the process of IPO is examined in this thesis, and evidence strongly supports the existence of IPO underpricing in China's stock market. Our major findings are consistent with the winner's curse, signalling theory and ownership dispersion hypothesis. We find that IPO return is negatively related to the number of IPO days, the time gap between offering and listing dates (DAYS), earning per share (EPS), the ratio of insidership to total shares outstanding (INSIDER), the size of IPO (IPOSZ), the percentage of successful application for the offer (LOTTERY), the ratio of the IPO capitalisation to GDP (MKGDP) and the size of single large shareholder (STATE) and positively related to allocation methods (METHOD), the size of SEO (SEOSZ) and average number of tradeable shares per person possesses (SHRPP). History of the firm (AGE) is not significantly related to IPO initial return perhaps due to the shortness of Chinese enterprises going public. IPO underpricing anomaly is also attributed to the special status of China's stock market. The imbalance between demand for shares and share supply and high speculation aggravate IPO underpricing. More importantly, the special ownership structure - the extremely centralised ownership - has a statistically and economically significant effect on IPO underpricing, which could be regarded as an important signal of the commitment of privatisation in China;

2) The long run underperformance anomaly concerning the process of IPO is also examined in this thesis, and evidence strongly supports the existence of IPO underperformance in China's stock market. Chinese IPOs are not only underpriced in the short run but also underperformed in the long run. The long-run performance is negatively related to the short-run underpricing. As for the aftermarket, long-run downward drift is not only confirmed but also found to be large in magnitude relative to the stock market price index performance. The post-issue operating performance is also poor and the level of IPO underperformance is economically and statistically significant. Moreover, Chinese evidence shows that such a gradual but steady decline tendency in the long-run performance lasts more than three years and continues even after the fifth anniversary of public listing. Besides, the divergence of opinion hypothesis and the speculative bubble hypothesis are both valid in China's stock market. That is to say, the long-run underperformance of Chinese IPOs could be explained by these two mutually inclusive hypotheses. In short, long-run underperformance has existed in China's stock market and negative abnormal returns continue to at least six years subsequent to listing.

3) CAPM and FF3FM are not fully valid in China's stock market; According to Efficient Market Hypothesis, the stock market in China is weakly efficient, which means the price of stock reflects only historical information, and investors can gain extra income if approaching for more information. Hence one possible implication is that China's stock market does not satisfy the criteria for full information efficiency. Put differently, stock prices in China's stock market fail to reflect fully all available information and trading is based on investor sentiment, pseudo-signals, or non-information, which is regarded as noise trading. Noise trading has been recognised as an important feature of the financial market: it not only exists, but also can have imprints on asset prices, causing systematic deviations from the efficient

market hypothesis. China's stock market is inefficient in the weak form, which has been confirmed by many Chinese economists and scholars, and this could be regarded as a possible consequence of the presence of investor mood swings that are not based on economic fundamentals, or noise trading. High volatility, or speculation, therefore, is a concentrated expression of noise trading. Though Chinese investors start to pay attention to intrinsic values of listed companies there is still huge speculation in the stock market and share prices rise regardless of fundamentals.

#### 7.2 Policy Implications

On the basis of empirical findings, policy implications could be drawn, which might be advantageous to China's stock market development.

1). Decreasing the information asymmetry

The stock market plays a crucial role in every modern economy. As long as stock prices accurately reflect fundamental values, the resource allocation function of stock markets works well and resources flow to their most beneficial uses. From the findings, we must be aware of the severity of information asymmetry in China's stock market and hence one of the priorities for Chinese policy-makers is to intensify the disclosure of information. Perhaps this can be done in one of two ways: government-required disclosure and the independent collection and production of information. Without satisfactory rules and regulations about disclosure of information and against insider trading set by Chinese policy-makers, financial statements of listed companies will not convey the information the investors require. Adequate accounting practices, surveillance on doubtful insider trading cases and information disclosure are crucial to investor confidence; Chinese policy-makers are also obliged to encourage the establishment of third-party independent research institutions like Moody's and Value line, which independently collect information directly from listed companies and produce evaluations, to assure Chinese investors that they are receiving accurate assessments of firm financial health.

2) Strengthening corporate governance

Ownership transformation is one thing, yet corporate governance is another. It might be easier for an SOE to convert into a listed company, but it might be rather difficult to improve its corporate governance. In essence, to reduce the poor performance of China's stock market, one of the key issues is how to improve its corporate governance and operating performance. Investors can be deceived once, but they cannot be deceived forever. In the long-run, the share prices represent their intrinsic values of the operating performance of listed companies. Yes, it is Chinese policy-makers' job to encourage the ownership reform of SOEs, but it is also a tough and very important task for Chinese policy-makers to force listed companies to improve their corporate governance and encourage business ethics and integrity principles amongst listed companies.

3) Improving regulatory abilities

Improving supervision abilities is also a long-term task for Chinese policy-makers. It is widely agreed that there is huge underpricing and underperformance in the Chinese primary stock market and huge speculation in the Chinese secondary stock market, and also many respective suggestions and measures have already been put forward by scholars and experts at home and abroad. On the basis of my empirical research, it seems that we might neglect a critical fact that the Chinese primary stock market and secondary stock market are closely linked and are interactive. We argue that so called underpricing, in one way, means the share prices are underpriced in the primary stock market; but in another, it might represent overpriced share prices in the secondary stock market. Chinese investors are starting to pay attention to listed companies' intrinsic values but we still cannot fail to notice that there is huge speculation in the Chinese secondary stock market and share prices rise regardless of the fundamentals. This argument has been confirmed after the Chinese secondary stock market is examined by using CAPM and FF3FM approaches in Chapter 6. If this argument is accepted by Chinese policy markers, curbing speculations and bubbles will not be only for the secondary market regulation but also for reducing the huge underpricing in the primary stock market. At the same time, improving issue methods will not be limited to the primary market regulation; instead it will also be used for curbing speculations and bubbles in the secondary market. From another point of view, there are three fundamental ways which could be conducted to promote China's stock market development. The first one is to improve issue methods and issue mechanisms, the second way is to consolidate the share structure, that is, to increase the free float by putting state shares and state-owned legal shares into circulation, and the third will be to merge the A-share market with the B-share market.

### 7.3 Future Research

This thesis conducts a close research into China' stock market including the primary market and secondary market, and gains some valuable conclusions through the models established. However, there are some deficiencies concerning this thesis and there are also some unsolved problems. Hopefully, these deficiencies and problems can be covered and overcome in future studies.

1) The models established could be further improved. Due to the history and special characteristics of China's stock market, the structure of the stock market is rather complicated, including state shares, state-own legal shares, and individual shares. Even all the tradable shares are divided into A-shares and B-shares. But the models in this thesis are unable to be technically taken into account, which means the models should be improved in my future research. Furthermore, the supervision system of shares listing and offering are in the course of reform, changing continuously, which makes it rather difficult for me to acquire enough samples, sample periods and data to meet the requirements of the empirical research and for me to carry on more detailed empirical analysis.

2) This thesis tries its best to offer policy suggestions for China's stock market on the basis of empirical studies, for instance, the circulation of state share and state-owned legal share, consolidating the share structure and so on. But how to technically make state shares, state-owned legal person shares and Chinese individual shares unified into one type of share, and how the entire shares can circulate in the unified market is not specified. This could be one of my research topics in near future.

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