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# The Hong Kong Polytechnic University
# School of Accounting and Finance

## Pricing and Long-Run Performance of
## IPOs in China:
## The Effects of Change in Accounting Standard

PAN Jie

A Thesis Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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**Abstract**

China changed its accounting regulation in 1998 by replacing the old "Accounting Regulation for Experimental Listed Companies" with the new "Accounting Regulation for Listed Companies". My thesis investigates the effects of such change in accounting regulation on the IPO market in terms of pricing and long-run performance of the IPO shares. Specifically, I examine whether the new accounting regulation improves the association between earnings and IPO offering price and leads to a stronger relationship between earnings and IPO underpricing (which is defined as returns from the offering price to the first-day closing price). In addition, I also study whether there is an increase in the association between accounting numbers and IPO long-term stock performance after the adoption of the new accounting regulation.

The main contributions of my thesis are as follows. First, by analyzing the differences between the new accounting regulation and the old one, I find that accounting information under the new one is of higher earnings quality and is more credible than that under the old one. Consequently, improvement of earnings quality has positive effects on IPO pricing and IPO long-term stock returns.

Second, I develop testable hypotheses regarding the effects of accounting standard on the pricing and long-run performance of IPOs. These hypotheses concern with how accounting standard affects (i) the relationship between earnings per share (EPS) and IPO offering price, (ii) the relationship between return on assets (ROA) and

underpricing, and (iii) the relationship between earnings changes and IPO's long-run stock performance.

Third, based on a sample of Chinese IPOs listed from 1996 to 2004, I find a positive relationship between EPS and offering price, and a negative relationship between ROA and IPO underpricing during the whole sample period. Furthermore, the relationship between EPS and offering price becomes more positive and the relationship between ROA and IPO underpricing becomes more negative after the adoption of the new accounting regulation. The majority of my findings are robust to alternative estimation methods and alterative measurements of earnings. In addition, I measure IPO long-run performance by calculating the IPOs' cumulative abnormal return (CAR) up to either a 2-year or 3-year period. My empirical results show that the relationship between these CARs and IPOs' earnings changes has been strengthened by the new accounting regulation.

In summary, my thesis indicates that accounting standard can be a proxy for information asymmetry and influence the relationship between IPOs' accounting numbers and their performance. My empirical results complement the existing IPO literature by showing that Chinese IPOs not only react to accounting numbers but also earnings quality.


**Keywords: IPOs, Chinese Accounting Standard, Earnings Quality, Pricing, Long-Run Performance**

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# CHAPTER ONE

# Introduction

## 1.1 Objectives and motivations

Ritter (1991) and Rajan and Servaes (1997) document three anomalies related to initial public offerings (IPOs). They are short-term IPO underpricing, hot issue market, and long-term IPO underperformance. Short-term IPO underpricing means an average positive initial return from the offering price to the closing price on the first trading day. Hot issue market refers to the observation that IPO underpricing is cyclical. That is, IPO underpricing is more during some periods (hot markets) and is less during other periods (cold markets). Long-term IPO underperformance means that IPOs perform worse relative to a benchmark in the long run, where the benchmark can be a matched firm or a matched portfolio.

From the perspective of information asymmetry, there are two major theories that explain the IPO underpricing phenomenon: "signaling theory" proposed by Welch (1989) and "winner's curse theory" documented by Rock (1986) and Beatty and Ritter (1986). Apart from the information asymmetry theories, there are other explanations on IPO underpricing such as the "legal liability or lawsuit avoidance" arguments, and the "reduced and increased monitoring" arguments. On the other hand, there are also various theories that explain the long-term underperformance of IPOs. These theories include the "investor's optimism" argument by Miller (1977), the "window of opportunity" argument by Ritter (1991), Loughran, Ritter and Rydqvist

(1994) and Loughran and Ritter (1995); the "pseudo market timing" argument by

Schultz (2003); the "earnings management" argument by Teoh, Welch and Wong

(1998); and the "accounting performance coincidence" argument by Aharony, Lee

and Wong (2000). The details about all the above-mentioned theories will be

discussed in the chapter of literature review of this thesis.

In this thesis, I provide theory and evidence that relate two IPO anomalies to

accounting standards in the Chinese stock markets. First, I investigate the effects of

Chinese accounting standard change on the pricing of IPOs, where pricing of IPOs

include the determination of IPO offering price and the degree of IPO underpricing.

Specifically, I examine whether the new accounting regulation improves the

association between accounting numbers and IPO offering price and leads to a

stronger relationship between accounting numbers and IPO underpricing. Besides, I

also study whether the association between accounting numbers and IPO long-term

stock performance has been increased after the adoption of the new accounting

regulation.

The motivation for my thesis can be explained as follows. First, IPO offering

price is a key factor from the perspective of IPO firms. A higher IPO offering price

means the issuer can receive more proceeds from the offering. In addition, IPO

underpricing is crucial from the point of investors in the primary market because IPO

underpricing can be regarded as the investment return from the IPO offering day to

the listing day. Furthermore, IPO long-term stock return is the reward to investors

holding shares for a long time. Consequently, determinants of IPO offering price, IPO

underpricing and IPO long-term stock return are very important to both the IPO firms and the stock investors.

Second, China adopted a new accounting regulation in 1998 to replace the old one issued in 1992. There is a hot debate whether the earnings quality ameliorates or deteriorates. Chen, Sun and Wang (2002) show the gap between International Accounting Standard (IAS)-based earnings and Chinese General Accepted Accounting Principle (GAAP)-based earnings doesn't reduce or eliminate after the adoption of 1998 accounting regulation. Other papers show that IAS has no more explanatory power than the Chinese GAAP (Eccher and Healy, 2000; Chen, Firth and Kim, 2002; Gao and Tse, 2004; Wu and Koo, 2005). Nevertheless, not many papers have compared the 1998 new accounting regulation with the old one. In my thesis, I use one measurement of earnings quality, value relevance of earnings, to analyze the effect of accounting standard change on earnings quality, i.e., whether the 1998 accounting regulation provides better information than the 1992 one. If my empirical findings support higher earnings quality after the adoption of the 1998 accounting regulation, there will be more impetus to further reconcile Chinese accounting standard with IAS.

Third, there are existing papers to investigate differences between IAS and domestic accounting standards in foreign countries and China. Empirical results in the Chinese A-share stock market do not support that IAS is of higher earnings quality than Chinese accounting standard. In China, listed firms issuing both A and B shares are required to provide accounting information under Chinese accounting standard

and IAS. However, there are a small number of such listed firms. Consequently, it is possible that the findings based on such a small number are not representative. The 1998 accounting regulation is more like a principles' based approach, while the 1992 one is more like a rules' based approach.[1] So the study on differences between the two accounting regulations can examine whether a principles' based approach is of better standard than a rules' based approach in China.

Fourth, there are no prior papers that examine the effect of accounting standard change on IPO pricing. Prior literature has recognized that information asymmetry adversely affects the cost of debt and equity capital. There are many proxies for information asymmetry. For example, a longer firm age, a larger firm size, reputable auditors, good underwriters, more analyst coverage, higher quality of disclosure and higher quality of earnings are usually considered to be associated with less information asymmetry. In this thesis, I use accounting standard as another proxy for information asymmetry. The underlying reason is that higher earnings quality derived from the improved accounting standard reduces information asymmetry, thus leading to lower cost of capital. Specifically, I use the relationship between IPO offering price and past earnings per share (EPS), and the relationship between IPO underpricing and return on asset (ROA) to capture the effects of accounting standard change on the cost of capital.

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[1] Under a principles' based approach, one starts with laying out the key objectives of good reporting in the subject area and then provides guidance explaining the objective and relating it to some common examples, while a rules' based approach provides specific details in an attempt to address as many potential contingencies as possible. The primary benefit of the principles' based accounting rests in its broad guidelines that can be applied to numerous situations. The rules' based standards are generally considered easier to audit for compliance purposes, and may produce more consistent and comparable financial reports across entities.

Last, one should also examine the effect of earnings quality change due to accounting standard change on the long-term stock returns. Chan, Wang and Wei (2004) study the relationship between Chinese IPO long-term stock performance and accounting performance. They show a significantly positive relationship between IPO long-term stock return and change of ROA. Their empirical result indicates that accounting information matters in the long-term performance of Chinese IPOs. However, there are no papers that study the effect of earnings quality on the relationship between accounting information and long-term stock returns in the Chinese IPO markets. Accounting measurement with higher earnings quality contains more information and is more credible, thus should exert more influence on the stock returns. Specifically, I use the association between long-term stock return and earnings change to capture how accounting standard change affects the stock return in the long run.

**1.2 Overview of research methods and major findings**

On January 1, 1998, a new accounting regulation was released by the Chinese government to replace the old one. There are many differences between the two accounting standards. For example, the 1998 regulation required that allowance for doubtful accounts be determined by the company, while the old one stipulated that allowance for doubtful accounts be a range from 0.3 percentage to 0.5 percentage approved by the government. Because the company knows better about itself than the government, allowance based on the new accounting regulation is closer to the real

condition of the company. Since operating income and net income are deducted by the allowance, it is reasonable that operating income and net income under the new accounting standard are of higher earnings quality.

I test four hypotheses relating to this accounting standard change in this thesis. The hypotheses are used to examine the effects of Chinese accounting standard change on IPO offering price, IPO underpricing, and IPO long-term stock return.

Since it is expected that IPO firms can command a higher offering price for a given level of earnings per share under the 1998 accounting regulation due to higher earnings quality, my first hypothesis is that the relationship between offering price and past earnings per share is more positive after the adoption of 1998 accounting regulation. My second and third hypotheses link ROA to IPO underpricing. To be specific, $H_{2a}$ postulates that there is a negative association between IPO underpricing and ROA, while $H_{2b}$ postulates that the association between IPO underpricing and ROA is more negative after the adoption of the new accounting regulation. My fourth hypothesis concerns with the effect of accounting standard change on IPO long-term stock returns. Specifically, $H_3$ argues that the relationship between stock return and earnings change in the long run is larger under the new accounting regulation.

Using a sample of Chinese A-share IPOs listed from 1996 to 2004, I find the relationship between IPO offering price and net income per share to be more positive after the adoption of the 1998 regulation. I also find a negative association between IPO underpricing and ROA during the whole sample period, and the negative relationship between these two variables becomes more significant after the adoption

of the 1998 regulation by utilizing the method of ordinary least squares (OLS) with

Rogers standard errors, which are White (1980) standard errors after accounting for

the possible correlations within the same month of the IPOs. In the robustness tests, I

use operating income instead of net income as another measurement for earnings, and

adopt the method of stochastic frontier estimation for the offering price regression.

Most of the results from the robustness testing are similar to the main results,

although the incremental effect of operating income on asset (OIOA) on IPO

underpricing after the adoption of the new accounting regulation is insignificantly

negative in the testing of my third hypothesis ($H_{2b}$). Overall speaking, my results

indicate that accounting standard can be served as a proxy for information asymmetry

and affects the cost of capital in the pricing of IPOs.

By comparing Chinese IPOs offered between 1996 and 1997 with that offered

between 2000 and 2003 under a 2-year holding period, as well as comparing Chinese

IPOs offered in 1996 with that offered between 2000 and 2002 under a 3-year holding

period, I find a more positive coefficient of IPO long-term stock return on net income

change after the adoption of the new accounting regulation. In the robustness test I

use operating income change as another proxy for earnings change, and find similar

results.


## 1.3 Contributions

There are four major contributions in my thesis. First, the accounting standard

reform has a positive effect on earnings quality. My empirical result shows a higher

value relevance of earnings after the adoption of 1998 accounting regulation. This conclusion supports the use of the new Chinese GAAP rather than the old one, which is similar to the accounting model in Soviet Union planning economy. Because my empirical results show higher earnings quality after the adoption of the 1998 accounting regulation, there will be more impetus to advance the reform of Chinese accounting standard for more reconciliation with IAS.

Second, as shown above, 1998 accounting regulation is of better earnings quality than 1992 one. Because 1998 regulation is more like a principles' based approach and 1992 one is more like a rules' based approach, my thesis indicates a principles' based approach is of better standard than a rules' based approach in China, consistent with the findings in foreign countries.

Third, higher earnings quality does matter to the issuers of the IPO. My empirical results indicate a more significant relationship between IPO offering price and past earnings per share under the 1998 accounting regulation. It implies that IPO firms can ask for a higher offering price for a given level of EPS, thus receiving more proceeds after the adoption of the new accounting regulation.

Last, higher earnings quality has an influence on both IPO underpricing and IPO long-term stock return. My empirical results show that under the new accounting regulation, there is a more negative relationship between IPO underpricing and ROA, as well as a larger relationship between IPO long-term stock return and earnings change. It means that earnings quality affects not only IPO initial returns (or IPO underpricing) but also long-term stock returns in the Chinese market. Chan, Wang and

Wei (2004) find that Chinese IPO performance reflects accounting information. My empirical result complements their findings by showing that not only accounting numbers but also earnings quality matters in the Chinese stock markets.

## 1.4 Structure of thesis

The rest of this thesis consists of five chapters. Chapter two conducts a brief view on the institutional background of the Chinese stock markets. Chapter three provides the review of the literature on IPO pricing, IPO long-term performance and accounting standards. Chapter four presents the effects of accounting standard change on IPO pricing. Chapter five investigates the impact of accounting standard change on IPO long-term performance. Chapter six summarizes my findings and gives the suggested areas for future research.

# CHAPTER TWO

# Institutional background

In this chapter, I will give a brief description of the institutional background relating to the areas of study in this thesis. Specifically, I will discuss the setting of the Chinese stock markets, and compare the mechanisms for pricing and allocating IPO shares in China with that in other major countries. Besides, I will conduct a brief review on the new 1998 accounting regulation and make a comparison between the new one and the old one which was issued in 1992.

## 2.1 The Chinese stock markets

More than twenty years of reform and openness in China have shown a big success in economic development. Thanks to the more than 8% real gross domestic product (GDP) growth each year, by the end of 2008 China became the third largest nation in the world in terms of GDP, following US and Japan. Following the growth of the real economy, the Chinese stock markets also experience rapid development since the 1990's when the financial packaging for state-owned enterprises (SOEs) and share issue privatization (SIP) began to implement.[2] According to the statistics given by the ShangHai and the ShenZhen Stock Exchanges, the total market capitalization in the two exchanges was RMB 12.1 trillion Yuan by the end of 2008. The Chinese stock market (excluding Hong Kong) was the six largest one around the world.

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[2] The details about financial package are referred to Aharony, Lee and Wong (2000). The details about SIP are referred to Sun and Tong (2003).

2.1.1 Background

There are two national exchanges in China. One is the ShangHai Stock
Exchange (SHSE), established in December 1990, and the other is the ShenZhen
Stock Exchange (SZSE), founded in April, 1991. Chinese shares are divided into
tradable shares and non-tradable shares. There are four types of tradable shares: A
shares, B shares, H shares, and N shares. A shares were initially held by domestic
individuals and domestic institutions. After 2003, foreign investors were also allowed
to own A shares after China Securities Regulatory Commission (CSRC) approved the
Qualified Foreign Institutional Investor (QFII) system. B shares are sold to the
investors in Hong Kong, Macau, and Taiwan. B shares are denominated and traded in
US Dollar in SHSE, and in HK Dollar in SZSE. There is no transferability between A
shares and B shares. Nevertheless, Chinese residents were allowed to buy or sell B
shares since February 18, 2001. In addition to B shares, domestic firms can also issue
H shares listed in Hong Kong and traded in Hong Kong dollar, as well as N shares
listed on the New York, London, or other foreign stock exchanges and traded in US
dollar. Owners of all the four types of tradable shares have the same rights and
obligations.

Non-tradable shares are divided into state shares and legal person shares. State
shares are owned by either the central government, the local government, or the
wholly government-owned enterprises. The shares are not tradable on the two stock
exchanges, but are transferable to other domestic institutions upon approval from the
CSRC. The legal person shares are the shares sold to domestic institutions including

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stock companies, non-bank financial institutions, and SOEs that have at least one non-state owner. Legal person shares cannot be traded on the two exchanges but can be transferred between legal persons. The transfers became common after August 2000.

Except state shares and legal person shares, there are other forms of minority shares such as employee shares. Employee shares are held by employees and managers. After a holding period of six to twelve months, employee shares can be sold on the open market. Once sold on the market, they become A shares. Owners of both the tradable shares and non-tradable shares have the same rights and obligations.

There are different accounting requirements between firms issuing A shares and firms issuing B shares. A-share firms should disclose accounting information in their prospectus and prepare financial reports in accordance with Chinese GAAP. B-share firms should report financial information according to IAS. On the other hand, the financial reports for H-share and N-share firms should comply with the foreign local GAAP or/and IAS.

2.1.2 Mechanism for pricing and allocating IPO shares

2.1.2.1 IPO pricing mechanism in major countries

There are mainly three methods for pricing IPOs in major countries. They are the fixed pricing method, auction pricing method and book-building pricing method. In developed countries, auction pricing and book-building pricing are the main pricing methods, while fixed pricing method is mainly used in developing countries.

Fixed pricing method is a method by which underwriters and IPO firms first

compute a range of stock price based on the intrinsic value of the IPO firms, and they decide the ultimate stock price from such a range. Based on the final offering price, underwriters sell the IPOs. Under this pricing method, oversubscription usually happens.

Auction pricing method is a method by which the offering price is totally decided by investors. Investors declare their bidding price and quantity, and underwriters sort all bidding prices from the highest to the lowest one. Underwriters count cumulative quantity until the quantity reaches the issued shares. The price when cumulative quantity reaches the number of issued shares is the final offering price. Auction pricing method is used mainly in Taiwan and Japan.

Book-building pricing method is a method by which IPO firms and underwriters determine a range of initial offering price for the IPO. Then they will conduct a road show to make presentations to institutional investors in order to extract information about the price and quantity demanded from them. Based on information from institutional investors, underwriters and IPO firms decide the final offering price. Book-building pricing method is used mainly in US and UK. As time passes, this pricing method tends to be popular in other countries.

2.1.2.2 IPO allocation mechanism in major countries

There are three major methods for allocating IPO shares to investors. They are the lottery allocation method, the pro rata allocation method and the discretional allocation method. The lottery allocation method is mainly used in China during her

early stage of stock market development. [3]

The pro rata allocation method means that investors will be allocated with IPO shares which are proportional to the quantity they have applied. In other words, if one investor bids more quantity, he/she will receive more shares. Such a method is used in Hong Kong and Singapore. The discretional allocation method gives underwriters the discretion to allocate IPO shares among individual and institutional investors. In order to get useful information from institutional investors, underwriters will give compensation either by lowering the IPO price or by discretional allocation to institutional investors. This method is used mainly in developed countries such as the United States.

2.1.2.3 Studies of IPO pricing and allocation mechanism in major countries

There are several studies on IPO allocation methods. Ritter and Welch (2002) review the theories about share allocation including the book-building theory and the conflict of interest theory.[4] The former theory posits that underwriters use their discretion to extract information from informed institutional investors. Consequently, it reduces IPO underpricing and increase money raised by the issuers. The latter theory argues that there is a conflict of interest between underwriters and issuers. Underwriters are inclined to deliberately underprice IPOs and allocate underpriced shares to their favored clients.

Aggarwal, Prabhala and Puri (2002) study institutional allocation in IPOs

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[3] The details about lottery allocation are discussed in the section of IPO allocation mechanism in China of this thesis.
[4] The details about share allocation theories are referred to Ritter and Welch (2002).

using a sample of IPOs in the US from 1997 to 1998. Their findings indicate a

positive relationship between institutional share allocation and IPO's first day return.

Their evidence is consistent with the book-building theory which argues that

underwriters allocate more shares to institutional investors when they acquire more

favorable premarket demand information. Cornelli and Goldreich (2003) examine the

institutional bids under the book-building method for a sample of international IPOs

in 65 countries. Specifically, they study whether underwriters use the information in

the book to set the offering price and which type of information is the most relevant.

They find that information in the bids including the limit price has strong influence on

the offering price. Moreover, the bids that most affect the offering price will receive a

more favorable share allocation. Their findings are consistent with the argument that

institutional investors provide information in exchange for favorable share allocations.

Jenkinson and Jones (2004) examine the factors influencing share allocation using a

sample of 27 European IPOs over the period 1996 to 2001. They find that investors

who are perceived to be long-term holders of the stock rather than IPO flippers are

favored in the share allocation. However, they do not find evidence that more

informative bids receive a favorable share allocation, which is in contrast to the

findings of Cornelli and Goldreich (2003).


2.1.2.4 IPO pricing mechanism in China

Before 1994, there was no offering price setting regulation in China. IPO firms

had no decision power on the offering size, the offering price and the price-to-

earnings (PE ratio). CSRC regulated the offering price based on the fixed pricing method. Furthermore, most of the IPOs were priced with the face value. Between 1994 and 1995, China adopted the auction pricing method. The auction pricing method was based on the market demand information to determine the offering price. As a result, the efficiency of offering price setting improved substantially. However, due to a limited offering size, there was a huge imbalance between share supply and demand. Together with investor's limited experience and knowledge about the stock market, irrational bids from investors were easy to occur, especially in a hot market circumstance. In order to reduce the risks which investors face, CSRC abandoned the auction pricing method later.

From January 1, 1996 to February 11, 1999, the pricing regulation stipulated that the IPO offering price be determined by the multiples of earnings per share (EPS) calculated over a pre-specified time period, with a PE cap specified by CSRC.[5] While the value of PE cap was usually set around 15, the definition of EPS had evolved over the years: first as the mean of forecasted EPS for the IPO year and the realized EPS for the fiscal year immediately preceding the IPO year (January 1, 1996 – December 25, 1996); then as the average of 3-year pre-IPO realized EPS (December 26, 1996 – March 16, 1998); finally as the forecasted EPS for the IPO year (March 17, 1998 – February 11, 1999). CSRC abolished the formula-based IPO pricing on February 11, 1999. Since then, Chinese IPO firms have been allowed to price IPOs through negotiation with underwriters after taking into account market conditions and firm-

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[5] The details about IPO offering price setting methods from January 1, 1996 to February 11, 1999 are referred to Kao, Wu and Yang (2009).

specific prospects, although the offering price was still subject to the CSRC's approval.

Starting from January 1, 2005, the Chinese IPO market began to implement the book-building pricing method. IPO firms and underwriters solicited information from institutional investors, such as fund companies, security firms, finance firms, insurance firms, and QFIIs, etc. When calculating earnings per share, the numerator was earnings excluding extraordinary items in order to reflect the true value about the IPO firms. In addition, the denominator was number of outstanding shares after the IPO. In other words, the outstanding shares included the IPO offering size. The underlying motive is to decrease earnings per share and reduce the offering price, thus benefiting the IPO subscribers.

IPO offering price reflects more information about the fundamentals of the IPO firm after 1999 than before 1999 due to the release of restriction on the earnings multiplier. There are empirical studies that support this hypothesis. Zhou (2006) examines 1,380 Chinese A-share IPOs over the period 1991 to 2005 and finds that IPO underpricing is more before 1999 when there is a cap limit on the multiplier of 15.[6] Tian and Megginson (2006) arrive at similar results with Zhou (2006).

2.1.2.5 IPO allocation mechanism in China

Before 1995, China mainly used the lottery allocation method to allocate IPO

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[6] Zhou (2006) reports that Chinese regulators require that the multiplier be less than 15 before June 1999 and be less than 20 after June 1999.

shares to investors, although a pro rata method was sometimes utilized.[7] In 1992, the

lottery allocation method with a pre-announced fixed number of lottery forms was

adopted. The maximum number of lottery forms that each individual investor can buy

was also fixed. When winning the lottery, investors can purchase a designated number

of shares per form. Consequently, the chance of winning the lottery was known to

investors in advance. In 1993, the lottery allocation method with unlimited number of

lottery forms was used. It means that investors can purchase as many lottery forms as

they desire. Thus, the probability of winning the lottery was unknown to them at the

time of purchase. Moreover, investors were required to deposit sufficient money into a

special account when applying for the IPO shares. In 1994, the pro rata allocation

method was utilized in case of oversubscription.

Since 1995, the pro rata allocation method was mainly used for allocating IPO

shares. Two specific practices were used.[8] One was full prepayment, pro rata

allocation with the balance deposited. Under this method, investors should prepay the

sufficient money when submitting an application for IPO shares. When the

application was successful, investors would acquire IPO shares. The prepayment

would be deposited into the bank account upon the failure of IPO subscription. Pro

rata allocation means the allocation would be proportional to IPO subscription when

oversubscription happened. The other was full prepayment, pro rata allocation with

the balance refunded immediately to IPO investors. This method is similar to the first

one, except that the prepayment would be returned to investors immediately upon the

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[7] The details about lottery allocation method in China are referred to Su and Fleisher (1999).
[8] The details about fixed price with pro rata allocation method in China are referred to Ma and Faff (2007).

failure of the IPO subscription. Moreover, in order to reduce issuing cost, IPO allocation began to be implemented online after 1994 whereas before 1994, IPO allocation was mainly implemented offline.

On June 12, 2001, the State Council promulgated the "Provisional Measures on Management over the Reduction of State Shares to Raise Social Security Fund". When stock companies (including companies listed overseas) issued IPOs or additional stocks, they could sell the state shares equaling up to 10% of the amount of funds being raised, and the money raised would contribute to the Social Security Fund.

Since the implementation of the new policy means that the government could reduce state shareholdings, ShangHai stock exchange index and ShenZhen stock exchange index kept dropping. In order to deal with this problem, a critical allocation policy came into effect since May 21, 2002. The allocation policy stipulated that new IPO shares could only be sold to the investors who had owned stocks. It means that only the current stock investors can apply for new IPO shares. The maximum number of IPO shares that investors can apply for was based on the market value of stocks that the current investors held. New investors had no right to apply for IPO shares. The above policy was abolished in May 2006 and after that, new investors can subscribe IPOs again.

2.1.2.6 Studies of IPO pricing and allocation mechanism in China

Su and Fleisher (1999) study the effects of allocation mechanism on IPO underpricing in China. They use a sample of 308 IPOs issued between January 1,

1987 and December 31, 1995. Their findings show that the lottery allocation mechanism contributes to more underpricing. However, there is less underpricing under the auction pricing method. Ma and Faff (2007) examine the effects of market conditions on the choice of IPO share allocation methods by studying Chinese IPOs from 1994 to 2003. Their findings show that secondary market proportional offering method, which means IPO shares are offered to existing investors which are proportional to the market value of their stock holding, is optimal in minimizing IPO underpricing. On the other hand, the book-building method is optimal in counteracting adverse market conditions and uncertainty, measured by the time gap from the offering date to the listing date.

## 2.2 Accounting standards in China

2.2.1 Background of the accounting standards

On January 1, 1998, a new accounting regulation-"Accounting Regulation for Listed Companies" (denoted as 1998 regulation) was promulgated. This new accounting regulation was considered to be more similar to the IAS, while the old one, the 1992 accounting regulation ("Accounting Regulation for Experimental Listed Companies", denoted as 1992 regulation) was more similar to the accounting model used in the Soviet Union planning economy.

Compared with the 1992 regulation, there are seven revisions in the 1998 new accounting regulation. They are the bad debt allowance method, the inventory valuation method, the investment valuation method, the equity/cost method, the

organization costs method, the revenue recognition method, and the consolidation method. The difference of accounting information between the Chinese GAAP and the IAS is considered to be smaller after the adoption of the new accounting regulation.[9] Details about the revisions are shown in Appendix 3.

(Insert Appendix 3 here)

More description of the accounting changes is shown as follows. Firstly, Firm's managers are given more discretion to decide accounting treatments under the 1998 regulation. For example, under the 1992 accounting regulation, allowance for doubtful accounts is based on a government-approved percentage from 0.3% to 0.5% of the year-end balance of accounts receivable. However, it is determined by the firm under the 1998 regulation.

Secondly, 1998 regulation reflects conservatism. For example, inventory is valued at the historical cost under the old standard, while it is valued based on lower of cost or net realizable value under the new one. However, no specific guidance is provided on how to measure the net realizable value.

Lastly, the new accounting regulation is reconciled with IAS on use of equity

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[9] Chen, Sun and Wang (2002) find the earnings gap between Chinese GAAP and IAS doesn't diminish or eliminate after the adoption of the 1998 accounting regulation. They explain weak enforcement of the 1998 regulation leads to a little effect. However, my thesis compares the 1992 accounting regulation with the 1998 regulation, rather comparing the 1998 regulation with IAS.

method and revenue recognition. For example, equity method is used for investment in subsidiaries with more than 50% ownership of equity under the 1992 regulation, while the method is used for 20%-50% ownership of equity under the 1998 regulation. Under 1992 regulation, revenue is recognized when goods are shipped and payments or promises of payments are received. However, under the 1998 regulation, revenue is recognized when risks and rewards of ownership of goods are transferred to buyer, no continuing managerial involvement and control over the goods, payments or promises of payments are received, and costs are reliably measurable.

When transferring from the 1992 regulation to the 1998 regulation, changes in accounting policies should be accounted for by a cumulative effect adjustment. The account balance should be adjusted to what would have been if the 1998 regulation had been implemented in the previous years.

The cumulative effect of the adjustments should be reported on the income statement in the year of the accounting change. The footnotes of the financial statements should disclose the contents, reasons, and effects of the change in accounting policies. When providing comparative financial statements, firms should adjust net income and other accounts affected by changes in accounting policies.

The government required firms that issue B shares, H shares, or N shares to implement the 1998 regulation on January 1, 1998. But firms that issued only A shares were allowed to delay the enforcement until 1999. In practice, few A-share firms adopted the 1998 regulation in 1998. The majority of the A-share firms adopted it in 1999. Due to higher provisions required by the 1998 regulation, both total asset and

income (operating income, pretax income, and net income) are less under the new regulation than under the old one.

2.2.2 Effects of accounting standard change on accounting numbers

I compare accounting information based on the 1998 regulation with that based on the 1992 regulation. A firm is required to re-prepare financial information when it adopts the new accounting regulation. The majority of the A-share IPO firms adopted the new accounting regulation in their 1999 annual financial reports. Firms which went public in 1999 provided the 1998 annual financial information under the old accounting regulation in their prospectuses. At the same time, such IPO firms also needed to re-prepare their 1998 annual financial information under the new accounting regulation in their 1999 annual financial reports. As a result, I have two sets of accounting information including those based on the new accounting regulation and those based on the old accounting regulation for IPOs issued in 1999.

Table 1 presents the difference in accounting information for IPOs issued in 1999. Altogether, there are 97 IPOs listed in 1999.[10] The new accounting regulation required that allowances and provisions be determined by the firm itself rather than by the government. Because there are more provisions for accounts receivable and

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[10] 15 IPOs were issued in 1998, while they were listed in 1999. On the other hand, 11 IPOs were issued in 1999, while they were listed in 2000. 82 IPOs were issued and listed in 1999. Consequently, the number of IPOs issued in 1999 was 93 and the number of IPOs listed in 1999 was 97. What I focus on are IPOs issued in 1999, because such IPOs need to prepare 1998 annual information in their 1998 annual reports under the old accounting standard, and they need to re-prepare 1998 annual information in their 1999 annual reports under the new accounting standard. Among the 93 IPOs issued in 1999, 5 IPOs did not have the data of outstanding shares, 3 IPOs did not have the data of net income, and 1 IPO did not have the data of liability. So the number of observations in Table 1 for ROA, EPS, LEV, BVPS and TAPS variables was 90, 88, 92, 88 and 88, respectively.

inventory under the 1998 accounting regulation, net income drops after the adoption

of the new accounting regulation. Descriptive statistics shows that ROA under the

new accounting regulation is 0.010 lower than that under the old one, where ROA is

defined as net income divided by total asset. The difference is statistically significant

at the 1% level.

The differences of other variables between the two accounting standards are

also significant at the 1% level. For example, EPS, BVPS, and TAPS variables have a

lower numbers under the new accounting standard. Differences in means of EPS,

BVPS, and TAPS between the two standards are -0.033, -0.076, and -0.071,

respectively. More provisions under the new accounting standard lead to a lower

earnings, and reduce total asset and book value.[11] The LEV variable increases

significantly after the adoption of the new accounting standard, because the LEV is

defined as liability over asset. A lower asset leads to a higher LEV variable.

Difference in means of LEV is 0.013.

(Insert Table 1 here)

Appendix 4 shows the format of income statement prepared by companies in

China under the 1998 accounting regulation. The income is composed of two main

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[11] $BV_{t+1}=BV_t + NI_{t+1} - DI_{t+1}$, where BV is book value, NI is net income, and DI is dividend. If $NI_{t+1}$ drops, $BV_{t+1}$ will drop. $TA_{t+1}=BV_{t+1} + LI_{t+1}$, where TA is total asset, LI is liability. If BV decreases, TA will decrease, too.

parts. They are core income and non-core income. Core income includes main

operating income and other operating income, while non-core income is decomposed

into investment income, subsidy income and non-operating income. Because core

income comes from operating activities and non-core income is derived from non-

operating activities, core income is more persistent than non-core income.

(Insert Appendix 4 here)

# CHAPTER THREE

# Literature review

Ritter (1991) and Rajan and Servaes (1997) document three IPO anomalies. They are short-term IPO underpricing, hot issue market and long-term IPO underperformance. Short-term IPO underpricing means on average there are positive initial returns from the offering price to the closing price on the first trading day. Hot issue market means IPO underpricing is cyclical. That is, IPO underpricing is more under the hot market and is less under the cold market. Long-term IPO underperformance refers to the observation that IPOs experience operating underperformance or stock return underperformance relative to a selected benchmark.

In the following, I will give a brief review on papers related to short-term IPO pricing and long-term IPO performance, as well as papers about the studies on accounting standards.

## 3.1 IPO pricing

I define the term "IPO pricing" from two perspectives. One is IPO offering price set by underwriters and issuing firms. The other is the return of the closing price on the first trading day over the offering price. If the closing price is higher than the offering price, it is termed as IPO underpricing. Otherwise it is IPO overpricing.

3.1.1 Evidence of IPO underpricing

IPO underpricing phenomenon is found both in China and abroad. Loughran,

Ritter and Rydqvist (1994) show that average IPO initial returns in 25 countries have a range from 4.2% to 80.3% in different time periods. In general, there is more IPO initial return in developing countries than in developed countries. For example, the average initial returns in Malaysia over the period 1980-1991 and in Thailand over the period 1988-1989 are 80.3% and 58.1%, respectively, while those in United Kingdom from 1959 to 1990 and in United States from 1960 to 1992 are 12% and 15.3%, respectively. Rajan and Servaes (1997) show that the average initial return for IPOs in US from 1975 to 1987 is 10%, while Teoh, Welch and Wong (1998) use IPOs in US from 1980 to 1992 and document an average initial return of 7.12%. Firth (1997) presents an average first day abnormal return of 25.87% for IPOs in New Zealand from 1979 to 1987, where abnormal return is defined as IPO stock return minus the matched firm stock return from the offering date to the listing date. Firth (1998) uses IPOs in Singapore over the period from 1979 to 1992 and documents an average abnormal initial return of 44%. Ritter and Welch (2002) report that from a sample of 6249 IPOs in US from 1980 to 2001, the average first day return equals 18.8%. Moreover, IPO average first day return during the 1999 -2000 bubble period is even more, reaching 65%.

When compared with other countries, IPO underpricing in China is even more severe. Su and Fleisher (1999) document IPO underpricing of 948.6% for A-share firm-commitment IPOs in China from 1987 to 1995. Chan, Wang and Wei (2004) report an average IPO underpricing of 178% and 11.6%, respectively, for Chinese A-share and B-share IPOs issued between 1993 and 1998. Chen, Firth and Kim (2004)

find that the mean initial return on Chinese A-share IPOs that are listed from 1992 to 1997 is 298%. Su (2004) documents an average IPO underpricing of 128.2%, using firm-commitment A-share IPOs in China from 1994 to 1999. In addition, there is a decreasing trend of IPO underpricing in China. IPO underpricing is 314.5% in 1994, while it is 56.4% in 1999. On the other hand, Yu and Tse (2006) find the average initial stock return for online fixed-price A-share IPOs in China from November 1995 to December 1998 equals 123.6%. Fan, Wong and Zhang (2007) document an average IPO initial return of 241% for A-share IPOs in China, and the average IPO underpricing is less for IPO firms with politically-connected CEOs than those without politically-connected CEO.

3.1.2 Representative studies of IPO pricing

3.1.2.1 Representative studies of IPO offering price

First, I review the literature about IPO valuation. Hunt-McCool, Koh and Francis (1996) evaluate IPO pricing using the stochastic frontier approach by comparing the actual offering price with the potentially maximum offering price at the time of the offering as a function of observable characteristics. They find that IPOs appear to be deliberately underpriced in the premarket in both hot-market and non hot-market periods. Moreover, the determinants of the maximum IPO offering price have different effects in the two periods. Kim and Ritter (1999) investigate how IPOs are valued. Practitioners usually use the PE multiple of a comparable firm and make some adjustment on that PE to determine the PE ratio of IPO firms. In general, they

find that the PE multiple of a comparable firm has only modest predictive ability on

IPOs' PE ratio. On the other hand, PE multiple of a comparable firm using forecasted

earnings leads to higher accurate prediction on IPOs' PE ratio than that using

historical earnings. They explain that valuable growth option in IPO firms cannot be

captured by historical earnings.

Koop and Li (2001) study the pricing of IPO and seasoned equity offering

(SEO) firms using the same method as Hunt-McCool, Koh and Francis (1996). Using

a sample of IPO and SEO firms from 1985 to 1998, they observe that IPO firms are

misvalued, while SEO firms are almost efficiently priced. Furthermore, firms in

industries with great earnings potential are highly valued relative to those in

traditional industries. They also examine the factors influencing IPO offering price. In

general, the determinants are broken down into the pricing factors and the

misvaluation factors. Pricing factors are those directly affect the value of shares, while

misvaluation factors are those affect pricing efficiency. Pricing factors include

profitability, default risk and total compensation paid to underwriters. They explain

that profitability reflects the firm's ability to generate income for shareholders and

default risk shows the chance of bankruptcy, while underwriters' compensation will

be higher if IPO firms suffer from more information asymmetry. Misvaluation factors

include underwriters' rank, economic situation (upturn or downturn), market situation

(hot VS non-hot), market uncertainty about the firm value and stock exchange

(NASDAQ, NYSE and AMEX). Higher underwriters' rank, upturn economic

situation, hot market situation and less market uncertainty reduce misvaluation.

Chan, Wu and Kwok (2007) study the impact of global offerings on US IPO offering price using the stochastic frontier approach. Their findings show that IPO offering price valuation efficiency for global IPOs exceeds that of IPOs with purely domestic offers. They also show that whether IPOs are globally issued or not is another misvaluation factor.

3.1.2.2 Representative studies of IPO underpricing

From the perspective of information asymmetry, there are two major theories to explain the IPO underpricing phenomenon.[12] They are the "signaling theory" proposed by Welch (1989), and the "winner's curse theory" documented by Rock (1986) and Beatty and Ritter (1986). "Signaling theory" assumes that IPO firms know more information than investors. Low quality IPO firms need to spend imitation costs to look like high quality firms and signal this wrong message to investors. Underpricing by high quality IPO firms increases sufficient imitation costs, thus forces low quality IPO firms to discover their true quality. It means that high quality firms will sell their IPOs at a lower price in order to distinguish themselves from low quality firms. They will recoup their losses in future by issuing seasoned equity.

"Winner's curse theory" assumes that some investors (informed investors) have more information than other investors (uninformed investors). In order to keep uninformed investors in the market, IPO firms need to compensate the ex ante uncertainty or adverse-selection bias derived from the information asymmetry

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[12] The details about theories related to IPO short term underpricing are referred to Ritter and Welch (2002).

between informed investors and uninformed investors. Consequently, the closing price on the first trading day in general is higher than the offering price. In other words, the offering price is "underpriced" relative to the closing price.

In the following, I will review representative IPO studies related with the area of information asymmetry. Beatty and Ritter (1986) examine the relationship between IPO underpricing and ex ante uncertainty. They use two proxies for uncertainty. One is the number of uses of proceeds listed in the prospectus. The other is the inverse of the gross proceeds raised by IPO firms.[13] A greater number of uses of proceeds and greater inverse of the gross proceeds mean larger ex ante uncertainty. Using a sample of IPOs in US from 1977 to 1982, they find a positive relationship between IPO underpricing and ex ante uncertainty, indicating that IPO underpricing is regarded as a compensation for ex ante uncertainty. Furthermore, they investigate the role of investment banks in IPO underpricing. Their findings show that investment banks will lose investors if IPOs are not underpriced enough or will lose issuers if IPOs are underpriced too much.

Michaely and Shaw (1994) test two competing theories: adverse selection and signaling. Using a sample of IPOs in US from 1984 to 1988, they document that IPOs underwritten by reputable investment banks underprice less and perform better in the long run, which is consistent with adverse selection argument. Moreover, they find firms that underprice more conduct SEOs less frequently and raise fewer amounts.

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[13] Su and Fleisher (1999) point out that there is spurious negative relationship between IPO underpricing and IPO offering size, the proxy for ex ante uncertainty, since both of the two variables include IPO offering price. In order to eliminate this spurious relationship, a two-stage approach is needed.

Firms that underprice less have higher earnings and pay higher dividends. All the results are contrary to the signaling model.

Dewenter and Malatesta (1997) compare IPO initial return in privatization of regulated firms with that in public offerings of private firms. They document that government officials in the UK underprice IPOs more than private firms. However, the opposite is true in Canada and Malaysia. In addition, initial returns are higher in relatively developing countries and for privatized firms in the regulated industries. They explain their results based on both information asymmetry, measured by time lag and the offering size, and political consideration by the government, measured by the regulated industries and government shareholdings. Because there is more uncertainty about the true value of IPO firms in the developing countries than in the developed countries, underpricing is more in the developing countries. Furthermore, government officials may consider both IPO proceeds and political goals in the privatization of IPOs from SOEs. As a result, there is no general tendency for the effects of government on IPO underpricing.

Carter, Dark and Singh (1998) use IPOs in the US over the period 1979 - 1991 to examine the effects of underwriters on IPO underpricing. Their findings show that IPOs underwritten by reputable underwriters are associated with less underpricing. They explain that underwriters with higher prestige tend to market higher quality IPOs. As a result, reputable underwriters are a signal of good IPOs to the investors.

Firth (1998) finds a positive relationship between IPO profit forecast accuracy and IPO market value at the first trading day, which indicates that forecast accuracy

leads to more IPO underpricing. He explains that profit forecast is a major signal of IPOs and it dominates other signaling mechanism such as retained shareholdings by institutional investors or entrepreneurs. Cornelli and Goldreich (2003) use the range size of initial offering price, and demand elasticity from institutional investors as the measurements for uncertainty. They find that higher uncertainty leads to higher IPO underpricing for a sample of international IPOs from 65 countries.

There are also papers that try to explain IPO underpricing from other perspectives. Ritter (1984) examines difference in IPO underpricing in different market condition in the U.S. He identifies IPOs issued during the period January 1980 to March 1981 as the hot issues, while during the period comprising the rest of 1977 to 1982 as the cold issue period. He finds that IPO underpricing is higher in the hot issue period. Loughran, Ritter and Rydqvist (1994) discuss evidence on IPO underpricing internationally. Difference in IPO underpricing across countries may be attributable to difference in law and regulation, IPO mechanism and IPO firm characteristics. They show that IPO underpricing is less in the 1990s than in the 1980s in most East Asian countries due to reduction in regulatory interference. Rajan and Servaes (1997) use IPOs in US issued between 1975 and 1987 to test the analyst behavior relating to IPO underpricing. Their findings indicate that higher underpricing leads to increased analyst following.

Ritter and Welch (2002) review the legal liability or lawsuit avoidance argument, which means that firms underprice IPOs to reduce their legal liability and probability of lawsuit. However, the empirical result that sued IPOs have more instead

of less underpricing contradicts with their argument. Arugaslan, Cook and Kieschnick (2004) test two contrasting monitoring arguments. One is the reduced monitoring hypothesis, indicating that insiders have an incentive to underprice an IPO in order to ensure a wide distribution, thereby reducing the likelihood of being monitored or removed by new shareholders, particularly institutional shareholders. The other is the increased monitoring hypothesis. It argues that large investors provide more monitoring than small investors and that an IPO firm's revenues are increasing in outside monitoring. In order to maximize firm value, firms will want to ration IPO shares going to small investors, thus increase large investors' shareholdings in the IPO firm. However, the empirical result from Arugaslan, Cook and Kieschnick (2004) rejects both of the above monitoring arguments.

3.1.3 Studies of IPO pricing in the Chinese stock market

Several studies have examined IPO underpricing in the Chinese stock market. Mok and Hui (1998) study Chinese A-share IPOs listed in the ShangHai Stock Exchange between December 1990 and December 1993 and conclude that IPO size is negatively and significantly related to underpricing. They argue that the inverse of IPO size, which is a proxy for ex ante uncertainty, is positively and significantly associated with underpricing. At the same time, state and legal entity ownership are negatively and significantly related to underpricing. They explain that high equity retention by the state is considered as a business guarantee.

Chen and Firth (1999) examine the role of forecast accuracy in IPO valuation

and IPO underpricing, using Chinese A-share IPOs from 1991 to 1996. They document a positive relationship between a forecast error, measured by actual earnings minus earnings forecasted by an IPO firm shown in the prospectus, and market valuation, as well as a positive association between the forecast error and IPO initial return. They explain that investors can accurately predict earnings by themselves. When earnings forecasted by an IPO firm are presented in the prospectus, investors can identify whether the forecasted earnings are underestimated or overestimated. For example, when forecasted earnings are underestimated, investors will buy the listed IPOs and push up the market price, leading to a high initial return. When forecasted earnings are overestimated, investors are suspicious of earnings forecasts.

Su and Fleisher (1999) examine the signaling hypothesis, using A-share IPOs in China from January 1987 to December 1995. Their empirical results support the signaling hypothesis, indicating that SEOs are positively related to IPO underpricing. Su (2004) uses firm-commitment IPOs in China from 1994 to 1999 to test three hypotheses. They are the adverse selection or ex ante hypothesis, the signaling hypothesis and the market feedback hypothesis. All of the three hypotheses are validated in China. Specifically, IPO underpricing is associated with ex ante uncertainty, measured by offering size, insider ownership, disclosure practice, etc. Market feedback hypothesis, which means that whether IPOs conduct SEOs depends on the market condition when IPO is listed, is more suitable than the signaling hypothesis, which means that whether IPOs conduct SEOs depends on the level of

IPO underpricing.

By using A-share Chinese IPOs listed over the period 1992 to 1997, Chen, Firth and Kim (2004) conclude that SEOs are positively and significantly associated with underpricing, which is consistent with the signaling hypothesis. Meanwhile, the time lag between A-share offering day and the listing day, which is a proxy for ex ante uncertainty, is positively related to underpricing. Furthermore, state ownership is also positively and significantly associated with underpricing. However, the relationship between legal entity ownership and underpricing is not statistically significant. They explain that the state has some political consideration and has no incentive to monitor the management and to ensure shareholder's benefit maximization.

Using IPO data between 1993 and 1998, Chan, Wang and Wei (2004) find that Chinese A-share IPO underpricing is positively related to the time lag between the offering date and listing day. Moreover, they find a negative relationship between number of shares offered and IPO underpricing. They explain that investors do not need to buy the shares urgently on the first day of trading when there are more shares being issued. Thus, IPO underpricing will be less.

Yu and Tse (2006) test three hypotheses, namely, winner's curse, ex ante uncertainty and signaling hypotheses. Winner's curse hypothesis has an implicit inference that when adjusted for rationing and risk, uninformed investors' initial returns should be on average equal to the riskless rate. They use standard deviation of aftermarket IPO stock return, IPO firms' age and offering size as the proxies for ex

ante uncertainty. Using IPOs in China from November 1995 to December 1998, they document the winner's curse hypothesis dominates other hypotheses in China. Moreover, the signaling hypothesis is not supported in the Chinese market, which contradicts with the results from Su and Fleisher (1999) and Su (2004).

Fan, Wong and Zhang (2007) find that IPO underpricing is less for Chinese A-share IPOs with politically-connected CEOs than those without politically-connected CEOs. They use signaling theory to explain the result. IPOs without politically-connected CEOs underprice themselves in order to signal their quality to the investors.

Kao, Wu and Yang (2009) examine the effects of IPO regulations on IPO underpricing over the period from January 1996 to February 1999. First, they find IPO firms use non-core income as a proxy for earnings management to boost their earnings. Second, they find a negative relationship between IPO initial return and accounting performance. Furthermore, IPOs that make overoptimistic forecasts also have less underpricing. They explain that Chinese investors cast doubt about forecast optimism and whether good performance could persist into the future.


3.1.3 Summary about IPO pricing

There are two interpretations on the meaning of IPO pricing. The first is IPO offering price set by underwriters and issuing firms. The second is the initial return from the offering date to the listing date. When the initial return is positive, it means IPO underpricing, otherwise it is IPO overpricing.

There are two directions to study IPO valuation. One is to use the information

from the PE multiple of a comparable firm (e.g., Kim and Ritter, 1999). The other is to utilize the stochastic frontier approach by comparing the actual offering price with the potentially maximum offering price at the time of the offering as a function of observable characteristics. In addition, the explanatory variables are separated into two categories - pricing factors and misvaluation factors (e.g., Hunt-McCool, Koh and Francis, 1996; Koop and Li, 2001; Chan, Wu and Kwok, 2007).

Prior literature mainly studies IPO underpricing from the following five angles. The first is to test different theories that explain IPO underpricing (e.g., Michaely and Shaw, 1994; Su and Fleisher, 1999; Chen, Firth and Kim, 2004; Su, 2004; Yu and Tse, 2006). The tested theories include adverse selection or ex ante theory, signaling theory, winner's curse theory and market feedback theory. The second is to study the relationship between ex ante uncertainty or information asymmetry and IPO underpricing (e.g., Beatty and Ritter, 1986; Carter, Dark and Singh, 1998; Cornelli and Goldreich, 2003; Chen, Firth and Kim, 2004; Chan, Wang and Wei, 2004). Prior papers have used different measurements for ex ante uncertainty or information asymmetry.

The third is to study the effects of ownership and the role of government in IPO underpricing (e.g., Loughran, Ritter and Rydqvist, 1994; Dewenter and Malatesta, 1997; Mok and Hui, 1998; Chen, Firth and Kim, 2004; Chan, Wang and Wei, 2004; Yu and Tse, 2006; Kao, Wu and Yang, 2009). The fourth is to study the role of pricing and allocation mechanism in IPO underpricing (e.g., Su and Fleisher, 1999; Aggarwal, Prabhala and Puri, 2002). The last is to test the effect of earnings management on IPO

underpricing (e.g., Kao, Wu and Yang, 2009).

## 3.2 IPO long-term performance

There are two different measurements of IPO long-term performance. One is measured by operating performance, such as earnings growth, sales growth, operating income (net income) on asset, operating cash flow in asset, profit margin etc. On the other hand, IPO performance can be also measured by stock return or growth in market value. Ritter (1991) and Rajan and Servaes (1997) document the IPO long-term underperformance anomaly, where IPO long-term underperformance can be operating underperformance or stock price underperformance relative to an appropriately selected benchmark.

In the following, I will review prior papers related to IPO long-term underperformance in foreign countries and in China.

3.2.1 Representative studies of IPO long-term performance

There are mainly four extant theories explaining long-term underperformance of IPOs.[14] The first theory refers to the investor's optimism. Miller (1977) assumes the existence of divergent opinion among investors about IPO valuation and that there are constraints on short selling IPO shares. The most optimistic investors buy the IPOs. In the long run, as a lot of negative information about the IPO firms is released, the over-optimism of investors will be reduced. As a result, the price will fall in the

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[14] The details about the theories related to IPO long term underperformance are referred to Ritter and Welch (2002).

long run. Miller (1977) contends that a wide divergence of opinion among investor will lead to short-term overvaluation and long-term underperformance. On the other hand, Ritter (1991), Loughran, Ritter and Rydqvist (1994) and Loughran and Ritter (1995) discuss the "window of opportunity" argument. They propose that IPO issuers will take advantage of the investor's optimism and more IPOs will be issued when the market sentiment is high. Furthermore, the existence of poor quality issuers leads to long-term underperformance.

The second theory comes from Schultz (2003). He argues that more IPOs follow successful IPOs. Consequently, the last group of IPOs accounts for a large weight in the sample. Moreover, the last group of IPOs is bad and underperforms while the former group of IPOs is good and outperforms. When IPO long-term performance is measured by weighting each IPO equally, underperformance will occur because the last group takes a larger weight.

The third explanation is related to earnings management by the issuers. Teoh, Welch and Wong (1998) argue that IPOs have the incentive to manipulate earnings in order to inflate the offering price and receive large proceeds. If investors cannot detect earnings management, they will pay too high a price. However, the manipulated earnings cannot persist for a long time. As information about the IPO firms is released, investors are aware of prior overoptimism. Stock price then begins to correct, which leads to long term-underperformance. The findings of Aharony, Lee and Wong (2000) also agree with the earnings management argument.

The fourth view is the accounting performance coincidence argument.

Aharony, Lee and Wong (2000) point out that managers may time IPOs to coincide

with periods of unusually good accounting performance about the IPO firms, and such

a situation cannot be sustained. Consequently, IPOs will underperform in the long run.

There are many empirical papers studying IPO long-term performance in

foreign countries. Using IPOs in the U.S. during the period 1975 to 1984, Ritter (1991)

documents that IPOs underperform relative to a sample of matched firms beginning

from the closing price on the first trading day for 3 years, where long-term

performance is measured by cumulative benchmark-adjusted and buy-and-hold

adjusted returns. Besides, there is a large difference in underperformance year-to-year

and across industries. Moreover, IPO firms that go public in high volume years

perform worse. He utilizes the "window of opportunity" and investor's overoptimism

arguments to explain the above empirical results. Nevertheless, his empirical result

shows a statistically insignificant relationship between IPO long-term performance

and IPO underpricing.

Using a sample of firm commitment IPOs in the U.S. from 1976 to 1988, Jain

and Kini (1994) find a significant decline in IPO performance in the long run,

measured by operating performance instead of stock performance, where changes in

operating performance are defined as operating return on asset or operating cash flow

over asset relative to those in the fiscal year prior to the IPO. The possible reasons for

the decline in operating performance are: (i) the agency problem as described in

Jensen and Meckling (1976); (ii) the earnings management that results in pre-IPO

performance overstatement and post-IPO performance understatement; (iii) timing

IPO in periods of unusual and unsustainable good performance. Furthermore, there is a statistically significant and positive relation between post-IPO operating performance and equity retention by the original entrepreneurs. Such a positive relation is consistent with both the arguments of agency problem and signaling. However, there is no relationship between post-IPO operating performance and the level of initial underpricing.

Using data from 15 different countries, Loughran, Ritter and Rydqvist (1994) present evidence on the ability of IPO firms to time IPOs to take advantage of 'window of opportunity', where 'window of opportunity' is measured by the relationship between IPO volume and the level of the stock market. They find that when the level of the stock market is high (high valuation by investors), IPO volume tends to be large. As a result, investors receive a low return in the long run, indicating a negative relationship between IPO volume and long-term return. It also means that IPO firms experience a low long-term stock performance when IPOs are issued in the period of high market sentiment. Loughran and Ritter (1995) use a sample of IPOs in the U.S. from 1970 to 1990 and find a poor long-term performance for these IPO firms. They use the Fama and French three-factor model and find that issuing firms underperform with respect to the matched firms. Their empirical results support the 'window of opportunity' argument.

By studying IPOs issued in the U.S. from 1975 to 1987, Rajan and Servaes (1997) document that IPOs have better long-term stock performance when analysts ascribe low growth potential rather than high growth potential. Therefore, IPO firms

utilize analyst overoptimism and more firms complete IPOs when analysts are

optimistic about the earnings potential and the long-term growth of IPOs. Their

findings support the 'window of opportunity' argument discussed by Ritter (1991),

Loughran, Ritter and Rydqvist (1994) and Loughran and Ritter (1995), as well as the

investor sentiment argument that more IPOs come to market when investor sentiment

is high. They also suggest that analysts are overoptimistic rather than making

systematic errors, and IPO long-term underperformance may be driven by analyst

overoptimism.

Carter, Dark and Singh (1998) use IPOs in the U.S. over the period 1979-1991

to examine the role of underwriters in IPO long-term underperformance. They find

that IPOs underwritten by high reputable underwriters are associated with less

underperformance. They explain that prestigious underwriters tend to market IPOs

that will experience less negative long-term performance.

Teoh, Welch and Wong (1998) examine the relationship between IPO long-

term performance and earnings management. They use discretional accruals measured

by the Jones (1991) model as a proxy for earnings management. Based on IPOs issued

in the U.S. from 1980 to 1992 and using cumulative abnormal return, buy-and-hold

abnormal return and the Fama-French three factor model to measure IPO abnormal

long-term stock performance, they find that IPOs engaging in earnings management

have poor long-term stock performance.[15]

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[15] However, Ball and Shivakumar (2008) use IPOs in the U.K. from 1992 to 1999 to examine the
earnings quality of IPO firms. They use the model from Ball and Shivakumar (2005) to measure
accounting conservatism as a proxy for earnings quality. Their findings show that IPOs are of
more conservatism relative to a matched non-IPO firm. They explain that the results are
attributable to higher quality reporting demanded by investors, higher monitoring by auditors, and

Firth (1998) documents a positive relationship between IPO profits forecast accuracy and long-term stock return, using IPOs from Singapore during the period 1979 to 1992. He explains that profits forecast serves as a signal of IPO value. Consequently, high forecast accuracy can be interpreted as high IPO value, and leads to a high long-term stock return.

3.2.2 Studies of IPO long-term performance in the Chinese stock market

There are several studies on the Chinese market examining the determinants of long-term IPO accounting and stock price underperformance. Chen, Firth and Kim (2000) investigate the post-issue market performance of IPOs in the Chinese market, using 277 A-share and 65 B-share listed from 1992 to 1995. They find that B-share IPOs underperform with respect to A-share IPOs in the long run. In addition, they document an insignificantly relationship between IPO long-term performance and IPO underpricing. The coefficients of IPO long-term performance on institutional ownership and foreign ownership are also both statistically insignificant. Moreover, they find a statistically insignificantly positive coefficient on earnings growth.

Aharony, Lee and Wong (2000) examine the pre- and post-IPO earnings patterns in China, using 83 Chinese SOEs that issue B shares or H shares during 1992 to 1995. They find that earnings decline around the IPO year is the most significant for firms in the unprotected industries when compared with firms in the protected industries. They explain that SOEs in unprotected industries may manage accounting

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higher regulation by the government.

accruals to boost earnings and/or list those businesses with temporarily high profits

resulting from high accounting accruals during the process of financial package.

Moreover, SOEs that issue H shares experience less earnings decline relative to those

issuing B shares, because of high market monitoring and good investor sophistication

in Hong Kong.[16]

Chan, Wang and Wei (2004) study long-term performance of A- and B-share

IPOs issued in China during the 1993–1998 period. In the long run, A-share IPOs

slightly underperform with respect to the benchmark while B-share IPOs outperform.

They also document declines in operating performance, such as ROA, operating cash

flow on assets, around the IPO year. Moreover, there is a positive relationship

between IPO stock return and changes in accounting performance. They argue that the

Chinese stock market incorporates information in accounting performance.

Wang (2005) examines the relationship between changes in operating

performance of Chinese listed companies around their IPO periods and ownership

concentration, utilizing Chinese A-share IPOs from 1994 to 1999. He finds no

relationship between changes in operating performance and state ownership. His

empirical results also show that there is a curvilinear relation between legal-entity

ownership and performance changes. At the same time, he does not find any

relationship between earnings change and IPO underpricing.

Using IPO data between 1999 and 2001, Aharony, Wang and Yuan (2005)

examine the effects of related party transactions (RPTs) between Chinese IPOs and

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[16] However, Kimbro (2005) finds that Chinese IPO firms use income-decrease accruals
(conservative accounting) in prospectus' financial statements, and this is contrary to earnings
management.

their parent companies on post-IPO abnormal stock return performance. They find a negative association between abnormal stock return and abnormal RPTs. They explain that IPO firms can use RPTs as the tool for earnings management. Fan, Wong and Zhang (2007) make a comparison between the Chinese A-share long-term accounting performance and stock performance for IPO firms without politically-connected CEOs and that with politically-connected CEOs. By using IPO data during 1993 to 2001, they show that the latter firms underperform with respect to the former firms based on stock return and earnings growth. They explain that government interference by the politically-connected CEOs leads to poor corporate performance.

Kao, Wu and Yang (2009) study the effects of IPO pricing regulations on earnings management and post-IPO performance. Their findings show that IPOs may be induced by the pricing regulation to use non-core earnings as the tool of earnings management to boost the reported earnings during the PE cap period from January 1996 to February 1999. Higher earnings management leads to poor post-IPO stock performance and decrease in accounting profitability. Moreover, IPOs that make overoptimistic forecasts experience poor long-term stock performance.

3.2.3 Summary about IPO long-term performance

There are four categories of studies about IPO long-term performance. The first is related to the investor's optimism and "window of opportunity" argument (e.g., Ritter, 1991; Loughran, Ritter and Rydqvist, 1994). The second is to study the effect of ownership on IPO long-term performance (e.g., Jain and Kini, 1994; Wang, 2005;

Fan, Wong and Zhang, 2007). The third relates earnings management to IPO long-term performance (e.g., Teoh, Welch and Wong, 1998; Aharony, Lee and Wong, 2000; Aharony, Wang and Yuan, 2005; Kao, Wu and Yang, 2009), where earnings management is measured by abnormal RPTs and non-core earnings, etc. The last is related with signaling by various mechanisms (e.g., Carter, Dark and Singh, 1998; Firth, 1998). Examples of signaling mechanism are high reputable underwriters and IPO profits forecast accuracy.

## 3.3 Studies on the effects of accounting standard

3.3.1 Representative studies of accounting standard

Hung (2001) examines the relationship between accounting standards and value relevance, where he defines value relevance as the ability of accounting measure to capture or summarize information that affects firm value.[17] Using a sample from 21 countries over the period 1991 to 1997, he finds that the use of accrual accounting (VS cash accounting) negatively influences the value relevance of financial information in countries with weak shareholder protection. However, this phenomenon is absent in countries with strong shareholder protection. He argues that managers have incentives and ability to use earnings management to benefit them under the accrual accounting system when shareholder protection is weak, leading to lower value relevance of financial information. However, shareholder protection can improve the effectiveness of accrual accounting.

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[17] Hung (2001) also points out that value relevance is affected by the price formation process. For example, market does not incorporate full information in accruals or misprices accruals (e.g., Sloan, 1996; Xie, 2001).

Ashbaugh and Pincus (2001) investigate the impact of differences in countries' accounting standards relative to the IAS on the accuracy of financial analyst earnings forecasts for a sample of non-U.S. firms before and after they adopt the IAS. They find that greater differences in accounting standards relative to IAS are positively related to analyst's forecast error before the adoption of IAS. Moreover, they document analyst forecast accuracy improves after the adoption of IAS.[18]

Hope (2003) studies the determinants of analysts' forecast accuracy using a sample from 22 countries. He agrees that the quality of financial information is a function of both the quality of accounting standards and enforcement of those accounting standards. Without efficient enforcement, even the best accounting standards have no effect on information quality. His empirical result shows that strong enforcement leads to higher forecast accuracy, which is consistent with the hypothesis that enforcement forces managers to implement the accounting standards, leading to reduction in analysts' uncertainty about future earnings. He also documents that enforcement is more important when more accounting choice among accounting methods is permitted.

Leuz (2003) examines whether firms using U.S. GAAP and firms using IAS are different in information asymmetry, measured by bid-ask spreads, share turnover, analysts' forecast dispersion and IPO underpricing. Using a sample of firms from Germany, he finds the differences in information asymmetry between the two

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[18] Ewert and Wagenhofer (2005) argue that tighter accounting standards may increase rather than decrease earnings management, thus decreasing earnings quality. Whether earnings management decreases or increases depends on the benefit and cost of earnings management by managers. If the benefit of earnings management is high, even under tighter accounting standards, they have incentives to manipulate earnings.

accounting standards are small. Because institutional factors, such as market microstructure and standards enforcement, are held constant for firms adopting U.S. GAAP or IAS, his findings do not support the claim that U.S. GAAP provides higher quality than IAS.

Balla, Robinb and Wu (2003) investigate whether firms from four East Asian regions and countries, namely Hong Kong, Malaysia, Singapore and Thailand, have higher earnings quality. Using a sample in these four regions during 1984-1996, they find that earnings quality, measured by accounting conservatism, is not higher than that under the code law.

Lang, Raedy and Wilson (2006) compare U.S. firms' earnings with reconciled earnings for cross-listed non-U.S. firms. They find that non-U.S. firms' earnings are of low quality, where earnings quality is measured by earnings management, value relevance and accounting conservatism. Moreover, firms from countries with weaker investor protection show more evidence of earnings management, suggesting that earnings quality of such firms does not improve even under the SEC supervision.

Eaton, Nofsinger and Weaver (2007) use a sample of foreign firms from 17 countries that cross-list on the NYSE to examine the relationship between the cost of equity and disclosure quality. They find that a firm from a country with disclosure quality lower than that of the U.S. could reduce cost of equity from cross-listing, because increased disclosure has the potential to reduce information asymmetry, thus reducing the cost of equity. They explain that accounting standards, analyst following, and investor protection are attributable to disclosure quality. Increased disclosure

through accounting standards is beneficial to investors, indicating better accounting standards can reduce the cost of equity.

Aharony and Barniv (2008) compare the value relevance of accounting information in 14 European countries in the year prior to and the year of the adoption of the International Financial Reporting Standards (IFRS). Specifically, they study three information items: goodwill, research and development (R&D), and asset revaluation. Overall speaking, their findings show that the adoption of the IFRS has increased the value relevance of the three accounting numbers. In detail, in the year prior to the adoption of the IFRS, the incremental value relevance of the three domestic-GAAP-based accounting items is greater in countries where the respective domestic standards are more compatible with the IFRS. The higher the deviation of the three domestic-GAAP-based accounting items from their corresponding IFRS, the greater the incremental value relevance from switching to IFRS.

Barth, Landsman and Lang (2008) examine whether application of IAS is associated with higher accounting quality. The application of IAS reflects combined effects of the features of the financial reporting system, including standards, their interpretation, enforcement, and litigation. They find that firms applying IAS from 21 countries generally show less earnings management, more timely loss recognition, and more value relevance of accounting amounts than do matched sample firms applying non-U.S. domestic standards. Differences in accounting quality between the two groups of firms in the period before the IAS firms adopt IAS do not account for the post-adoption differences. Firms applying IAS generally show an improvement in

accounting quality between the pre- and post-adoption periods.[19]

3.3.2 Studies of accounting standard in the Chinese stock market

Chen, Gul and Su (1999) investigate differences between earnings based on Chinese GAAP and those based on IAS. Their findings indicate that the reported earnings under Chinese GAAP are 20-30 percent higher than those under IAS. They suggest that differences between the two types of earnings are caused by differences in accounting standards and financial rules, opportunistic applications of Chinese GAAP, and unusual market-wide events.

Eccher and Healy (2000) investigate the usefulness of IAS in China. They use two measurements for the usefulness. One is the correlation between accounting information and future cash flow. The other is the association between accounting information and stock performance. By using A-share and B-share IPOs in China between 1993 and 1997, they conclude that information produced using IAS is no more useful than that using the Chinese standard. Specifically, there is no difference in the explanatory power of IAS and Chinese GAAP for future cash flow. The relationship between GAAP-based earnings and A-share stock return of dual class firms (issuing both A shares and B shares) is higher than that of firms with earnings prepared under IAS.

Chen, Firth and Kim (2002) check whether accounting data are useful in helping to explain the market value of listed firms in China by studying Chinese listed

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[19] Barth, Landsman and Lang (2008) are not sure that the improvement in accounting quality is attributable to the change in the financial reporting system rather than to changes in firms' incentives and the economic environment.

firms' data from 1993 to 1997. Their results show that Chinese A-share investors appear to place most weight on Chinese GAAP earnings when evaluating A-share stock price and only recently has there been an association between A-share stock price and IAS information.

By comparing accounting numbers based on Chinese GAAP with those based on IAS before and after adopting the new Chinese accounting standard, Chen, Sun and Wang (2002) show that accounting standard harmonization between Chinese GAAP and IAS does not reduce or eliminate the gap between IAS-based earnings and Chinese GAAP-based earnings. It means that the harmonized accounting standard does not harmonize accounting practices. They explain that implementation of the new accounting standard does not improve the earnings quality, because auditors in China have little professional experience relative to their counterparts in the developed countries. They suggest that the institutional environment, such as auditing quality, investor protection and enforcement of accounting regulation, should be improved in order to enhance the earnings quality.

Gao and Tse (2004) study market reaction to announcement of earnings prepared under Chinese GAAP and IAS. By using data from June 1995 through May 2000 for firms that have listed both A and B shares, they show that investors in the B-share market react to both the IAS and Chinese GAAP earnings announcements, while the investors in the A-share market pay more attention to the Chinese GAAP earnings reports.

Wu and Koo (2005) study whether IAS is more value-relevant than Chinese

GAAP. Using data in the Chinese A-share and B-share markets from 1997 to 2003, they find that IAS does not provide greater explanatory power than Chinese GAAP for A-share investors. Moreover, the explanatory power of Chinese earnings and book values has increased from 2001 in the A-share market due to the improvement of the capital market infrastructure.

### 3.3.3 Summary about accounting standard

Prior literature mainly discusses accounting standards from three perspectives. The first is to compare the informativeness of accounting information under different accounting standards (e.g., Eccher and Healy, 2000; Chen, Firth and Kim, 2002; Gao and Tse, 2004; Wu and Koo, 2005; Aharony and Barniv, 2008; Barth, Landsman and Lang, 2008). The informativeness can be measured by earnings management, timely loss recognition and value relevance, etc. The second is to study the determinants of informativeness (e.g., Hung, 2001; Balla, Robinb and Wu, 2003). Examples of determinants are shareholder protection and incentives of managers and auditors. The third is to analyze the effects of the informativeness under different accounting standards (e.g., Ashbaugh and Pincus, 2001; Hope, 2003; Eaton, Nofsinger and Weaver, 2007). The effects of the informativness can be analysts' forecast errors and cost of equity, etc.

# CHAPTER FOUR

# Accounting standard change and IPO pricing in the Chinese market

## 4.1 Introduction

Previous studies have recognized information asymmetry adversely affects the cost of debt and equity capital (e.g., Sengupta, 1998; Francis, LaFond, Olsson and Schipper, 2004; Pittman and Fortin, 2004; Bowen, Chen and Cheng, 2008).[20] Due to the existence of information asymmetry, issuing firms need to make compensation in order to attract the less informed investors to participate in the capital raising process. Consequently, firms need to issue shares with extra cost of capital, thus resulting in underpriced IPOs and SEOs.

Prior literature uses many proxies for information asymmetry. For instance, firms with a longer age or a larger size are considered to be associated with less information asymmetry and less underpricing. Besides, firms with reputable auditors, prestigious underwriters, more analyst coverage, higher quality of disclosure and higher quality of earnings are also regarded as associated with less information asymmetry (e.g., Botosan, 1997; Sengupta, 1998; Bowen, Pittman and Fortin, 2004; Francis, LaFond, Olsson and Schipper, 2004; Bowen, Chen and Cheng, 2008).

In this thesis, I use accounting standards as a proxy for information asymmetry. The underlying reason is that higher earnings quality derived from improved accounting standards reduces information asymmetry between the more informed

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[20] The review about information asymmetry and capital market is referred to Healy and Palepu (2001).

issuer and the less informed investors, thus leading to lower cost of capital.

China adopts a new accounting regulation (1998 regulation) to replace the old one (1992 regulation). I investigate whether the application of the 1998 regulation reduces the cost of capital. It should be noticed that the application of accounting standard includes the accounting regulation itself and the regulation enforcement (Hope, 2003). The 1998 regulation provides firms' managers with more discretion to determine the allowance for accounts receivable and inventory. However, without effective implementation of the regulation, managers will have incentives and more ability to make earnings management which reduces the value relevance of earnings, especially during the capital raising process (e.g., Teoh, Welch and Wong, 1998; Aharony, Lee and Wong, 2000; Chen and Yuan, 2004; Kao, Wu and Yang, 2009). Thus a better accounting standard may not improve the value relevance of accounting information. However, I argue that Chinese enforcement of the new accounting regulation effectively reduces earnings management and enhances the value relevance of earnings. The reasons are as follows. First, Chinese government intensifies the monitoring on the issuing firms in order to protect the investors (e.g., Kao, Wu and Yang, 2009). Second, the government regulates auditors more stringently. Consequently, auditors audit the issuing firms more carefully and independently in order to avoid punishment resulting from auditing failure (e.g., DeFond, Wong and Li, 2000). Last, investors know how to 'price protect' themselves. More experience and knowledge makes investors more able to detect the earnings management (e.g., Chen and Firth, 1999).

To understand the effects of accounting standard as a proxy for information asymmetry on the cost of capital, I examine the relationship between IPO offering price and earnings per share (EPS), and the relationship between IPO underpricing and return on asset (ROA). If application of the 1998 accounting regulation improves the earnings quality, I argue that there should be a stronger positive association between offering price and earnings per share after the adoption of the new regulation. In other words, other things being equal, an IPO firm can command a higher offering price for a given earnings per share under the 1998 accounting regulation due to higher earnings quality. Similarly, I also argue that there should be a stronger negative association between IPO underpricing and ROA under the new regulation. Higher earnings quality reduces information asymmetry, thus having stronger influence on IPO underpricing.

My empirical findings support the above arguments. Using a sample of Chinese A-share IPOs listed from 1996 to 2004, I find the relationship between IPO offering price and net income per share is more positive after the adoption of the 1998 regulation. I also document a more negative relationship between IPO underpricing and ROA after the adoption of the 1998 regulation. In the robustness tests, I use operating income as another proxy for earnings, adopt the method of stochastic frontier estimation for the offering price regression and find similar results. Overall speaking, my empirical results support the argument that accounting standard serves as a proxy for information asymmetry, which in turn has effects on IPO firms' cost of capital.

**4.2 Hypothesis development**

In this section I will develop two hypotheses regarding the effects of changes in accounting standard on IPO offering price and IPO initial return.

4.2.1 Hypothesis 1

My first hypothesis concerns with the determinants of IPO offering price. There are papers examining the procedure of setting IPO offering price and the factors influencing the offering price (e.g., Hunt-McCool, Koh and Francis, 1996; Koop and Li, 2001; Chan, Wu and Kwok, 2007). Since IPO underpricing is defined as the return of the new issue on the first trading day in the aftermarket relative to its offering price, the magnitude of the offering price itself also affects the degree of IPO underpricing. Ceteris paribus, a higher offering price leads to less underpricing (or more overpricing).

Among the various determinants of IPO offering price, I am interested in the association between IPO offering price and earnings. Earnings is an important factor when valuing a firm since it reflects the firm's profitability and ability to generate income for shareholders. In the accounting literature, how a firm's performance in the stock market is related to earnings is called value relevance of earnings.[21]

Value relevance has two measures (e.g., Collins, Maydew and Weiss, 1997; Eccher and Healy, 2000; Chen and Wang, 2004; Aharony and Barniv, 2008). One is

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[21] Francis, LaFond, Olsson and Schipper (2004) show seven measures for earnings quality. Except value relevance, the other six are accrual quality, earnings persistence, earnings predictability, earnings smoothness, earnings timeliness and earnings conservatism.

the association between earnings and stock market performance, usually stock price or stock return. The other is the explanatory power of the model in which earnings explains stock market performance. A higher association between stock price and earnings indicates that earnings are of more value relevance. The value relevance of earnings has been studied in the Chinese market (e.g., Eccher and Healy, 2000; Chen, Firth and Kim, 2002; Chen and Wang, 2004). Until now, the value relevance of earnings has rarely been applied to the IPO context, especially in the area of IPO offering price. In this thesis, I investigate the effect of accounting standard change on the association between IPO offering price and earnings.

To begin with, I refer to the standard growing perpetuity valuation model as the mechanism for IPO offering price valuation. Assuming an α payout rate, where $0 \leq \alpha \leq 1$, the model is expressed as

$$P_t = \frac{\alpha * EPS_{t+1}}{r - g} \qquad (1)$$

where $P_t$ is the IPO offering price, r is the discount rate set by the underwriter, g is the expected earnings growth rate set by the underwriter, and $EPS_{t+1}$ is one-year-ahead expected earnings per share.[22]

In addition, the following equation shows the earnings growth:

$$EPS_{t+1} = EPS_{t-1} * (1 + g)^2 \qquad (2)$$

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[22] It is assumed that the discount rate, r, is greater than the level of growth, g.

where $EPS_{t-1}$ is last year earnings per share.

Combining equation 1 and equation 2 together, I arrive at the following
equation:

$$P_t = \frac{\alpha * EPS_{t-1} * (1+g)^2}{r-g} \qquad (3)$$

In the above equations, the discount rate r is equal to risk-free rate (denoted as
$r_{RF}$) plus risk premium, whereas risk premium is the premium paid to the investors for
bearing the undiversifiable systemic risk (denoted as $r_{SR}$) as well as the risk of
information asymmetry between the less informed investors and more informed issuer
(denoted as $r_{IA}$).

$$r = r_{RF} + r_{SR} + r_{IA} \qquad (4)$$

After incorporating equation 4 into equation 3, I obtain the following equation:

$$P_t = \frac{\alpha * EPS_{t-1} * (1+g)^2}{r_{RF} + r_{SR} + r_{IA} - g} \qquad (5)$$

Equation 5 shows that the degree of information asymmetry affects the
offering price through its effect on $r_{IA}$. This argument is supported by prior literature

which documents the effect of information asymmetry on cost of capital (e.g.,

Diamond and Verrecchia, 1991; Bowen, Chen and Cheng, 2008).

Taking the first order derivative of equation 5 on historical earnings per share,

I come to equation 6:

$$\frac{\partial P_t}{\partial EPS_{t-1}} = \frac{\alpha * (1 + g)^2}{r_{RF} + r_{SR} + r_{IA} - g} > 0 \tag{6}$$

Since the right hand side of equation 6 is always larger than zero, offering

price is positively related to historical earnings per share. Moreover, equation 6 also

indicates that the positive relationship between offering price and earnings per share

will be larger if there is a reduction in $r_{IA}$.

It should be noticed that my above analysis assumes that the IPO offering

price depends only on EPS, r and g. Since February 11, 1999, Chinese IPO firms have

been allowed to price IPO through negotiation with underwriters after taking into

account market conditions and firm-specific prospects, although the offering price is

still subject to the CSRC's approval. Thus, my analysis is applicable to this period in

which there is no IPO pricing cap regulation. On the other hand, from January 1, 1996

to February 11, 1999, the CSRC's pricing regulation stipulates that the IPO offering

price be given by the product of earnings per share (EPS) calculated over a pre-

specified time period and a price-to-earnings (PE) cap specified by CSRC. Although

the value of PE cap is usually set around 15, the range of the earnings multiplier is

from 13 to 16 in practice. I argue that my equations 5 and 6 still explains the offering

price even during this period. This is because in practice, the Chinese government has discretionary judgment on the PE ratio for IPOs. If the IPO is relatively good in terms of lower r or higher g, the PE ratio set by the government will be high. Therefore, the offering price still depends on EPS, r and g. When conducting the empirical analysis, in order to separate the effects of accounting standard change from the effects of the PE cap release on the relationship between offering price and earnings, I also study the subsample of IPOs issued between 1999 and 2004 to eliminate the effect of PE cap since there is no pricing cap regulation from February 1999.

Next, I provide arguments to justify that information asymmetry has been reduced after the adoption of the 1998 accounting standard, thus leading to a lower risk premium from information asymmetry ($r_{IA}$). In other words, the new accounting regulation reduces $r_{IA}$. As a result, the association between IPO offering price and historical earnings per share becomes larger under the new accounting regulation.

Compared with the old one, there are seven revisions in the new accounting regulation. For example, the new accounting regulation requires that allowance for doubtful accounts be determined by the company, while the old one stipulates that allowance for doubtful accounts be a range of 0.3 percentage to 0.5 percentage approved by the government. Because the company knows more about itself than the government, allowance based on the new accounting regulation should be closer to the true condition of the company than that based on the old one. In other words, allowance based on the new accounting regulation provides more relevant accounting information than the old one. Operating income and net income are deducted from

allowances and provisions. Therefore, it is reasonable that operating income and net income calculated under the new accounting regulation are of higher earnings quality than those under the old one.

Higher earnings quality leads to lower risk premium due to information asymmetry ($r_{IA}$), resulting in a higher association between IPO offering price and past earnings. As a result, I arrive at my hypothesis 1 which is stated as follows:

*$H_1$: the association between IPO offering price and past earnings per share is higher under the new accounting regulation.*

4.2.2 Hypothesis 2

After explaining how accounting standard change affects IPO offering price, I discuss the effects of accounting standard on IPO underpricing. IPO underpricing means the IPO offering price is lower than the closing price on the first trading day, after adjusting for the corresponding market return. There are two major theories to explain the IPO underpricing phenomenon. They are the "signaling theory" proposed by Welch (1989), and the "winner's curse theory" documented by Rock (1986) and Beatty and Ritter (1986). Both of the above two theories emphasize the roles played by information asymmetry and ex ante uncertainty.

Previous empirical studies confirm the arguments of information asymmetry

and ex ante uncertainty in China (e.g., Mok and Hui, 1998; Chen, Firth and Kim, 2004). My research is to examine the effect of accounting standard change on IPO underpricing. My analysis starts with the equation which expresses the stock return from the offering price to the closing price on the first trading day. By taking natural logarithm on both sides of equation 3, I arrive at equation 7 as follows:

$$\ln P_t = \ln(\frac{\alpha * EPS_{t-1} * (1+g)^2}{r-g}) = \ln(\alpha) + \ln(EPS_{t-1}) + 2\ln(1+g) - \ln(r-g)$$

$$(7)$$

In addition, the derivative of $\ln P_t$ is:

$$d(\ln P_t) = \frac{d(P_t)}{P_t} \tag{8}$$

Combing equations 7 and 8 together, I obtain the following equation:

$$\frac{d(P_t)}{P_t} = \frac{d(\alpha)}{\alpha} + \frac{d(EPS_{t-1})}{EPS_{t-1}} + \frac{2d(g)}{1+g} - \frac{d(r) - d(g)}{r-g} \tag{9}$$

Referring equation 9 to the rate of return from the offering price ($P^{offer}$) to the first day closing price ($P^{close}$), I arrive at the following result:

$$\frac{P^{close} - P^{offer}}{P^{offer}} = \frac{d(\alpha)}{\alpha} + \frac{d(EPS_{t-1})}{EPS_{t-1}} + \frac{2d(g)}{1+g} - \frac{d(r) - d(g)}{r-g} \tag{10}$$

where $d(P_t)$ is the change from the offering price to the closing price on the first trading day, $d(\alpha)$ is the change of payout rate from the offering date to the first trading day, $d(EPS_{t-1})$ is the change in past earnings per share during the same period as above, $d(g)$ is the earnings growth expected by the investors on the first trading day minus earnings growth expected by the underwriter, and $d(r)$ is the discount rate required by the IPO investors on the first trading day minus the discount rate set by the underwriter.

It is reasonable to assert that there is no change in the payout rate as well as the past earnings per share from the offering day to the first trading day. Consequently, equation 10 can be shortened as:

$$\frac{P^{close} - P^{offer}}{P^{offer}} = \frac{2d(g)}{1+g} - \frac{d(r) - d(g)}{r - g} \tag{11}$$

Equation 11 can be interpreted as follows. The left hand side of equation 11 is the stock return from the IPO offering price to the closing price on the first trading day, which is usually termed as IPO first day return or IPO initial return. If investors on the first trading day consider the risk of the IPO to be higher than that expected by the underwriter, i.e., $d(r)$ is positive, there will be IPO overpricing. Thus, IPO underpricing doesn't always happen in theory. Nevertheless, empirical results show that IPO underpricing generally exists. It means there is a negative change in the discount rate from the offering day to the first trading day, other things being equal.

I utilize equation 11 to infer the relationship between IPO underpricing and the

level of the growth. First, I consider the first component on the right hand side of

equation 11, or $\dfrac{2d(g)}{1+g}$. Since level of growth (g) appears in the denominator of this

component and carries a positive sign, apparently there is a negative relationship

between IPO underpricing and g. Next, I analyze the second component, or

$(-\dfrac{d(r)-d(g)}{r-g})$. Since g appears in the denominator of this component and carries

double negative signs, it is also not difficult to reach a conclusion that the level of the

growth (g) has a negative impact on IPO underpricing, other things being equal.[23]

Altogether, I can conclude that IPO underpricing is negatively related to the level of

growth. At the same time, the level of the growth is positively related to ROA because

g=ROA*(Asset/Equity)*(1-payout rate). Thus my second hypothesis is herby

expressed as follows:

$H_{2a}$: *there is a negative association between IPO underpricing and ROA.*

Then I analyze the effect of accounting standard change on the relationship

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[23] I can also differentiate the first day return or left hand side on the equation 11 by the level of
growth (g) and reach a conclusion that there is a negative relationship between first day return and
the level of the growth. ( $\dfrac{\partial(\dfrac{P^{close}-P^{offer}}{P^{offer}})}{\partial g}$ )

between IPO underpricing and ROA. First, the level of the growth is estimated from a variety of accounting information including ROA. If the ROA estimate is noisy and people are not confident about the ROA figure, there is little relationship between ROA and the level of the growth. On the contrary, if the ROA figure is highly informative and contains much information about the firm value, people will rely much on the ROA figure. Consequently, when the ROA figure is informative, there is a high association between ROA and level of growth, which in turn translates into a high association between ROA and IPO underpricing. Second, I have previously argued that the new accounting regulation is of higher earnings quality. Therefore, for a given ROA figure, its effect on the first day return (or underpricing) will be much stronger under the new accounting regulation. This follows that there is a more negative relationship between IPO underpricing and ROA after the adoption of the new accounting regulation.

Apart from the above explanation, I can also infer the effect of the new accounting regulation on the relationship between IPO underpricing and ROA from another perspective. The new accounting regulation provides investors with accounting information of higher quality. It indicates that the information known by IPO investors is better after the adoption of the new accounting regulation. Other things being equal, information asymmetry reduces. Thus, the new accounting regulation reduces the risk premium due to information asymmetry. I use the following equations to illustrate the effects of the new and the old accounting regulations on the discount rates and underpricing:

$$\frac{P_{new}^{close} - P_{new}^{offer}}{P_{new}^{offer}} = \frac{2d(g)}{1+g} - \frac{d(r_{new}) - d(g)}{r_{new} - g} \qquad (12)$$

$$\frac{P_{old}^{close} - P_{old}^{offer}}{P_{old}^{offer}} = \frac{2d(g)}{1+g} - \frac{d(r_{old}) - d(g)}{r_{old} - g} \qquad (13)$$

Equation 12 is expressed under the new accounting regulation, while equation 13 is under the old one. $r_{new}$ is the discount rate set by the underwriter under the new accounting regulation, while $r_{old}$ is under the old one. $d(r_{new})$ is the difference between the discount rate required by the IPO investors on the first trading day and that set by the underwriter under the new accounting regulation, while $d(r_{old})$ is the one under the old accounting regulation. In the above section 4.2.1, I infer that information asymmetry is lower under the new accounting regulation due to higher earnings quality. Thus $r_{new}$ is less than $r_{old}$.[24] As defined above, g is the expected earnings growth rate set by the underwriter, while $d(g)$ is the difference between the expected earnings growth rate anticipated by the IPO investors on the first trading day in the aftermarket and that set by the underwriter. I suppose the expected earnings growth rate set by the underwriter increases from g to $g + \Delta g$, where $\Delta g$ is positive. Consequently, the figure of $(r_{new} - g)$ drops to $(r_{new} - g - \Delta g)$, while $(r_{old} - g)$ drops to $(r_{old} - g - \Delta g)$. Because $r_{new}$ is less than $r_{old}$, $(r_{new} - g - \Delta g)$ is smaller than $(r_{old} - g - \Delta g)$.

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[24] The discount rate set by the underwriter or r, is equal to risk free rate (denoted as $r_{RF}$) plus risk premium, whereas risk premium comes from undiversifiable systemic risk (denoted as $r_{SR}$) plus risk of information asymmetry between uninformed investors and informed investors (denoted as $r_{IA}$). Other things equal, the decrease in $r_{IA}$ leads to the decrease in the discount rate.

Thus $(-\dfrac{d(r_{new}) - d(g)}{r_{new} - g})$ drops more when compared with $(-\dfrac{d(r_{old}) - d(g)}{r_{old} - g})$ when g is

increased to $g + \Delta g$.[25] Consequently, IPO first day return decreases more for a given

increase in the expected earnings growth rate set by the underwriter after the adoption

of the new accounting regulation. As indicated earlier, the level of the expected

earnings growth rate is positively related to ROA. As a result, my third hypothesis is

herby expressed as:

*$H_{2b}$: the association between IPO underpricing and ROA is more negative after the*

*adoption of the new accounting regulation.*

**4.3 Methodology**

4.3.1 Model specifications

      I estimate two regression models to test the hypotheses developed in the last

section. The dependent variables of the regression models are the IPO offering price

and IPO underpricing (first day return), respectively. The regressions are specified as

follows:

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[25] I can also reach the same conclusion by comparing the following two items:

$$\left(\dfrac{\partial(\dfrac{P_{new}^{close} - P_{new}^{offer}}{P_{new}^{offer}})}{\partial g}\right) \text{ and } \left(\dfrac{\partial(\dfrac{P_{old}^{close} - P_{old}^{offer}}{P_{old}^{offer}})}{\partial g}\right).$$

**Offering price (OFP) regression:**

$OFP = \alpha_0 + \alpha_1 EPS + \alpha_2 EPS*EVENT + \alpha_3 GOV + \alpha_4 LEGAL +$

$\qquad \alpha_5 FOR + \alpha_6 GOVSQ + \alpha_7 LEGALSQ + \alpha_8 LEV + \alpha_9 STDR +$

$\qquad \alpha_{10} AGE + \alpha_{11} UW + \alpha_{12} CPA + \alpha_{13} EX + \Sigma \mu_i IND$ (14)

**Underpricing (FDR) regression:**

$FDR = \gamma_0 + \gamma_1 ROA + \gamma_2 ROA*EVENT + \gamma_3 GOV + \gamma_4 LEGAL +$

$\qquad \gamma_5 FOR + \gamma_6 GOVSQ + \gamma_7 LEGALSQ + \gamma_8 LEV + \gamma_9 STDR +$

$\qquad \gamma_{10} AGE + \gamma_{11} UW + \gamma_{12} CPA + \gamma_{13} MRTN + \gamma_{14} RELPE +$

$\qquad \gamma_{15} LAG + \gamma_{16} EX + \Sigma \mu_i IND$ (15)

4.3.2 Variable measurements

OFP is IPO offering price. In the IPO literature, underpricing (FDR) is

measured by IPO return on the first trading day. Following prior studies on IPO

underpricing in the Chinese market such as Chen, Firth and Kim (2000) and Chen,

Firth and Kim (2004), I measure FDR as

$$FDR = \frac{P_1}{P_0} - \frac{I_1}{I_0}$$ (16)

where $P_1$ is IPO closing price on the first trading day, $P_0$ is the offering price, $I_1$ is the market index on the first trading day and $I_0$ is the market index on the IPO offering day. Because there are two stock exchanges in China, $I_1$ refers to the ShangHai A-share index for IPOs listed in the ShangHai Stock Exchange, and ShenZhen A-share index for IPOs listed in the ShenZhen Stock Exchange.

EPS is measured as net income divided by total number of outstanding shares. Net income is after-tax profit one year before the IPO year. When an IPO is offered, its prospectus provides investors with prior year accounting information. For example, if a firm issues an IPO in 1998, net income is after-tax profit in 1997. Because accounting information is one year before the IPO year, the corresponding outstanding shares are year-end total outstanding shares before the IPO year. ROA is measured as net income one year before the IPO year divided by total asset at the end of that period.

GOV is measured as state shareholdings divided by total outstanding shares after the IPO. LEGAL is defined as legal shareholdings divided by total outstanding shares after the IPO. GOVSQ and LEGALSQ are squares of the variables of GOV and LEGAL, respectively. I include squares of state ownership and legal ownership because prior literature has found a non-linear relationship between stock price and accounting numbers (e.g., Wei, Xie and Zhang, 2005; Wei, 2007).

FOR is a dummy variable. It is equal to one if IPOs have previously or simultaneously issued B shares. Otherwise it is equal to zero. Firms with foreign

ownership must prepare two sets of accounting information. One is prepared under

Chinese GAAP and the other is prepared under IAS. On the other hand, firms without

foreign ownership only need to provide accounting numbers based on Chinese GAAP.

Since IAS is different from Chinese GAAP, income numbers and asset numbers differ

between IAS and Chinese GAAP. Furthermore, IAS is considered as a better

accounting standard than Chinese GAAP.[26]

LEV is measured as IPO year-end liability divided by IPO year-end asset

before the IPO year.[27] STDR is the standard deviation of the IPO firm's after-market

stock return from the second trading day until the 22nd trading day. AGE is years

between the IPO firm establishment day and IPO offering day.

UW is the dummy variable which is equal to one if an IPO is underwritten by

one of the following six largest underwriters in China—Guotai Securities, Nanfang

Securities, Jun'an Securities, Shenyin wanguo Securities, Haitong Securities and

Huaxia Securities.[28] Otherwise it is equal to zero.

CPA is the dummy variable which is equal to one if an IPO is audited by one

of the following eight largest auditors in China ---Beijing CPA, Beijing Zhonghua

CPA, Shanghai CPA, Shanghai Dahua CPA, Lixin CPA, Sheko Zhonghua CPA,

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[26] First, there are some existing papers to investigate differences between IAS and Chinese accounting standard (Eccher and Healy, 2000; Chen, Firth and Kim, 2002; Gao and Tse, 2004; Wu and Koo, 2005). They assume that IAS provides higher earnings quality than Chinese standard. Second, there are several papers to conclude that IAS is of higher earnings quality than domestic accounting standards in foreign countries (Ashbaugh and Pincus, 2001; Aharony and Barniv, 2008; Barth, Landsman and Lang, 2008). I infer the above conclusion can be applied to Chinese stock market.
[27] Leverage has different measurements. For example, Su (2004) use short term and long term debts/asset as the measurement.
[28] The definition comes from Chen, Firth and Kim (2004).

Shenzhen Zhonghua CPA and Sheko Xinde CPA.[29] Otherwise it is equal to zero.

EX is a stock exchange dummy variable. It is equal to one if an IPO is listed in the ShangHai Stock Exchange. Otherwise it is equal to zero when the IPO is listed in the ShenZhen Stock Exchange. IND is an industry dummy variable. There are 6 industries based on the 1999 industry classification standard. They are banking and finance; transportation and related industry, public facilities and power industry; civil engineering construction and real estate; farming, forestry, food industry, conglomerate, estate development and operation, information industry and wholesale trade; manufacturing, mining and smelting; retail trade, hotel and tourism. I delete the industry of banking and finance from my sample because there is a special accounting standard for this sector in China.

LAG is a discrete variable.[30] If the number of months (denoted as months) between the offering day and the listing day are less than one, then LAG=1; if $1<=$ months $<3$, then LAG $=2$; if $3<=$ months $<6$, then LAG=3; if $6<=$ months $<12$, then LAG=4; if months $>=12$, then LAG=5. The LAG variable is the proxy for ex ante uncertainty in the prior literature (e.g., Su, 2004). MRTN is the return on the stock market index in the 30 trading days before the listing day. For IPOs listed in ShangHai Stock Exchange, I use ShangHai A-share index, otherwise I use ShenZhen A-share index. This variable is a proxy for market sentiment (e.g., Ritter, 1984; Ritter, 1991; Su, 2004). If the index return is relatively high before the IPO, the market is

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[29] The definition comes from Chen, Firth and Kim (2004).

[30] I use a discrete instead of continuous proxy for LAG in order to eliminate the effects of outlier observations. In China, time lag between the offering day and the listing day can be very long, especially in the early stage of Chinese stock market development due to political rather than economic consideration. In such a circumstance, measurement error can be very large.

considered as optimistic. However, if the index return is relatively low before the IPO, the market is considered as pessimistic.

RELPE, which is the relative PE ratio, is defined as IPO firm's PE ratio minus the median PE ratio of all the listed firms in the same industry as the IPO firm at the time of the listing. IPO PE ratio is measured as IPO offering price divided by its EPS. PE ratios of the listed firms in the same industry are calculated by those market prices on the IPO offering day divided by their own EPS.

Next I turn to my most interested variables. In the offering price regression, I use the interaction between EPS and the EVENT dummy variable as the measurement of the incremental effect of the new accounting regulation. The expression is shown as EPS*EVENT. EVENT is a time dummy variable and is equal to one if the IPO firm adopts the new accounting regulation. Otherwise it is equal to zero. Although the new accounting regulation was released on January 1, 1998, few IPO firms adopted it in their 1998 annual financial reports. The majority of the A-share IPO firms adopted it in their 1999 annual financial reports. It means that a firm that went public in 2000 or after adopted the new accounting regulation in its prospectus showing the previous year's annual financial report. Consequently, EVENT is equal to one if the firm issued an IPO in 2000 or after. Otherwise it is equal to zero.

In the underpricing regression, using similar reasoning I use the interaction between ROA and the EVENT dummy variable as the measurement of the incremental effect by the new accounting regulation. In other words, the interaction in the underpricing regression is equal to ROA times EVENT.

**4.4 Expected signs**

4.4.1 Expected signs in the offering price regression

First, I expect the coefficient on EPS to be positive. In the hypothesis development section above, I have made the first order derivative on EPS (see equation 6) and the result shows a positive relationship between IPO offering price and EPS.

There are substantial empirical results about the effects of state and legal ownership on firm valuation and performance in China (e.g., Qi, Wu and Zhang, 2000; Chen, Firth and Kim, 2000; Chen, Firth and Kim, 2004; Wei, Xie and Zhang, 2005; Wang, 2005; Chen, Firth and Xu, 2009).[31] Because the government has less incentive to monitor managers, it results in less firm value and worse earnings. Following their arguments, I expect a negative sign on the state ownership variable. On the other hand, due to the competing empirical results on the effect of the legal ownership, the sign on this variable is unpredictable.

I expect a positive sign for the foreign ownership dummy variable (FOR). An IPO firm with foreign ownership has two sets of accounting information. One is based on Chinese GAAP, and the other is based on IAS. However, PO firms without foreign ownership have only one set of accounting information under Chinese GAAP. Higher earnings quality for the IPO firm with foreign ownership leads to a higher offering

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[31] The role of government in the IPO firms seems mixed. Tian and Megginson (2006) argue that government has two faces. One is 'grabbing hand', and the other is 'helping hand'. Thus the effect of state ownership on the offering price depends on which hand prevails.

price.[32]

Underwriters with good reputation [33] and auditors with high auditing quality [34] help an IPO firm to ask for a higher offering price. Therefore, I expect positive signs on both of these two variables. High leverage implies a high bankruptcy risk, and a negative sign on the LEV variable is expected. I expect a negative sign on the STDR variable, because a lower offering price is considered as compensation for higher after-market stock return volatility. The AGE variable has a positive effect on the offering price, because a long firm age means more information release and lower risk compared with a short firm age.

In the offering price regression, my interested variable is the interaction between EPS and the time dummy variable EVENT. As argued above, the interaction catches the incremental effect of the new accounting regulation. Hypothesis 1 indicates the association between the offering price and past earnings is higher under the new accounting regulation. As a result, I anticipate a positive sign on this interaction term.

As a summary, the expected signs of the explanatory variables in the offering price regression are shown in appendix 2.

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[32] Chen and Firth (1999) document a significantly positive relationship between market valuation and FOR variable by using Chinese A-share IPOs between 1991 and 1996. Wei, Xie and Zhang (2005) find that foreign ownership is significantly positively related to Tobin's Q. However, Wang (2005) finds an insignificant relationship between changes in operating performance around the IPO and the dummy variable of FOR.

[33] Carter, Dark and Singh (1998) assume that good reputable underwriters tend to market higher quality IPOs. As a result, it is a good signal to the investors when IPOs are underwritten by more prestigious underwriters. Furthermore, Ellis, Michaely and O'Hara (2000) show that the lead underwriter plays a role in IPO aftermarket stability. It seems that such a function by the lead underwriter is desirable to the investors. IPOs by more reputable underwriters can ask a higher offering price because of this stability function.

[34] Teoh and Wang (1993) argue firms audited by high quality auditors provide more credible accounting information. As a result, the ERC for such firms is higher than non-high-auditor firms.

(Insert Appendix 2 here)

4.4.2 Expected signs in the underpricing regression

Chen, Firth and Kim (2004) argue that higher ROA is a favorite condition for an IPO, resulting in less underpricing. Nevertheless, their empirical result shows an insignificant coefficient. As discussed earlier, my hypothesis 2a ($H_{2a}$) predicts a negative association between IPO underpricing and ROA. Consequently, I expect a negative sign on this variable.

For the sign on the GOV variable, there are two contradictory explanations. Mok and Hui (1998) and Yu and Tse (2006) argue that high state shareholdings give confidence to A-share investors because there is an implicit guarantee of IPO viability. Chan, Wang and Wei (2004) argue that when the state or legal entities retain a high percentage of shares, this might be perceived as an indicator of bureaucratic control and operating inefficiency. The empirical results of the above papers show a negative relationship between institutional ownership (including both state and legal shareholdings) and underpricing.

On the other hand, Chen, Firth and Kim (2004) contend that the state may not have incentives for income growth and stockholders' benefit maximization. In many cases, state and legal entity consider political factors and social factors. Kao, Wu and

Yang (2009) argue that retained ownership by institutions is a credible signal for reducing agency problem. Consequently, investors are willing to pay a high price when IPOs are listed. Both of the two papers document a positive sign of IPO underpricing on the institutional ownership (including both state and legal shareholdings). Combining the above arguments, it means there is no clear conclusion on the expected signs of the GOV.

Because the effects of legal ownership on the corporate performance in the prior literature are unclear, the relationship between legal ownership and IPO underpricing is unpredictable (e.g., Qi, Wu and Zhang, 2000; Chen, Firth and Kim, 2000; Chen, Firth and Kim, 2004; Wei, Xie and Zhang, 2005; Wang, 2005). Furthermore, considering the non-linear relationship between institutional ownership and stock price, I also include squares of state and legal ownership.

Prior literature investigates the effects of IAS information in China (e.g., Chen and Firth, 1999; Chen, Firth and Kim, 2002; Chen, Sun and Wang, 2002; Chen, Firth and Kim, 2004; Chan, Wang and Wei, 2004). However, there is no clear conclusion on the expected sign of the FOR variable.

I expect a positive sign on the LAG variable. Prior literature shows that a long time lag between the IPO offering day and the listing day implies high ex ante uncertainty. Consequently, more underpricing is expected for a long time lag. At the same time, leverage is used as a proxy for ex ante uncertainty (Su 2004) or for risk (Chen, Firth and Kim, 2004). As a result, firms of high leverage need to underprice IPO more in order to attract investors to participate in the IPO issuing process.

Therefore, the sign on the LEV variable is also expected to be positive.[35]

For the STDR variable, which measures the standard deviation of after-market stock return, I expect a positive sign. Higher standard deviation means higher risk and the IPO firm needs to underprice more to compensate investors for subscribing to the offering shares. The MRTN variable, which measures the index return before the listing day, is a proxy for the overall market sentiment. High market sentiment helps to push up the closing price on the first trading day. Thus, higher market sentiment leads to more underpricing and I predict a positive sign on the MRTN variable.[36] The AGE variable has a negative effect on the underpricing, because a long firm age means more information release and less information asymmetry compared with a short firm age.

As mentioned above, high quality auditing and good underwriter reputationlead to less underpricing.[37] However, the difference of ability between Chinese big auditors and non-big auditors, and that between Chinese big underwriters and non-big underwriters, may be small. The expected signs on the UW and CPA variables are not clear. EX is a stock exchange dummy variable. It is equal to one if an IPO is listed in the SHSE. In general, IPO firms listed in the SHSE are large and belong to the traditional industries, while IPO firms listed in the SZSE are small and belong to the emerging industries. Thus, I predict a negative sign on the EX variable.

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[35] Kao, Wu and Yang (2007) document a negative relationship between IPO underpricing and the leverage. They explain that the market discounts stocks of high leverage, because investors won't want to pay a high price when IPOs of high leverage are listed.

[36] Ritter (1984), Ritter (1991) and Su (2004) find that IPO underpricing is more when market return is high.

[37] Carter, Dark and Singh (1998) find a negative association between underwriter reputation and IPO underpricing.

The PE ratio variable has been examined in the IPO valuation literature (Firth, 1997; Firth, 1998; Chen, Firth and Kim, 2004; Chan, Wang and Wei, 2004). While Chen, Firth and Kim (2004) and Chan, Wang and Wei (2004) compare an IPO's PE ratio with the market average PE ratio in the Chinese stock market, none considers difference in PE ratio in different industries. My measurement is defined as an IPO's PE ratio minus the median PE ratio of all the listed firms in the same industry as the IPO on the IPO offering day. When the IPO PE ratio is much lower than the industry median, investors have more incentive to purchase the IPO shares at the time of the listing. Thus, the closing price at the first trading day will be high and there will be more underpricing. As a result, I expect a negative sign on the RELPE variable.

My interested variable in the underpricing regression is ROA*EVENT, which is the interaction term between ROA and the time dummy variable EVENT. The sign on this interaction term is predicted by my third hypothesis $H_{2b}$, which states that the association between IPO underpricing and ROA is more negative after the adoption of the new accounting regulation due to higher earnings quality. Because the interaction term catches the incremental effect of the new accounting regulation, I expect a negative sign on the ROA*EVENT variable.

As a summary, the expected signs of the explanatory variables in the underpricing regression are shown in appendix 2.

(Insert Appendix 2 here)

**4.5 Sample and descriptive statistics**

4.5.1 Sample

My sample starts from 1996 and ends in 2004. I choose this period for the following reasons. First, *Accounting Regulation for Experimental Listed Companies* (1992 regulation) was promulgated in May 1992. The majority of the firms adopted this version of regulation in 1993. It means that IPOs issued in 1994 and afterwards provided previous year financial information based on the 1992 regulation in their prospectus. However, since there are not enough data before 1996 for the variables in my regressions, I have to start my sample period in January 1996. Second, China began to adopt book-building pricing method from January 2005. As a result, my sample ends at December 2004. After excluding those IPOs in the industry of banking and finance, there are totally 1062 A-share IPOs listed between 1996 and 2004 in the Chinese stock market. Among them, 646 IPOs are listed in the ShangHai Stock Exchange (SHSE), and 416 IPOs are listed in the ShenZhen Stock Exchange (SZSE).

My data come from the CSMAR (China Stock Market and Accounting Research) and the TEJ (Taiwan Economic Journal) databases. I gather data regarding the share offering information such as IPO offering price, number of shares offered and ownership structure from the CSMAR database, while the data regarding the financial information of the IPO firm, such as operating income, net income and total asset, are collected from the TEJ database. I delete firms with: (1) insufficient

information to calculate underpricing as defined above and (2) insufficient

information to measure the independent variables as defined above. After the above

adjustment, there are 948 sample observations in the offering price regression, where

missing observations in this regression mainly come from the CPA dummy variable

and the UW dummy variable. On the other hand, the final sample of the underpricing

regression consists of 908 observations. There are less observations in the

underpricing regression than in the offering price regression because the missing

observations of the LAG variable and the RELPE variable further reduce the number

of observations used in the underpricing regression due to missing data about the IPO

offering date.[38]

4.5.2 Descriptive statistics

Table 2 shows the distribution of all the A-share IPOs listed from 1996 to

2004 by listing year and by industry after excluding the industry of banking and

finance. Altogether three are 1062 IPOs issued during that period. The distribution is

found to be not uniform. IPOs listed in 1996 and 1997 are 203 and 206 respectively.

Compared with the earlier years, quite a small number of IPOs are offered in the later

part of my investigation period. Among the five industries, the largest number of IPOs

belongs to the manufacturing, mining and smelting industry and there are 698 IPO

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[38] The LAG variable cannot be measured if the offering date is unavailable, because LAG is time between the offering date and the listing date. The stock prices of the listed firms in the same industry as IPOs at the offering date cannot be found if the offering date is unavailable. The PE ratios for such listed firms cannot be measured. Consequently, the RELPE variable cannot be measured since RELPE is the difference between IPO PE ratio and the industry median PE ratio. Similarly, market index at the offering date cannot be found if the offering date is unavailable. As a result, IPO underpricing cannot be measured since the market index return from the offering date to the listing date cannot be measured.

firms belonging to this industry.

Table 2 also reports the distributions of sample firms used in the offering price regression and in the underpricing regression, respectively. The distributions are also shown by listing year and by industry. The sample used in the offering price regression is composed of 948 IPOs, while 908 IPOs are employed in the underpricing regression. Although there are some missing observations in both samples, the distributions are similar to that of the overall IPO sample. For example, similar to the overall sample, the largest numbers of IPOs used in the regressions are listed in 1996 and 1997. Moreover, the industry of manufacturing, mining and smelting has the largest number of IPOs among the five industries, too.

(Insert Table 2 here)

Table 3 shows the descriptive statistics of the variables used in the offering price regression. OFP is the offering price per share, and has a mean (median) of 6.84 (6.28) with standard deviation of 3.15. The relative high standard deviation indicates a large dispersed offering price. EPS is measured as net income per share. It has a mean (median) of 0.41 (0.36) with standard deviation of 0.23 and ranges from 0.04 to 3.55. It seems that the distribution of EPS is highly dispersed. On the other hand, combining the State Ownership variable and the Legal Ownership variables together,

they account for 63 percentages of all the outstanding shares on average. It means that

state and legal entity are the main shareholders of the IPO firms. The average and the

median for the variable of Foreign Ownership Dummy are 0.02 and 0.00, respectively.

It indicates that a small percentage of IPOs have previously or simultaneously issued

B shares. The variables of Underwriter Dummy and CPA Dummy have means

(medians) of 0.36 (0.00) and 0.08 (0.00), respectively. It implies that 36 percentages

and 8 percentages of IPOs employ top underwriters and top auditors. The average and

the median for the Leverage variable are 0.51 and 0.54, with the maximum equal to

0.90. Since I measure the Leverage variable as total liability divided by total assets,

the average value of 0.51 of the Leverage variable suggests that total liability in

general accounts for about one half of the total asset.

(Insert Table 3 here)

Table 4 presents the descriptive statistics of the variables used in the

underpricing regression. IPO underpricing is defined as price change from IPO

offering price to the closing price on the first trading day, adjusted by corresponding

exchange index change in the same period. The descriptive statistics shows that the

mean (median) value of underpricing is 1.22 (1.09), with a minimum of -0.29 and a

maximum of 8.20. ROA is measured as net income divided by total asset. It has a

mean (median) of 0.10 (0.09) with standard deviation of 0.05. The figures of other variables used in the underpricing regression such as the Legal Ownership variable, the Foreign Ownership Dummy variable, the Underwriter Dummy variable, the CPA Dummy variable and the Leverage variable, are similar to those used in the offering price regression. The Prior Market Return variable has a mean (median) of 0.02 (0.01). It implies that firms generally issue IPOs in a relative hot market condition. The variable of IPO PE Minus Industry Median PE has a mean (median) of -22.97 (-22.81). It indicates that on average, IPO PE ratio is much less than industry median PE ratio on the IPO offering day. Such difference boosts the initial return when IPOs are listed.

(Insert Table 4 here)

Table 5 presents the Pearson correlation coefficients among the explanatory variables used in the offering price regression. The relationship between EPS and GOV is -0.06 and statistically significant at the 10% level, while the correlation between EPS and LEGAL is positively insignificant. It means that government has a negative impact on an IPO firm's earnings, while legal entities cannot help the IPO firm to enhance the earnings. There is a significantly positive relationship between EPS and OIPS at the 1% level with their correlation equals 0.67. Since OIPS is

operating income per share and EPS is net income per share, it indicates that EPS can

be increased by improving operating activities. The correlation between GOV and

LEGAL is -0.92 and statistically significant at the 1% level. It means that state

ownership and legal ownership is substituted. The relationships between FOR and

UW, FOR and CPA are 0.07 and 0.08, respectively. Both of them are significant at the

5% and 1% levels, respectively. It indicates that IPOs with foreign ownership tend to

employ reputable underwriters and auditors. In general, the relationships among the

explanatory variables are not large.

(Insert Table 5 here)

Table 6 reports the Pearson correlation coefficients among the explanatory

variables used in the underpricing regression. The relationship between ROA and

GOV is -0.10 and statistically significant at the 1% level, while the association

between ROA and LEGAL is 0.14 and statistically significant at the 1% level. It

means that government and legal entities play a different role in the IPO firm. Legal

entities can improve earnings, but government won't benefit the IPO firm. The

relationships between ROA and UW, ROA and CPA are 0.06 and 0.14, positively

significant at the 5% and 1% levels, respectively. It seems that underwriters with

better reputation and auditors with high rankings are inclined to choose good IPOs as

their clients. The association between ROA and OIOA is 0.69, positively significant at the 1% level, which is similar to the results presented above. In general, the correlations among the explanatory variables are not large.

(Insert Table 6 here)

## 4.6 Empirical results

4.6.1 Regression results for hypothesis 1

I estimate the offering price regression by the OLS method. Table 7 shows the empirical results. EPS has a positive sign, with the coefficient equal to 3.94, which is significant at the 1% level (t-statistics=9.86). It means that increase by one dollar of net income per share leads to 3.94 dollar increase in the offering price per share. The variable of State Ownership has a coefficient of -2.98 and statistically significant at the 10% level (t-statistics=-1.74). It indicates that higher state ownership reduces the offering price. The coefficient of the Legal Ownership variable is -1.02. However, it is not statistically significant. It is conceivable that the state has less incentive to monitor managers relative to legal entity, resulting in a lower offering price.

The coefficient of the Foreign Ownership Dummy variable is 2.12 and statistically significant at the 1% level (t-statistics=3.75). It means that the presence of foreign ownership adds value to IPOs and leads to a higher offering price. The

variables of Underwriter Dummy and CPA Dummy are 0.04 and 0.21, respectively. However, they are both statistically insignificant. It means that top underwriters and top auditors cannot add value to IPOs. There is no statistically significant difference between top underwriters and no-top underwrites, or between top auditors and non-top auditors in determining the IPO offering price. In addition, my result shows a significantly negative coefficient on the variable of Aftermarket Stock Return Standard Deviation at the 1% level (t-statistics=-5.10). The figure is -35.04. It indicates that higher stock return volatility decreases the offering price. In other words, investors need more compensation for bearing higher uncertainty and risk.

The most interested variable in the offering price regression is the interaction term between the EPS and the EVENT dummy variable, which is denoted as EPS*EVENT in my offering price regression model. In the above section I have given prediction of the sign on this variable according to my first hypothesis. $H_1$ indicates that the relationship between past earnings and IPO offering price is higher under the new accounting regulation. From table 7, the coefficient on EPS*EVENT is positively significant at the 1% level (t-statistics=10.90) with the value of the estimated coefficient equals to 4.33. Therefore, there is a support for my hypothesis 1. Furthermore, table 7 also shows that the association between EPS and the offering price equals to 8.27, the sum of 3.94 and 4.33, after the adoption of the new accounting regulation. The coefficient after the adoption is very much higher than that before the adoption.[39]

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[39] Investors may use the assets approach to supplement the earnings approach for IPO valuation. To see whether the assets approach helps to explain IPO valuation, I have also

From January 1, 1996 to February 11, 1999, the pricing regulation stipulated

that the IPO offering price be given by the product of earnings per share (EPS) and a

price-to-earnings (PE) cap specified by CSRC. In the hypothesis development section,

I have provided the argument that my equation 5 is still effective in valuing offering

price even during the period from January 1, 1996 to February 11, 1999. In order to

segregate the change of the association between the offering price and past earnings

due to accounting standard change from that due to PE cap release, I estimate the

offering price regression with the subsample between 1999 and 2004 to eliminate the

effect of the PE cap release.

The right hand side column of table 7 presents the empirical results for the

1999-2004 subperiod in which there is the release of the PE cap regulation. Prior

literature has documented the effects of the PE ratio cap in the Chinese stock market

(Zhou, 2006; Kao, Wu and Yang, 2009). In order to eliminate the effect of PE ratio

cap, I use the subsample from 1999 to 2004. The coefficient on EPS*EVENT for the

subsample is 3.88. The figure is positively significant at the l% level (t-

statistics=4.32). My empirical results for the 1999-2004 subperiod indicates that the

association between EPS and the offering price is equal to 7.76, the sum of 3.88 and

3.88, after the adoption of the new accounting regulation. The effect of EPS on

offering price after the adoption of the new accounting regulation is again higher than

included both the EPS and BVPS variables (i.e., EPS, EPS*EVENT, BVPS, and
BVPS*EVENT) in an alternative model of the offering price regression. Under this
alternative specification, the empirical results still show a statistically significant sign on the
EPS*EVENT variable and this implies that my first hypothesis still remains valid.
Furthermore, the coefficients on both BVPS and BVPS*EVENT variables are not statistically
significant. It indicates that Chinese investors pay more attention to earnings rather than
assets when valuating the IPOs.

that before the adoption. The new accounting regulation indeed enhances the earnings quality and leads to a higher association between IPO offering price and past earnings even after I have controlled for the PE ratio cap release. The empirical findings are similar for other variables in both the whole period and subperiod.

(Insert Table 7 here)

4.6.2 Regression results for hypothesis 2

I use the OLS method to estimate the underpricing regression. It should be noticed that prior literature shows that there are certain characteristics about the IPO volume. In some periods when there is high market sentiment, volume of IPOs is relatively high. But in other period of low market sentiment, the volume of IPOs is low. Because IPO observations are not independent from each other but correlate within a particular time period, we face the time clustering problem when running the OLS regressions. When the regression residuals suffer from the time clustering problem, the OLS standard errors will be inappropriate and the t statistic will be unreliable. The standard errors are needed to be adjusted to take into account the time clustering property. Therefore, in the underpricing regression I report the Rogers standard errors which are the White (1980) standard errors after accounting for the possible correlations within the same month of IPOs. When running the regression, I

place those IPOs offered during the same month into one time clustering period. For example, if an IPO was offered in January 1, 2000 and another IPO was offered in January 20, 2000, they will belong to the same time clustering period.

Table 8 presents the empirical results with the t statistics based on the Rogers standard errors. The coefficient on the ROA variable is -1.65. It is negative and statistically significant at the 5% level (t-statistics=-2.62). This implies that higher ROA results in less underpricing. Therefore, my hypothesis $H_{2a}$ holds. The variables of State Ownership and Legal Ownership have coefficients of 0.77 and 0.70, respectively. However, both of them are statistically insignificant.[40] It means that state ownership and legal ownership don't necessarily underprice IPOs. There are a significantly negative sign on the variables of State Ownership Square and an insignificant sign on the Legal Ownership Square. It implies the existence of non-linear relationship between state ownership and IPO underpricing.

The variable of the Foreign Ownership Dummy has a coefficient of -0.31, negatively significant at the 5% level (t-statistics=-2.21), which means the two sets of accounting information can reduce information asymmetry and leads to less underpricing. The variables of the Underwriter Dummy and the CPA Dummy have negative coefficients of -0.04 and -0.03, respectively. However, both of them are not statistically significant. There is a significantly negative coefficient on the Leverage variable at the 1% level (t-statistics=-4.15). The figure is equal to -1.02. It indicates that more debt leads to less underpricing. This empirical result is consistent with that

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[40] The impact of state and legal ownership on the IPO underpricing in the prior literature is mixed. The mixed results depend on the incentives and abilities of state and legal entity. For example, the government has two faces. One is the 'grabbing hand'. The other is the 'helping hand'.

from Kao, Wu and Yang (2009). Prior literature uses leverage as a proxy for ex ante uncertainty (Su 2004) or for risk (Chen, Firth and Kim, 2004). But the coefficients on the leverage in their papers are insignificantly positive. My empirical result shows that investors don't want to pay a high price when IPOs of high leverage are listed, which leads to less underpricing. The coefficient on the STDR variable is 10.84. The figure is expected since higher stock return volatility, which is a proxy for risk, leads to more underpricing. The sign on the variable of Prior Market Return is significantly positive at the 1% level (t-statistics=3.42) and the figure is 0.98. It indicates that the market return before the IPO is listed, which is a proxy for market sentiment, has a positive impact on IPO underpricing. Therefore, optimistic market sentiment pushes up market price at the first trading day and leads to more underpricing, while pessimistic market sentiment depresses underpricing.

The variable of IPO PE Minus Industry Median PE has a coefficient of -0.02. The figure is negatively significant at the 1% level (t-statistics=-4.24). It implies a lower IPO PE ratio leads to more underpricing. Although the sign on the variable of Time Lag is positive, it is statistically insignificant. This is reasonable since the average of this variable is around 30 days. Prior literature finds a statistically significant estimate of this variable because the sample period used in their papers include the years before 1994 when there is large time lag between the offering day and the listing day. However, my sample period is just from year 1996 to year 2004.[41]

The interested variable in the underpricing regression is the interaction term

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[41] Yu and Tse (2006) also find an insignificant coefficient on time lag, using IPOs in China from.November 1995 to December 1998. The starting year of theirs is similar with mine.

between ROA and the EVENT dummy variable. It is denoted as ROA*EVENT in my

underpricing regression. I expect the sign on this variable to be negative according to

my third hypothesis. According to my $H_{2b}$, the association between IPO underpricing

and ROA is more negative after the adoption of the new accounting regulation. Indeed,

the coefficient on ROA*EVENT in table 8 is found to be negative and statistically

significant at the 5% level (t-statistics=-2.44). The figure is -1.68. The empirical result

is consistent with $H_{2b.}$ It indicates that the association between underpricing and ROA

is equal to -3.33, the sum of -1.65 and -1.68, after the adoption of the new accounting

regulation. Therefore, the association between IPO underpricing and ROA is more

negative after the adoption of the new accounting regulation.


(Insert Table 8 here)


**4.7 Robustness tests**

4.7.1 Robustness tests in the offering price regression

I have conducted several robustness tests to check whether my empirical

results are robust enough. First, I control for earnings management (EM). It is noticed

that EM has been studied in the IPO literature (Aharony, Lee and Wong, 2000; Teoh,

Welch and Tong, 1998).

In the robustness test, I use operating income as an alternative proxy for

accounting performance. Compared with net income, operating income reflects more about the firm's operating conditions and is less likely to be manipulated. Besides, it is believed that related party transactions (RPTs) are often used to deliberately enhance non-core income in the Chinese IPO firms. Because operating income doesn't incorporate non-core business, it excludes the effect of earnings management to some extent. In this sense, operating income is less manipulated and is a better measurement of business performance than net income.

Table 9 shows the result using operating income per share (OIPS) as the measurement for earnings. Similar to the case of net income, I use the interaction between OIPS and the EVENT dummy variable (denoted as OIPS*EVENT) to capture the incremental effect of the new accounting regulation. The coefficient on this interaction is 4.34. The figure is positive and statistically significant at the 1% level (t-statistics=11.35). Therefore, my hypothesis 1 still holds for the alternative measurement of earnings. For the other control variables, the empirical results are basically similar as before.

It is also interested to discuss the coefficient estimate of the OIPS variable in table 9. The association between operating income per share and the offering price before the adoption of the new accounting regulation is equal to 2.27, while that between net income per share and the offering price in the same period is larger and equal to 3.94 (table 7). A similar result happens after the adoption of the new accounting regulation (6.61 VS 8.27). It means that the underwriter places large weight on net income rather than on operating income. Besides, the adjusted R square

for the offering price regression using operating income per share is 33.39%, while

that using net income per share is 38.77%. It means that net income explains the

offering price more than operating income.

(Insert Table 9 here)

My second robustness test is to estimate the offering price regression using the

stochastic frontier estimation method (SFE) instead of the OLS method. As first

pointed out by Hunt-McCool, Koh and Francis (1996), SFE is better for studying IPO

pricing than the OLS method. SFE assumes that there is a pricing frontier so that the

observed offering price may fall below the maximum potential price due to a random

error as well as a systematic one-sided error used to account for pricing inefficiency.

OLS estimation is inappropriate under this context as the one-sided error component

will be incorporated into the intercept term and become unidentifiable. Under the

stochastic frontier maximum likelihood estimation, the systematic one-sided error will

appear in the form of skewness in the residuals and can be identified separately.

I can use a formula to explain SFE method: $y_i = x_i\beta + v_i - u_i$, where $y_i$ is

output, $x_i$ is input, $\beta$ is parameter, $v_i$ is random variable, and $u_i$ is non-negative random

variable to account for inefficiency. In the offering price model, $y_i$ can be seen as the

offering price, $x_i$ seen as "pricing factors", and $u_i$ considered as misvaluation factors.

Consequently, it implies the closer the actual offering price relative to the estimated efficient price, the higher the pricing efficiency.[42]

Table 10 shows the estimation results of the offering price regression using the stochastic frontier estimation method. The estimated coefficients on the interaction between EPS and the EVENT dummy variable during the 1996-2004 whole period and the 1999-2004 sub-period are 4.33 and 3.88, respectively. The figures are positive and statistically significant both at the 1% level (t-statistics=11.85 and 5.56, respectively). Therefore, there is still a support for my hypothesis 1 under the stochastic frontier estimation method.

(Insert Table 10 here)

4.7.2 Robustness tests in the underpricing regression

In the robustness tests of the underpricing regression, I first check whether my empirical results would be affected if the ROA variable is adjusted by industry median, where the adjusted ROA is measured as the ROA for firm i minus the median ROA of the industry which the firm i belongs to. Table 8 shows the findings. The coefficients on ROA and ROA*EVENT are -1.50 and -2.83, respectively. They are negatively significant at the 5% and 1% levels (t-statistics=-2.24 and -3.31,

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[42] More details about SFE method are referred to Chan, Wu and Kwok (2007) and Koop and Li (2001).

respectively). As a result, my second and third hypotheses $H_{2a}$ and $H_{2b}$ are still held with an industry median-adjusted ROA. For the other control variables, my empirical results are basically similar as before.

Second, I use operating income scaled by total asset (denoted as OIOA) as an alternative proxy for profitability. As argued above, operating income is less likely to be manipulated. Table 9 reports the empirical result. The coefficient on OIOA is -1.10, which is negative and statistically significant at the 5% level (t-statistics=-2.09). The interaction between operating income scaled by total asset and the EVENT dummy variable (denoted as OIOA*EVENT) has an estimated coefficient of -0.80. However, this interaction term is not statistically significant. Therefore, my second hypothesis $H_{2a}$ holds while my third hypothesis $H_{2b}$ does not hold. For the other control variables, the empirical results are basically similar as before.

## 4.8 Summary about chapter 4

In this chapter, I study the effects of accounting standard change on IPO offering price and IPO underpricing. Based on the comparison between the new accounting regulation and the old one, I find that accounting information under the new accounting regulation is of higher earnings quality and is more credible than that under the old one. As a result, IPO firms should be able to command a higher offering price under the new accounting regulation. Hereby I have my first hypothesis that the association between IPO offering price and past earnings per share is higher under the new accounting regulation.

Because the new accounting regulation is of higher earnings quality than the old one, accounting standard can be a proxy for information asymmetry. In other words, information asymmetry is less under the new accounting regulation than that under the old one. I use the relationship between IPO underpricing and ROA to operationalize the effects of accounting regulation on IPO underpricing. Higher ROA helps an IPO firm to require a higher offering price and also pushes up the closing price on the first trading day because investors consider it as a favorable condition. However, the difference between offering price and the closing price on the first trading day is not directly related to ROA. Consequently, my second hypothesis is that IPO underpricing is negatively related to ROA because IPO underpricing is calculated as the difference between the closing price on the first trading day and IPO offering price, divided by IPO offering price. Since information asymmetry is less under the new accounting regulation, there is a stronger relationship between IPO offering price and ROA under the new accounting regulation. Thus, my third hypothesis is that there is a stronger relationship between IPO underpricing and ROA under the new accounting regulation.

Using a sample of Chinese IPOs listed from 1996 to 2004 and using the OLS estimation method, I find a more positive relationship between IPO offering price and past earnings per share. In the robustness tests, I use operating income per share, adopt the method of stochastic frontier estimation and use the subperiod from 1999 to 2004 when China released the cap on PE ratio in setting IPO offering price, and find consistent results. My first hypothesis holds under all the robustness tests.

Using Chinese IPOs listed from 1996 to 2004 and the method of OLS adjusted by the Rogers standard errors, I find a negative relationship between IPO underpricing and ROA, where ROA is defined as net income divided by total assets. Moreover, the association between IPO underpricing and ROA is more negative under the new accounting regulation. In the robustness tests, I use operating income on asset (OIOA) as a proxy for profitability. I also find a negative relationship between IPO underpricing and OIOA under the robustness test. However, the robustness test shows that the association between IPO underpricing and OIOA is not more negative under the new accounting regulation. Consequently, my second hypothesis holds for alternative measurement of profitability while my third hypothesis doesn't.

**CHAPTER FIVE**

**Accounting standard change and IPO long-term performance in the Chinese market**

**5.1 Introduction**

Prior literature has recognized the relationship between stock price performance and accounting information.[43] For example, Dechow (1994) compares the relationship between earnings and stock return with that between cash flow and stock return in the U.S. market. Collins, Maydew and Weiss (1997) investigate value relevance of earnings and book values over time, using U.S. data.[44] Chen, Firth and Kim (2000) conduct a research about the association between IPO long-term stock performance and earnings growth in the Chinese market. Chen and Wang (2004) examine the value relevance of operating income and net income in the Chinese market. Chan, Wang and Wei (2004) also study the relationship between IPO long-term stock performance and accounting performance, using Chinese data.

Earnings quality matters when accounting information is incorporated into stock price performance. For instance, Teoh and Wong (1993) find that the earnings response coefficient (ERC) is higher for Big Eight audited firms than non-Big Eight clients, where ERC is defined as the coefficient of abnormal stock return on unexpected earnings or earnings surprise. Ashbaugh and Pincus (2001) find that greater differences in accounting standards relative to IAS are positively related to

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[43] More details about the capital market research in accounting are referred to Kothari (2001).
[44] More details about the research on value relevance are referred to Barth, Beaver and Landsman (2001).

analyst's forecast error before the adoption of IAS. Moreover, they document that analyst forecast accuracy improves after the adoption of IAS. Hope (2003) shows strong enforcement leads to higher forecast accuracy. Eaton, Nofsinger and Weaver (2007) find that increased disclosure through accounting standards is beneficial to investors, indicating better accounting standards can reduce the cost of equity.

Earnings quality can be improved due to change in accounting standard. For example, Aharony and Barniv (2008) show the evidence of higher value relevance after the adoption of the IFRS because the IFRS provides higher earnings quality than domestic GAAP. Barth, Landsman and Lang (2008) find that firms applying IAS from 21 countries generally have less earnings management, more timely loss recognition, and more value relevance of accounting amounts than do matched sample firms applying non-U.S. domestic standards.

Earnings quality change due to accounting standard change can also affect the long-term stock performance. In previous chapters of this thesis I have indicated that earnings quality improves after the adoption of the 1998 accounting regulation. Consequently, one unit of earnings change under the 1998 accounting regulation contains more information and is more credible than that under the 1992 accounting regulation. Thus, it is reasonable to expect that the association between long-term stock return and earnings change is larger under the 1998 accounting regulation.

In this chapter, I document a more positive coefficient of IPO long-term abnormal stock return on net income change after the adoption of the 1998 accounting regulation, where abnormal stock return is measured by cumulative abnormal return

(CAR). My results are based on comparing the samples of Chinese A-share IPOs offered between 1996 and 1997 and that offered between 2000 and 2003 for a 2-year holding period, as well as comparing the samples of IPOs offered in 1996 and that offered between 2000 and 2002 for a 3-year holding period. In addition, I also conduct robustness tests to examine whether the more positive relationship between long-term stock return and earnings change under the 1998 accounting standard still holds for alternative measurement of earnings. Using operating income change as another measurement for earnings change, I arrive at similar results.

## 5.2 Hypothesis development

My aim is to investigate the effect of accounting standard change on the relationship between stock return and earnings change. To be specific, I examine whether the new accounting regulation improves such a relationship. Following Kothari (2001), I start with the linear regression relating stock return and earnings change:

$$R = \alpha + \beta * \Delta E + \varepsilon \tag{17}$$

where R is the stock return, $\Delta E$ is the earnings change, $\alpha$ is the intercept, $\beta$ is the slope coefficient, and $\varepsilon$ is the disturbance error. The slope coefficient $\beta$ can be expressed as:

$$\beta = \frac{Cov(R, \Delta E)}{Var(\Delta E)} \tag{18}$$

This slope coefficient is determined by two factors. One is the covariance between the stock return and the earnings change, and the other is the variance of the earnings change. Since we can only observe the noisy estimate of earnings change, its true value is unobservable. I suppose the true value of $\Delta E$ is $\Delta \tilde{E}$. Thus, I have the following equation:

$$\Delta E = \Delta \tilde{E} + \eta \tag{19}$$

where $\eta$ is the disturbance error. After combining equations 18 and 19 together, I have the following equation:

$$\beta = \frac{\text{Cov}(R, \Delta \tilde{E} + \eta)}{\text{Var}(\Delta \tilde{E} + \eta)} \tag{20}$$

I assume $\Delta \tilde{E} \sim N(\mu_E, \sigma_E^2)$ $\eta \sim N(0, \sigma_\eta^2)$ $R \sim N(\mu_R, \sigma_R^2)$. In other words, the above random variables are subject to the normal distributions. Furthermore, I assume that $\Delta \tilde{E}$ and $\eta$ are uncorrelated, and R and $\eta$ are uncorrelated. As a result, we have:

$$\begin{aligned}&\text{Var}(\Delta \tilde{E} + \eta) \\ &= \text{Var}(\Delta \tilde{E}) + 2 * \text{Cov}(\Delta \tilde{E}, \eta) + \text{Var}(\eta) = \text{Var}(\Delta \tilde{E}) + \text{Var}(\eta)\end{aligned} \tag{21}$$

$$\begin{aligned}
\text{Cov}(R, \Delta\tilde{E} + \eta) &= \text{Cov}(R, \Delta\tilde{E}) + \text{Cov}(R, \eta) \\
&= \text{Cov}(R, \Delta\tilde{E})
\end{aligned} \tag{22}$$

Therefore,

$$\beta = \frac{\text{Cov}(R, \Delta\tilde{E})}{\text{Var}(\Delta\tilde{E}) + \text{Var}(\eta)} \tag{23}$$

As discussed in chapter three above, the new accounting regulation is of higher earnings quality than the old one. Because there is better earnings quality, $\text{Var}(\eta)$ is smaller after the accounting standard change. Besides, Teoh and Wong (1993) argue that investors' response to an earnings surprise will depend on the perceived credibility of the earnings report. Their findings show that the ERC of Big Eight clients is statistical significantly higher than for non Big Eight clients. This is due to Big Eight's higher auditor quality, and a high-quality auditor is able to provide more credible earnings reports. Therefore, it is reasonable that earnings of higher quality are more credible than that of lower quality. Consequently, I conclude that the magnitude of the slope coefficient, $\beta$, is larger after the adoption of the new accounting regulation. I hereby reach the fourth hypothesis:

*$H_3$: the relationship between stock return and earnings change in the long run is larger under the new accounting regulation.*

## 5.3 Methodology

### 5.3.1 Model specifications

I employ the following regression model to test the relationship between the stock return and change of earnings in the long run, after controlling for variables used in the prior literature.

**Long-term stock return performance (STRN) regression:**

$$STRN = \eta_0 + \eta_1 CHGNI + \eta_2 CHGNI*EVENT + \eta_3 FDR +$$

$$\eta_4 GOV + \eta_5 LEGAL + \eta_6 FOR + \eta_7 GOVSQ + \eta_8 LEGALSQ +$$

$$\eta_9 EX + \Sigma\mu_i IND \qquad (24)$$

### 5.3.2 Variable measurements

STRN is IPO long-term stock return from the second trading day up to a 2-year or 3-year holding period, adjusted by the return of a matched firm controlling for both the book to market ratio and size effects during the same period.[45]

The procedure for selecting the matched firm comes from Ritter (1991). Each IPO firm is matched with a firm that has been listed for at least 2 years[46] and book value for the issuing firm also includes the issuing proceeds. To control for both size[47]

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[45] I do not use the market index as the benchmark, because Barber and Lyon (1997) indicate that in the long run, the test statistic of abnormal return using reference portfolio, such as the market index, is negatively biased. However, using matched firms can eliminate that problem.

[46] My criterion that matched firms are listed for at least 2 years is same as Chan, Wang and Wei (2004) due to short history of stock market, while Ritter (1991) and Loughran and Ritter (1995) require the matched firms are listed for at least 3 years and 5 years, respectively.

[47] Size is defined as market value, which is equal to market price times total outstanding shares. If

and B/M effects, a non-IPO firm in the previous 2 years is chosen such that the product of size difference and book to market ratio (B/M) difference at the end of the issuing calendar month is the minimal. Since there are two types of shares for every listed company in China: tradable and non-tradable, I compute the market value by the number of total outstanding shares multiplied by the stock price at the end of the issuing month.[48]

Instead of using the calendar month, I follow Ritter (1991) and assume that there are 21 trading days in one month. Therefore, the first month spans from the second trading day until the 22<sup>nd</sup> trading day, the second month consists of 21 days from the 23<sup>rd</sup> trading day through the 43<sup>rd</sup> trading day and so on.

I have two measurements for the long-term abnormal stock return. The first is cumulative abnormal return (CAR), which is defined as follows:

$$CAR_i = \sum_{t=1}^{T} r_{it} - \sum_{t=1}^{T} r_{mt} \tag{25}$$

The other measurement for the long-term abnormal stock return is buy-and-hold abnormal return (BHAR). BHAR is shown as:

IPOs are not listed at the end of the issuing calendar month, I use the offering price instead of market price.
[48] Chan, Wang and Wei (2004) show similar results when either total outstanding shares or tradable shares are used.

$$BHAR_i = \prod_{t=1}^{T}(1 + r_{it}) - \prod_{t=1}^{T}(1 + r_{mt}) \qquad (26)$$

In equations 25 and 26, $r_{it}$ is the IPO stock return in each month composed of

21 trading days, T is 24 months or 36 months, and $r_{mt}$ is the benchmark return in the

same period as above.

CHGNI is 2-year or 3-year change of net income starting from the year prior

to the IPO, divided by the market value on the first trading day.[49] The market value is

calculated by the closing price on the first trading day multiplied by the total

outstanding shares after the IPO. Thus, CHGNI is defined as $(NI_{t+1} - NI_{t-1})/MV$ for the

2-year holding period, and as $(NI_{t+2} - NI_{t-1})/MV$ for the 3-year holding period. $NI_{t-1}$ is

the net income in the year prior to the IPO, $NI_{t+1}$ is the net income one year after the

IPO, $NI_{t+2}$ is the net income 2 years after the IPO, and MV is the market value on the

first trading day. As a robustness test, I also replace CHGNI by CHGOI as the

alternative measurement of earning change. CHGOI is 2-year or 3-year change of

operating income starting from the year prior to the IPO, divided by the market value

on the first trading day. Thus, CHGOI is defined as $(OI_{t+1} - OI_{t-1})/MV$ for the 2-year

holding period, and as $(OI_{t+2} - OI_{t-1})/MV$ for the 3-year holding period. $OI_{t-1}$ is the

operating income in the year prior to the IPO, $OI_{t+1}$ is the operating income one year

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[49] Francis, LaFond, Olsson and Schipper (2004) use the market value at the beginning of the year
as the scale for the earnings change. In my thesis, my dependent variable is scaled by the closing
price on the first trading day. Consequently, I use the market value on the first trading day as the
scale for the earnings change in the 2-year and 3-year holding periods.

after the IPO and $OI_{t+2}$ is the operating income 2 years after the IPO. The definitions of the FDR, FOR, GOV, LEGAL, GOVSQ, LEGALSQ, EX and IND variables are the same as those in Chapter 4.

In the long-term stock performance regression, the most interested variable is to measure the incremental effect of earnings change under the new accounting regulation. I use the interaction between CHGNI and the EVENT dummy variable to account for that effect. The formulation is expressed as CHGNI*EVENT where EVENT is the time dummy variable as defined in Chapter 4. In addition, I also use CHGOI*EVENT as the alternative proxy for earnings change in the robustness test.

## 5.4 Expected signs

First, I consider the expected sign on the underpricing variable (FDR). Ritter (1991) argues that IPO underpricing is negatively related to long-term stock performance, because it is related to the investor's overoptimism. However, his empirical result shows an insignificantly negative relationship between IPO long-term performance and IPO underpricing for U.S. data. Chen, Firth and Kim (2000) also find a negative sign on the variable of underpricing for Chinese IPOs, although the coefficient is not statistically significant. Following the arguments of Ritter (1991), I expect a negative relationship between IPO underpricing and stock performance based on the argument of investor's overoptimism.

Positive change of earnings reflects IPO's accounting performance improvement. As a result, stock price reacts positively to earnings increase. Thus, I

expect a positive sign on the variable of CHGNI and CHGOI.

The empirical results of ownership structure on stock performance are mixed in the Chinese stock market (e.g., Qi, Wu and Zhang, 2000; Wei, Xie and Zhang, 2005; Chen, Firth and Xu, 2009). Consequently, there is not a clear conclusion about the impact of state and legal ownership on the long-term stock price performance.

I expect a positive sign for the foreign ownership dummy variable (FOR). Chinese A-share IPO firms with foreign shares have less information asymmetry due to additional information disclosure because such IPO firms are required to prepare accounting information based on IAS in addition to the domestic accounting standard. Chen, Firth and Kim (2000) also argue that Chinese government in general only permits IPO firms of high quality to issue new shares to foreigners. Thus, I anticipate that the foreign ownership has a positive impact on the stock performance.[50]

The most interested variable in the long-term stock performance regression is CHGNI*EVENT, the interaction between earnings change and the EVENT dummy variable. The expected sign of this variable is predicted with reference to my fourth hypothesis. $H_3$ states that because the new accounting regulation provides higher quality information than the old one, stock price responds stronger to change of net income under the new accounting regulation. Because the interaction term catches the incremental effect of the new accounting regulation, I expect a positive sign on CHGNI*EVENT.

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[50] Wang (2005) finds an insignificant relationship between changes in operating performance around the IPO and the dummy variable of FOR. However, Chen and Firth (1999) document a significantly positive relationship between market valuation and FOR variable. Wei, Xie and Zhang (2005) find that foreign ownership is significantly positively related to Tobin's Q.

As a summary, the expected signs of the explanatory variables in the long-term stock performance regression are shown in appendix 2.

(Insert Appendix 2 here)

**5.5 Sample and descriptive statistics**

5.5.1 Sample

My preliminary sample in the long-term stock performance regression includes IPOs listed from 1996 to 2004. The reasons why I choose this period are given in the previous chapter. After excluding those in the industry of banking and finance, there is a total of 1062 IPOs listed during this period in the Chinese stock market. Among them, 646 IPOs are listed in the ShangHai Stock Exchange (SHSE), and 416 IPOs are listed in the ShenZhen Stock Exchange (SZSE). The data used in the empirical analysis come from the CSMAR (China Stock Market and Accounting Research) database and the TEJ (Taiwan Economic Journal) database.

I delete firms with: (1) insufficient information to calculate the long-term stock performance as defined above; (2) insufficient information to measure the ownership structure and financial information as defined above; (3) IPOs without a matched firm that has been listed for at least 2 years when IPOs are issued. Because I need to compare the coefficients on 2-year and 3-year earnings change before and

after the new accounting regulation in the long-term stock performance regression, the key issue is to ensure that $NI_{t+1}$, $NI_0$ and $NI_{t-1}$ are prepared under the same accounting (new or old) regulation for the 2-year holding period, and that $NI_{t+2}$, $NI_{t+1}$, $NI_0$ and $NI_{t-1}$ are prepared under the same accounting regulation for the 3-year holding period. As a result, in the 2-year holding period, I choose IPOs offered in 1996 and 1997 as the sample under the old accounting regulation, and IPOs offered from 2000 to 2003 as the other sample under the new accounting regulation.[51] Similarly, in the 3-year holding period, I select IPOs issued in 1996 as the sample under the old accounting regulation, and IPOs issued between 2000 and 2002 as the other sample under the new accounting regulation. As a result, the final sample size for the 2-year abnormal stock return regression is 603 observations, while that for the 3-year abnormal stock return regression is 365 observations.

5.5.2 Pattern of long-term abnormal returns and descriptive statistics

Figure 1a shows the long-term stock cumulative return of IPOs listed from 1996 to 2004 and the benchmark stock cumulative return for 3 years starting from the year prior to the IPO. This figure indicates that in general IPOs underperform with respect to the benchmark, where the benchmark is a book-to-market-ratio-and-size-matched firm. Moreover, IPO underperformance becomes more serious as the holding

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[51] $NI_{t+1}$, $NI_0$ and $NI_{t-1}$ are prepared under the same accounting regulation for the 2-year holding period. Moreover, financial information in 2004 is the latest I have. The cutoff IPO year is calculated by the equation of t+1=2004, so that t is equal to 2003. IPOs adopt the new accounting regulation in 1999 and after. The cutoff IPO year under the new accounting regulation is calculated by the equation of t-1=1999, so that t is equal to 2000. Similarly, IPOs adopt the old accounting regulation in 1998 and before. The cutoff IPO year under the old accounting regulation is calculated by the equation of t+1=1998, so that t is equal to 1997. Similar calculation can be applied for the 3-year holding period.

period increases.

Figure 1b compares the 3-year cumulative abnormal return (CAR) between IPOs offered in 1996 and IPOs offered in 2000-2002, where benchmark is a book-to-market-ratio-and-size-matched firm. This figure implies in general IPOs offered in 1996 underperform with respect to those offered in 2000-2002 in the 3-year holding period.

(Insert Figure 1a and Figure 1b here)

Table 11 reports the descriptive statistics of the earnings and stock returns variables used in long-term stock performance regression. IPOs underperform with respect to the benchmark in 2-year and 3-year holding periods regardless of which measurement of long-term abnormal returns is used. For example, the mean (median) of CAR in the 2-year holding period is -9.92% (-10.81%), while the corresponding figure in the 3-year holding period is -16.17% (-16.55%). The mean (median) of BHAR in the 2-year holding period is -10.07% (-5.90%), while the corresponding figure in the 3-year holding period is -18.96% (-10.13%). Moreover, IPO firms' stock performance deteriorates when the holding period is longer. On the other hand, the averages (medians) of CHGNI in the 2-year and 3-year holding periods are 0.84% (0.52%) and 0.95% (0.45%), respectively. The variable of CHGOI has means

(medians) of 0.35% (0.19%) and 0.36% (0.09%) in the 2-year and 3-year holding

periods, respectively. Therefore, it seems that IPO firms' accounting performance do

not have large changes after the listing.

(Insert Table 11 here)

Table 12a and table 12b show the Pearson correlation coefficients among the

explanatory variables used in the long-term stock performance regression under the 2-

year and the 3-year holding periods, respectively. First, the correlation between

change in net income (CHGNI) and GOV is -0.12, negatively significant at the 1%

level under a 2-year holding period, while that between CHGNI and LEGAL is 0.11,

positively significant at the 1% level during the same period. However, both of the

correlations in the 3-year holding period are statistically insignificant. Therefore, it

seems that government and legal entities ownership do not have effects on the IPO

firm's net income under a longer holding period. Second, the associations between

change in operating income (CHGOI) and GOV, CHGOI and LEGAL are statistically

insignificant in the 2-year and 3-year holding periods. It implies that government and

legal entities do not benefit the IPO firm's operating activities. Last, there are

significantly positive relationships between CHGNI and CHGOI both at the 1% level

during the two periods. The figures are 0.72 and 0.73 in the 2-year and 3-year holding

periods, respectively. Such a positive relationship between CHGNI and CHGOI are

expected since both of these two variables measure the performance of the IPO firms.

(Insert Table 12a and Table 12b here)

**5.6 Empirical results**

The long-term stock performance regression model of equation 24 is estimated

using the OLS method with the Rogers standard errors. Table 13 shows the empirical

results of the 2-year and 3-year long-term stock performance regressions. In this table,

I use a B/M-and-size-matched firm as the benchmark. STRN is measured by CAR.

The coefficients on the 2-year and 3-year CHGNI variable are 7.34 and 4.70,

respectively. Both of them are statistically significant at the 1% level (t-statistics=5.91

and 3.26, respectively). This is reasonable since stock price responds positively to

earnings improvement. There are statistically significant and negative signs on the

FDR variable at the 1% and 5% levels during the two periods (t-statistics=-3.44 and -

2.16, respectively). For example, the coefficients for the 2-year and 3-year holding

period regressions are -0.07 and -0.09, respectively. This empirical result is consistent

with the investor's overoptimism argument. The variables of State Ownership and

Legal Ownership are statistically insignificant under both the 2-year and 3-year

holding periods. It means that both state and legal entity ownership have no impact on

the long-term stock performance. The sign on the coefficient of the FOR variable, the Foreign Ownership Dummy, is not statistically significant. It implies that foreign ownership doesn't add value to stock performance. This result is consistent with that of Wang (2005), but contradicts with the results of Chen and Firth (1999) and Wei, Xie and Zhang (2005).

The most interested variable in the long-term stock performance regression is the interaction between CHGNI and the EVENT dummy variable, which is denoted as CHGNI* EVENT. I expect the sign on this variable to be positive according to my fourth hypothesis. $H_3$ predicts that the association between the IPO long-term stock return and earnings change is more positive after the adoption of the new accounting regulation. In table 13, I find the coefficient on CHGNI*EVENT to be positively significant at the 1% level during the two periods (t-statistics=4.25 and 5.38, respectively). The figures are 8.02 and 12.01 for the 2-year and 3-year holding period regressions, respectively.[52] This empirical finding is consistent with $H_3$. Table 13 indicates that the association between long-term stock return and net income change is equal to 15.36, the sum of 7.34 and 8.02, for the 2-year holding period, while that figure is equal to 16.71, the sum of 4.70 and 12.01, for the 3-year holding period, after the adoption of the new accounting regulation. Therefore, the association between the long-term stock return and earnings change is more positive after the adoption of the new accounting regulation.

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[52] The coefficients of change in net income are more positive in the longer run. It is reasonable since earnings change in the short run may include some noisy information, which affects the value relevance of earnings. However, such noisy information will be diminished in the longer run, resulting in a more positive coefficient.

(Insert Table 13 here)

## 5.7 Robustness tests

First, I utilize change in operating income, scaled by the market value on the first trading day, as the measurement for earnings change. Table 14 shows the empirical results, which are similar to that of table 13. For example, the coefficients on CHGOI*EVENT are 7.05 and 9.04 for the 2-year and 3-year holding periods, respectively. Both of them are positive and statistically significant at the 1% level (t-statistics=2.75 and 4.17, respectively). In addition, the relationship between long-term abnormal stock return and operating income change is equal to 13.61, the sum of 6.56 and 7.05, for the 2-year holding period, while that figure is equal to 14.59, the sum of 5.55 and 9.04, for the 3-year holding period, after the adoption of the new accounting regulation.[53] Overall speaking, my fourth hypothesis still holds when earnings are measured by operating income instead of net income.

(Insert Table 14 here)

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[53] The coefficients of change in net income are more positive that those of change in operating income. It seems Chinese A-share investors place more weight on net income, which include less persistent items such as non-operating activities. The findings in the long run are similar with those in the offering price regression in the earlier chapter of this thesis.

Then I use BHAR as the measurement of the long-term stock return performance. Table 15 presents the BHAR regression using the B/M-and-size-matched firm as the benchmark. The coefficients on the CHGNI*EVENT are 1.50 and 4.68 for the 2-year and the 3-year holding periods, respectively. Although both of them are positive, they are statistically insignificant. Therefore, there is no support for $H_3$ when BHAR is used as the measurement for long-term abnormal return.

(Insert Table 15 here)

## 5.8 Summary about chapter 5

In this chapter, I study the effects of accounting standard change on IPOs' long-term stock returns. Specifically, I investigate the impact of accounting standard change on the relationship between IPO long-term stock return and earnings change. Because accounting information is of higher earnings quality under the new accounting regulation, earnings change provides more credible information to the investors. As a result, stock price should react stronger to earnings change of higher quality. Consequently, my hypothesis is that the association between IPO long-term stock return and earnings change is stronger under the new accounting regulation.

I test my hypothesis by studying IPO's long-term stock returns under the 2-year and 3-year holding periods. In conducting the empirical analysis, the key issue is to ensure that each year's reported earnings from the year prior to IPO until one year after the IPO is under the same accounting regulation for the 2-year holding period, and that each year's reported earnings from the year prior to IPO until 2 years after the IPO is under the same accounting regulation for the 3-year holding period. Consequently, I compare the group of IPOs offered in 1996 and 1997 with that offered from 2000 to 2003 for the 2-year holding period, and the group of IPOs offered in 1996 with that offered from 2000 to 2002 for the 3-year holding period. I use CAR adjusted by a B/M-and-size-matched firm as the measurement for IPO long-term abnormal return, and change in net income, divided by market value on the first trading day to proxy for earnings change. By estimating the OLS regression with the Rogers standard errors, I document a more positive relationship between IPO long-term abnormal return and earnings change in both the 2-year and 3-year holding periods. Furthermore, I use another measurement for earnings change, i.e., change in operating income divided by market value on the first trading day, and consistent results. Nevertheless, there is no support for my hypothesis when I use BHAR as the measurement for IPO's long-term abnormal returns.

# CHAPTER SIX

# Conclusion and suggestions for future research

## 6.1 Conclusion

In this thesis, I study the effects of accounting standard change on IPO offering price, IPO underpricing and IPO long-term stock return in the Chinese stock market. By analyzing the difference between the new accounting regulation and the old one, I find that accounting information under the new one is of higher earnings quality and is more credible than that under the old one. It supports Chinese government's reform of accounting standard for more reconciliation with IAS. In addition, because the 1998 accounting regulation is more like a principles' based approach, my empirical results show that a principles' based approach provides better information than a rules' based approach in China.

Due to the improvement of earnings quality, there are reasons to believe that accounting regulation change will have effects on IPO pricing and IPO long-term stock returns. I have developed four testable hypotheses in this thesis. $H_1$ states that the relationship between offering price and past earnings per share is more positive after the adoption of 1998 accounting regulation. $H_{2a}$ posits that there is a negative association between IPO underpricing and ROA, while $H_{2b}$ predicts that the association between IPO underpricing and ROA is more negative after the adoption of the new accounting regulation. $H_3$ argues that the relationship between stock return and earnings change in the long run is larger under the new accounting regulation.

Using a sample of Chinese IPOs listed from 1996 to 2004 and the method of OLS, I find a more positive relationship between IPO offering price and net income per share under the new accounting regulation. In the robustness tests, I try different empirical methodologies such as using operating income per share as the earnings measurement, adopting the stochastic frontier estimation method and estimating the regressions with the sub-sample of IPOs offered between 1999 and 2004. I find similar results under all of the above robustness tests which support my hypothesis.

Using Chinese IPOs listed from 1996 to 2004 and the method of OLS adjusted by the Rogers standard errors, I document a negative relationship between IPO underpricing and ROA measured by net income on asset. In addition, I utilize operating income on asset (OIOA) as another proxy for profitability and arrive at similar results. These results support my second hypothesis $H_{2a}$. Using the same sample as above, I also find a more negative relationship between IPO underpricing and ROA under the new accounting regulation. Therefore, there are supports for my third hypothesis $H_{2b}$.

By comparing IPOs offered in 1996 and 1997 with IPOs offered between 2000 and 2003 under a 2-year holding period, and comparing IPOs offered in 1996 with IPOs offered between 2000 and 2002 under a 3-year holding period, I find a more positive relationship between CAR and change in net income. When I use change in operating income as another measurement for earnings change in the robustness test, I also find a more positive association. As a result, my fourth hypothesis $H_3$ which states that the relationship between long-term stock return and earnings change is

larger under the new accounting regulation is also supported by the data.

Overall speaking, my thesis indicates that accounting standard can serve as a proxy for information asymmetry, thus influencing IPO underpricing. Besides, earnings quality also affects IPO offering price and IPOs' long-term stock return. My empirical results complement previous studies such as Chan, Wang and Wei (2004) by showing that Chinese IPOs' performance not only react to accounting numbers but is also affected by earnings quality.

## 6.2 Suggestions for future research

I can extend my thesis from the following angles. First, I have used value relevance of earnings as a proxy for earnings quality in this thesis. Francis, LaFond, Olsson and Schipper (2004) show seven measures for earnings quality. Except value relevance, the other six are accrual quality, earnings persistence, earnings predictability, earnings smoothness, earnings timeliness and earnings conservatism. I can adopt other measures of earnings quality to examine the effects of changes in accounting regulation.

Furthermore, I can also examine the effect of ownership on the relationship between accounting standard change and IPO pricing as well as IPO long-term stock return. For example, I can examine whether the change of association between IPO offering price and past earnings per share after the adoption of the 1998 accounting regulation is larger or smaller for IPOs with larger state shareholdings. In other words, I can test the combined effects of accounting standard change and ownership structure.

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**Table 1:**

*Descriptive statistics for the comparison of accounting information calculated under the new accounting regulation and the old accounting regulation*

| | | Under the old regulation | Under the new regulation | Differences in means (New − Old) |
|---|---|---|---|---|
| ROA | Mean | 0.119 | 0.109 | -0.010*** |
| | Standard deviation | 0.061 | 0.060 | |
| | Minimum | 0.032 | 0.026 | |
| | Maximum | 0.379 | 0.379 | |
| | Obs | 90 | 90 | |
| EPS | Mean | 0.374 | 0.341 | -0.033*** |
| | Standard deviation | 0.143 | 0.151 | |
| | Minimum | 0.152 | 0.104 | |
| | Maximum | 0.876 | 0.866 | |
| | Obs | 88 | 88 | |
| LEV | Mean | 0.549 | 0.562 | 0.013*** |
| | Standard deviation | 0.123 | 0.122 | |
| | Minimum | 0.168 | 0.238 | |
| | Maximum | 0.698 | 0.754 | |
| | Obs | 92 | 92 | |
| BVPS | Mean | 1.649 | 1.573 | -0.076*** |
| | Standard deviation | 0.705 | 0.686 | |
| | Minimum | 0.777 | 0.772 | |
| | Maximum | 5.948 | 5.793 | |
| | Obs | 88 | 88 | |
| TAPS | Mean | 3.848 | 3.777 | -0.071*** |
| | Standard deviation | 1.702 | 1.672 | |
| | Minimum | 1.620 | 1.620 | |
| | Maximum | 13.096 | 12.942 | |
| | Obs | 88 | 88 | |

This table shows the differences of the same accounting measures under the new and old accounting regulations. When adopting the new accounting regulation, IPO firms are required to prepare the last year's financial information under the new accounting regulation. As a result, I have two sets of accounting information based on the new and the old accounting regulations. The variables are defined in appendix 1. *** denotes statistical significance at the 1% level.

**Table 2:**

*Number of A-share IPOs by exchange, listing year and industry from 1996 to 2004*

| Listing year | Shanghai Stock Exchange (SHSE) | | | Shenzhen Stock Exchange (SZSE) | | | Total | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Whole sample | Sample 1 | Sample 2 | Whole sample | Sample 1 | Sample 2 | Whole sample | Sample 1 | Sample 2 |
| 1996 | 103 | 77 | 73 | 100 | 76 | 66 | 203 | 153 | 139 |
| 1997 | 85 | 75 | 75 | 121 | 111 | 96 | 206 | 186 | 171 |
| 1998 | 53 | 48 | 48 | 53 | 47 | 41 | 106 | 95 | 89 |
| 1999 | 45 | 43 | 43 | 52 | 49 | 48 | 97 | 92 | 91 |
| 2000 | 87 | 86 | 85 | 49 | 46 | 46 | 136 | 132 | 131 |
| 2001 | 78 | 71 | 70 | 1 | 1 | 1 | 79 | 72 | 71 |
| 2002 | 69 | 66 | 65 | 1 | 1 | 1 | 70 | 67 | 66 |
| 2003 | 65 | 56 | 55 | 0 | 0 | 0 | 65 | 56 | 55 |
| 2004 | 61 | 58 | 58 | 39 | 37 | 37 | 100 | 95 | 95 |
| Total | 646 | 580 | 572 | 416 | 368 | 336 | 1062 | 948 | 908 |
| Industry | | | | | | | | | |
| 1 | 49 | 43 | 42 | 22 | 21 | 21 | 71 | 64 | 63 |
| 2 | 13 | 9 | 9 | 3 | 3 | 3 | 16 | 12 | 12 |
| 3 | 152 | 135 | 133 | 59 | 51 | 44 | 211 | 186 | 177 |
| 4 | 399 | 369 | 365 | 299 | 265 | 242 | 698 | 634 | 607 |
| 5 | 33 | 24 | 23 | 33 | 28 | 26 | 66 | 52 | 49 |
| Total | 646 | 580 | 572 | 416 | 368 | 336 | 1062 | 948 | 908 |

Industry code:
1. Transportation and related industry, public facilities, power industry
2. Civil engineering construction and real estate
3. Farming, forestry, food industry, conglomerate, estate development and operation, information industry, and wholesale trade
4. Manufacturing, mining and smelting
5. Retail trade, hotel and tourism

The whole sample includes all IPOs listed from 1996 to 2004, excluding those belonging to the industry of banking and finance.
Sample 1 is the sample used in the offering price regression, while sample 2 is used in the underpricing regression.

**Table 3:**

*Descriptive statistics of variables used in the offering price regression*

| | Mean | Median | Std Dev | Min | Max |
|---|---|---|---|---|---|
| Offering Price (OFP) | 6.84 | 6.28 | 3.15 | 1.00 | 36.68 |
| Earnings Per Share (EPS) | 0.41 | 0.36 | 0.23 | 0.04 | 3.55 |
| Operating Income Per Share (OIPS) | 0.42 | 0.38 | 0.29 | -0.54 | 2.63 |
| State Ownership (GOV) | 0.33 | 0.37 | 0.28 | 0.00 | 0.84 |
| Legal Ownership (LEGAL) | 0.30 | 0.23 | 0.28 | 0.00 | 0.84 |
| State Ownership Square (GOVSQ) | 0.19 | 0.13 | 0.19 | 0.00 | 0.72 |
| Legal Ownership Square (LEGALSQ) | 0.17 | 0.05 | 0.20 | 0.00 | 0.72 |
| Foreign Ownership Dummy (FOR) | 0.02 | 0.00 | 0.15 | 0.00 | 1.00 |
| Underwriter Dummy (UW) | 0.36 | 0.00 | 0.48 | 0.00 | 1.00 |
| CPA Dummy (CPA) | 0.08 | 0.00 | 0.27 | 0.00 | 1.00 |
| Leverage (LEV) | 0.51 | 0.54 | 0.15 | 0.00 | 0.90 |
| Aftermarket Stock Return Standard Deviation (STDR) | 0.03 | 0.03 | 0.01 | 0.01 | 0.13 |
| Firm Age (AGE) | 2.93 | 2.58 | 3.25 | 0.00 | 39.95 |

This table shows the descriptive statistics of the variables used in the offering price regression. The sample consists of IPOs listed between 1996 and 2004. The variables are defined in appendix 1.

**Table 4:**

*Descriptive statistics of variables used in the underpricing regression*

| | Mean | Median | Std Dev | Min | Max |
|---|---|---|---|---|---|
| Underpricing (FDR) | 1.22 | 1.09 | 0.82 | -0.29 | 8.20 |
| Return On Asset (ROA) | 0.10 | 0.09 | 0.05 | 0.01 | 0.45 |
| Operating Income On Asset (OIOA) | 0.10 | 0.09 | 0.06 | -0.07 | 0.47 |
| State Ownership (GOV) | 0.33 | 0.37 | 0.28 | 0.00 | 0.84 |
| Legal Ownership (LEGAL) | 0.30 | 0.22 | 0.28 | 0.00 | 0.84 |
| State Ownership Square (GOVSQ) | 0.19 | 0.13 | 0.19 | 0.00 | 0.72 |
| Legal Ownership Square (LEGALSQ) | 0.17 | 0.05 | 0.20 | 0.00 | 0.72 |
| Foreign Ownership Dummy (FOR) | 0.02 | 0.00 | 0.15 | 0.00 | 1.00 |
| Underwriter Dummy (UW) | 0.36 | 0.00 | 0.48 | 0.00 | 1.00 |
| CPA Dummy (CPA) | 0.08 | 0.00 | 0.28 | 0.00 | 1.00 |
| Leverage (LEV) | 0.51 | 0.54 | 0.15 | 0.00 | 0.90 |
| Aftermarket Stock Return Standard Deviation (STDR) | 0.03 | 0.02 | 0.01 | 0.01 | 0.13 |
| Firm Age (AGE) | 2.96 | 2.66 | 3.14 | 0.00 | 39.95 |
| Prior Market Return (MRTN) | 0.02 | 0.01 | 0.12 | -0.28 | 0.60 |
| PE ratio—IPOs | 19.10 | 17.62 | 10.08 | 2.15 | 155.15 |
| PE ratio—Industry Median | 42.08 | 38.57 | 12.54 | 18.14 | 103.16 |
| IPO PE Minus Industry Median PE (RELPE) | -22.97 | -22.81 | 12.83 | -93.41 | 88.79 |
| Time Lag (LAG) | 1.29 | 1.00 | 0.53 | 1.00 | 5.00 |

This table shows the descriptive statistics of the variables used in the underpricing regression. The sample consists of IPOs listed between 1996 and 2004. The variables are defined in appendix 1.

**Table 5:**

*Pearson correlation coefficients among the explanatory variables used in the offering price regression*

| | EPS | OIPS | GOV | LEGAL | FOR | UW | CPA | LEV | STDR | AGE |
|---|---|---|---|---|---|---|---|---|---|---|
| EPS | 1.00 | | | | | | | | | |
| OIPS | 0.67*** | 1.00 | | | | | | | | |
| GOV | -0.06* | -0.003 | 1.00 | | | | | | | |
| LEGAL | 0.03 | -0.01 | -0.92*** | 1.00 | | | | | | |
| FOR | 0.05 | 0.006 | -0.02 | -0.03 | 1.00 | | | | | |
| UW | 0.04 | 0.02 | 0.03 | -0.02 | 0.07** | 1.00 | | | | |
| CPA | 0.06* | -0.04 | -0.05* | 0.09*** | 0.08*** | 0.12*** | 1.00 | | | |
| LEV | 0.07** | 0.20*** | 0.07** | -0.07** | -0.11*** | 0.01 | -0.03 | 1.00 | | |
| STDR | 0.04 | -0.02 | -0.06** | 0.05 | -0.009 | 0.14*** | 0.10*** | -0.03 | 1.00 | |
| AGE | 0.006 | -0.009 | -0.13*** | 0.03 | 0.02 | -0.09*** | -0.06* | -0.03 | -0.09*** | 1.00 |

*, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. The variables are defined in appendix 1.

**Table 6:**

*Pearson correlation coefficients among the explanatory variables used in the underpricing regression*

| | ROA | OIOA | GOV | LEGAL | FOR | UW | CPA | LEV | STDR | AGE | MRTN | RELPE | LAG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROA | 1.00 | | | | | | | | | | | | |
| OIOA | 0.69*** | 1.00 | | | | | | | | | | | |
| GOV | -0.10*** | -0.04 | 1.00 | | | | | | | | | | |
| LEGAL | 0.14*** | 0.07** | -0.92*** | 1.00 | | | | | | | | | |
| FOR | 0.01 | -0.02 | -0.02 | -0.03 | 1.00 | | | | | | | | |
| UW | 0.06** | 0.06* | 0.02 | -0.009 | 0.08** | 1.00 | | | | | | | |
| CPA | 0.14*** | 0.01 | -0.05* | 0.09*** | 0.08** | 0.12*** | 1.00 | | | | | | |
| LEV | -0.39*** | -0.13*** | 0.05* | -0.05 | -0.12*** | 0.01 | -0.04 | 1.00 | | | | | |
| STDR | 0.08** | 0.007 | -0.06* | 0.04 | -0.005 | 0.15*** | 0.11*** | -0.03 | 1.00 | | | | |
| AGE | -0.20*** | -0.16*** | -0.13*** | 0.03 | 0.02 | -0.08*** | -0.06** | -0.01 | -0.08*** | 1.00 | | | |
| MRTN | -0.04 | -0.04 | 0.02 | -0.003 | 0.02 | 0.09*** | 0.04 | 0.01 | 0.21*** | -0.008 | 1.00 | | |
| RELPE | -0.15*** | -0.10*** | -0.06** | 0.06** | 0.09*** | 0.11*** | 0.09*** | -0.10*** | 0.24*** | -0.01 | 0.14*** | 1.00 | |
| LAG | 0.02 | -0.001 | -0.05 | 0.07** | -0.001 | -0.01 | -0.01 | -0.13*** | -0.10*** | -0.12*** | 0.03 | 0.03 | 1.00 |

*, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. The variables are defined in appendix 1.

**Table 7:**

*OLS results of the offering price regression for the whole period and the sub-period*

$$OFP = \alpha_0 + \alpha_1 EPS + \alpha_2 EPS*EVENT + \alpha_3 GOV + \alpha_4 LEGAL + \alpha_5 FOR + \alpha_6 GOVSQ + \alpha_7 LEGALSQ + \alpha_8 LEV + \alpha_9 STDR + \alpha_{10} AGE + \alpha_{11} UW + \alpha_{12} CPA + \alpha_{13} EX + \Sigma\mu_i IND$$

| | Whole period (1996-2004) | | Sub-period (1999-2004) - PE ratio cap release | |
|---|---|---|---|---|
| | Coefficients | t-statistics | Coefficients | t-statistics |
| Earnings Per Share (EPS) | 3.94*** | 9.86 | 3.88*** | 3.68 |
| EPS*EVENT | 4.33*** | 10.90 | 3.88*** | 4.32 |
| State Ownership (GOV) | -2.98* | -1.74 | -3.28 | -1.25 |
| Legal Ownership (LEGAL) | -1.02 | -0.58 | -1.22 | -0.42 |
| State Ownership Square (GOVSQ) | 1.33 | 0.67 | 0.93 | 0.28 |
| Legal Ownership Square (LEGALSQ) | -0.38 | -0.19 | 0.81 | 0.24 |
| Foreign Ownership Dummy (FOR) | 2.12*** | 3.75 | 7.75*** | 6.35 |
| Underwriter Dummy (UW) | 0.04 | 0.24 | -0.12 | -0.41 |
| CPA Dummy (CPA) | 0.21 | 0.70 | 0.24 | 0.30 |
| Leverage (LEV) | 0.25 | 0.49 | -1.49 | -1.61 |
| Aftermarket Stock Return Standard Deviation (STDR) | -35.04*** | -5.10 | -53.66*** | -3.86 |
| Firm Age (AGE) | -0.01 | -0.35 | -0.11** | -2.26 |
| Industry Dummy | Y | | Y | |
| Exchange Dummy | Y | | Y | |
| Observations | 948 | | 498 | |
| Adjusted R square | 38.77% | | 38.59% | |

\*, \*\* and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively. The variables are defined in appendix 1.

**Table 8:**

*OLS results of the underpricing regression for the whole period*
*----ROA with and without industry median adjustment*

$FDR = \gamma_0 + \gamma_1 ROA + \gamma_2 ROA*EVENT + \gamma_3 GOV + \gamma_4 LEGAL + \gamma_5 FOR + \gamma_6 GOVSQ + \gamma_7 LEGALSQ + \gamma_8 LEV + \gamma_9 STDR + \gamma_{10} AGE + \gamma_{11} UW + \gamma_{12} CPA + \gamma_{13} MRTN + \gamma_{14} RELPE + \gamma_{15} LAG + \gamma_{16} EX + \Sigma \mu_i IND$

| | ROA without industry median adjustment | | ROA with industry median adjustment | |
|---|---|---|---|---|
| | Coefficients | t-statistics | Coefficients | t-statistics |
| Return On Asset (ROA) | -1.65** | -2.62 | -1.50** | -2.24 |
| ROA*EVENT | -1.68** | -2.44 | -2.83*** | -3.31 |
| State Ownership (GOV) | 0.77 | 1.48 | 0.69 | 1.33 |
| Legal Ownership (LEGAL) | 0.70 | 1.41 | 0.63 | 1.28 |
| State Ownership Square (GOVSQ) | -1.17* | -1.97 | -1.15* | -1.92 |
| Legal Ownership Square (LEGALSQ) | -0.88 | -1.53 | -0.83 | -1.47 |
| Foreign Ownership Dummy (FOR) | -0.31** | -2.21 | -0.35** | -2.41 |
| Underwriter Dummy (UW) | -0.04 | -0.90 | -0.05 | -1.14 |
| CPA Dummy (CPA) | -0.03 | -0.37 | -0.03 | -0.40 |
| Leverage (LEV) | -1.02*** | -4.15 | -1.04*** | -4.25 |
| Aftermarket Stock Return Standard Deviation (STDR) | 10.84*** | 3.39 | 10.76*** | 3.36 |
| Firm Age (AGE) | -0.02*** | -3.65 | -0.02*** | -3.51 |
| Prior Market Return (MRTN) | 0.98*** | 3.42 | 0.96*** | 3.43 |
| IPO PE Minus Industry Median PE (RELPE) | -0.02*** | -4.24 | -0.02*** | -4.42 |
| Time Lag (LAG) | 0.04 | 0.51 | 0.02 | 0.35 |
| Industry Dummy | Y | | Y | |
| Exchange Dummy | Y | | Y | |
| Observations | 908 | | 908 | |
| Adjusted R square | 20.54% | | 21.86% | |

The t statistics are based on the Rogers standard errors. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. The variables are defined in appendix 1.

**Table 9:**

*OLS results of the offering price regression and the underpricing regression for the whole period with alternative measurement for earnings*

$$OFP = \alpha_0 + \alpha_1 OIPS + \alpha_2 OIPS*EVENT + \alpha_3 GOV + \alpha_4 LEGAL + \alpha_5 FOR + \alpha_6 GOVSQ + \alpha_7 LEGALSQ + \alpha_8 LEV + \alpha_9 STDR + \alpha_{10} AGE + \alpha_{11} UW + \alpha_{12} CPA + \alpha_{13} EX + \Sigma\mu_i IND$$

$$FDR = \gamma_0 + \gamma_1 OIOA + \gamma_2 OIOA*EVENT + \gamma_3 GOV + \gamma_4 LEGAL + \gamma_5 FOR + \gamma_6 GOVSQ + \gamma_7 LEGALSQ + \gamma_8 LEV + \gamma_9 STDR + \gamma_{10} AGE + \gamma_{11} UW + \gamma_{12} CPA + \gamma_{13} MRTN + \gamma_{14} RELPE + \gamma_{15} LAG + \gamma_{16} EX + \Sigma\mu_i IND$$

| | Offering price (1996-2004) | | Underpricing (1996-2004) | |
|---|---|---|---|---|
| | Coefficients | t statistics | Coefficients | t statistics |
| Operating Income Per Share (OIPS) | 2.27*** | 6.71 | | |
| OIPS*EVENT | 4.34*** | 11.35 | | |
| Operating Income On Asset (OIOA) | | | -1.10** | -2.09 |
| OIOA*EVENT | | | -0.80 | -1.21 |
| State Ownership (GOV) | -2.50 | -1.40 | 0.86* | 1.71 |
| Legal Ownership (LEGAL) | 0.05 | 0.03 | 0.61 | 1.26 |
| State Ownership Square (GOVSQ) | 1.04 | 0.50 | -1.29** | -2.28 |
| Legal Ownership Square (LEGALSQ) | -1.28 | -0.60 | -0.78 | -1.38 |
| Foreign Ownership Dummy (FOR) | 2.43*** | 4.12 | -0.30** | -2.14 |
| Underwriter Dummy (UW) | 0.15 | 0.87 | -0.03 | -0.73 |
| CPA Dummy (CPA) | 0.59* | 1.87 | -0.06 | -0.73 |
| Leverage (LEV) | -0.33 | -0.59 | -0.77*** | -3.73 |
| Aftermarket Stock Return Standard Deviation (STDR) | -30.11*** | -4.22 | 11.46*** | 3.63 |
| Firm Age (AGE) | -0.004 | -0.16 | -0.02*** | -3.67 |
| Prior Market Return (MRTN) | | | 1.01*** | 3.45 |
| IPO PE Minus Industry Median PE (RELPE) | | | -0.02*** | -3.92 |
| Time Lag (LAG) | | | 0.06 | 0.81 |
| Industry Dummy | Y | | Y | |
| Exchange Dummy | Y | | Y | |
| Observations | 948 | | 908 | |
| Adjusted R square | 33.39% | | 19.74% | |

This table uses operating income as the measurement for earnings. The t statistics reported in the underpricing regressions are based on the Rogers standard errors. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. The variables are defined in appendix 1.

**Table 10:**

*Stochastic frontier estimation results of the offering price regression for the whole period and the sub-period*

| | Whole period(1996-2004) | | Sub-period (1999-2004) - PE ratio cap release | |
|---|---|---|---|---|
| | Coefficients | t statistics | Coefficients | t statistics |
| Earnings Per Share (EPS) | 3.94*** | 9.32 | 3.88*** | 4.82 |
| EPS*EVENT | 4.33*** | 11.85 | 3.88*** | 5.56 |
| State Ownership (GOV) | -2.99*** | -3.90 | -3.31*** | -4.10 |
| Legal Ownership (LEGAL) | -1.03 | -1.34 | -1.25 | -1.56 |
| State Ownership Square (GOVSQ) | 1.33 | 1.53 | 0.94 | 1.02 |
| Legal Ownership Square (LEGALSQ) | -0.37 | -0.43 | 0.84 | 0.92 |
| Foreign Ownership Dummy (FOR) | 2.12*** | 3.65 | 7.75*** | 7.70 |
| Underwriter Dummy (UW) | 0.04 | 0.23 | -0.12 | -0.41 |
| CPA Dummy (CPA) | 0.21 | 0.69 | 0.24 | 0.24 |
| Leverage (LEV) | 0.26 | 0.79 | -1.49 | -1.61 |
| Aftermarket Stock Return Standard Deviation (STDR) | -35.05*** | -35.07 | -53.68*** | -53.69 |
| Firm Age (AGE) | -0.01 | -0.35 | -0.11*** | -2.42 |
| Industry Dummy | Y | | Y | |
| Exchange Dummy | Y | | Y | |
| Delta0 | -0.53*** | -22.86 | -0.48*** | -17.67 |
| Observations | 948 | | 498 | |

*** denotes statistical significance at the 1% level. The variables are defined in appendix 1.

**Table 11:**

*Descriptive statistics of the earnings and stock return variables used in the long-term stock performance regression*

|  | Mean | Median | Std Dev | Min | Max |
|---|---|---|---|---|---|
| 2-year NI change, divided by market value at the first trading date (CHGNI_2years) | 0.84 | 0.52 | 2.34 | -12.65 | 15.42 |
| 2-year OI change, divided by market value at the first trading date (CHGOI_2years) | 0.35 | 0.19 | 2.29 | -10.82 | 13.82 |
| 2-year cumulative abnormal return, adjusted by the B/M-and-size matched firm's return (CAR_2years) | -9.92 | -10.81 | 60.58 | -293. 24 | 224.39 |
| 2-year buy-and-hold abnormal return, adjusted by the B/M-and-size matched firm's return (BHAR_2years) | -10.07 | -5.90 | 107.17 | -948.46 | 532.01 |
| 3-year NI change, divided by market value at the first trading date (CHGNI_3years) | 0.95 | 0.45 | 4.19 | -36.07 | 22.94 |
| 3-year OI change, divided by market value at the first trading date (CHGOI_3years) | 0.36 | 0.09 | 3.81 | -10.46 | 29.03 |
| 3-year cumulative abnormal return, adjusted by the B/M-and-size matched firm's return (CAR_3years) | -16.17 | -16.55 | 71.11 | -273.72 | 253.89 |
| 3-year buy-and-hold abnormal return, adjusted by the B/M-and-size matched firm's return (BHAR_3years) | -18.96 | -10.13 | 167.04 | -1469.29 | 648.39 |

These figures are in percentage terms. The variables are defined in appendix 1.

**Table 12a:**

*Pearson correlation coefficients among the explanatory variables used in the long- term stock performance regression (2-year holding period)*

|  | CHGNI_2years | CHGOI_2years | GOV | LEGAL | FOR |
|---|---|---|---|---|---|
| CHGNI_2years | 1.00 |  |  |  |  |
| CHGOI_2years | 0.72*** | 1.00 |  |  |  |
| GOV | -0.12*** | -0.03 | 1.00 |  |  |
| LEGAL | 0.11*** | 0.04 | -0.93*** | 1.00 |  |
| FOR | -0.08** | -0.08** | -0.04 | -0.02 | 1.00 |

** and *** denote statistical significance at the 5% and 1% levels, respectively. The variables are defined in appendix 1.

**Table 12b:**

*Pearson correlation coefficients among the explanatory variables used in the long-term stock performance regression (3-year holding period)*

|  | CHGNI_3years | CHGOI_3years | GOV | LEGAL | FOR |
|---|---|---|---|---|---|
| CHGNI_3years | 1.00 |  |  |  |  |
| CHGOI_3years | 0.73*** | 1.00 |  |  |  |
| GOV | -0.01 | 0.02 | 1.00 |  |  |
| LEGAL | -0.001 | -0.02 | -0.94*** | 1.00 |  |
| FOR | -0.02 | -0.06 | -0.05 | -0.03 | 1.00 |

*** denotes statistical significance at the 1% level. The variables are defined in appendix 1.

**Table 13:**

*OLS results of the long-term stock performance regression on net income change*

$$STRN = \eta_0 + \eta_1 CHGNI + \eta_2 CHGNI*EVENT + \eta_3 FDR + \eta_4 GOV + \eta_5 LEGAL + \eta_6 FOR + \eta_7 GOVSQ + \eta_8 LEGALSQ + \eta_9 EX + \Sigma\mu_i IND$$

| | 2-year holding period 1996-1997 VS 2000-2003 | | 3-year holding period 1996 VS 2000-2002 | |
| --- | --- | --- | --- | --- |
| | Coefficients | t statistics | Coefficients | t statistics |
| Change of Net Income (CHGNI) | 7.34*** | 5.91 | 4.70*** | 3.26 |
| CHGNI*EVENT | 8.02*** | 4.25 | 12.01*** | 5.38 |
| Underpricing (FDR) | -0.07*** | -3.44 | -0.09** | -2.16 |
| State Ownership (GOV) | 0.40 | 0.92 | 1.02 | 1.02 |
| Legal Ownership (LEGAL) | 0.14 | 0.27 | 1.98 | 1.65 |
| State Ownership Square (GOVSQ) | -0.45 | -0.99 | -0.14 | -0.18 |
| Legal Ownership Square (LEGALSQ) | -0.14 | -0.22 | -1.38 | -1.16 |
| Foreign Ownership Dummy (FOR) | -0.16 | -1.43 | 0.11 | 0.77 |
| Industry Dummy | Y | | Y | |
| Exchange Dummy | Y | | Y | |
| Observations | 603 | | 365 | |
| Adjusted R square | 14.19% | | 19.98% | |

The dependent variable is IPO long-term abnormal stock return, which is defined as IPO cumulative return, minus book-to-market-ratio–and-size-matched firm's cumulative return during the same period. The t statistics are based on the Rogers standard errors. ** and *** denote statistical significance at the 5% and 1% levels, respectively. The variables are defined in appendix 1.

**Table 14:**

*OLS results of the long-term stock performance regression on operating income change*

$$STRN = \eta_0 + \eta_1 CHGOI + \eta_2 CHGOI*EVENT + \eta_3 FDR + \eta_4 GOV + \eta_5 LEGAL + \eta_6 FOR + \eta_7 GOVSQ + \eta_8 LEGALSQ + \eta_9 EX + \Sigma \mu_i IND$$

| | 2-year holding period 1996-1997 VS 2000-2003 | | 3-year holding period 1996 VS 2000-2002 | |
|---|---|---|---|---|
| | Coefficients | t statistics | Coefficients | t statistics |
| Change of Operating Income (CHGOI) | 6.56*** | 6.50 | 5.55*** | 5.13 |
| CHGOI*EVENT | 7.05*** | 2.75 | 9.04*** | 4.17 |
| Underpricing (FDR) | -0.08*** | -3.91 | -0.09** | -2.34 |
| State Ownership (GOV) | 0.24 | 0.59 | 0.95 | 0.96 |
| Legal Ownership (LEGAL) | 0.20 | 0.37 | 2.04* | 1.77 |
| State Ownership Square (GOVSQ) | -0.33 | -0.73 | -0.19 | -0.24 |
| Legal Ownership Square (LEGALSQ) | -0.24 | -0.38 | -1.54 | -1.30 |
| Foreign Ownership Dummy (FOR) | -0.18 | -1.59 | 0.18 | 1.10 |
| Industry Dummy | Y | | Y | |
| Exchange Dummy | Y | | Y | |
| Observations | 603 | | 365 | |
| Adjusted R square | 11.73% | | 19.57% | |

The dependent variable is IPO long-term abnormal stock return, which is defined as IPO cumulative return, minus book-to-market-ratio–and-size-matched firm's cumulative return during the same period. The t statistics are based on the Rogers standard errors. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. The variables are defined in appendix 1.

**Table 15:**

*OLS results of the long-term stock performance regression on net income change with alternative measurement of long-term stock performance*

$$STRN = \eta_0 + \eta_1 CHGNI + \eta_2 CHGNI*EVENT + \eta_3 FDR + \eta_4 GOV + \eta_5 LEGAL + \eta_6 FOR + \eta_7 GOVSQ + \eta_8 LEGALSQ + \eta_9 EX + \Sigma\mu_i IND$$

| | 2-year holding period 1996-1997 VS 2000-2003 | | 3-year holding period 1996 VS 2000-2002 | |
| --- | --- | --- | --- | --- |
| | Coefficients | t statistics | Coefficients | t statistics |
| Change of Net Income (CHGNI) | 14.11*** | 5.53 | 11.33*** | 4.24 |
| CHGNI*EVENT | 1.50 | 0.47 | 4.68 | 1.40 |
| Underpricing (FDR) | -0.08** | -2.18 | 0.002 | 0.02 |
| State Ownership (GOV) | 1.14* | 1.84 | 3.25 | 1.10 |
| Legal Ownership (LEGAL) | 0.39 | 0.54 | 3.74 | 1.23 |
| State Ownership Square (GOVSQ) | -1.25** | -2.05 | -1.32 | -0.72 |
| Legal Ownership Square (LEGALSQ) | -0.31 | -0.32 | -1.85 | -0.74 |
| Foreign Ownership Dummy (FOR) | 0.01 | 0.09 | 0.50* | 1.99 |
| Industry Dummy | Y | | Y | |
| Exchange Dummy | Y | | Y | |
| Observations | 603 | | 365 | |
| Adjusted R square | 11.06% | | 8.80% | |

The dependent variable is IPO long-term abnormal stock return, which is calculated as IPO buy-and-hold return, minus book-to-market-ratio–and-size-matched firm's buy-and-hold return during the same period. The t statistics are based on the Rogers standard errors. *, ** and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. The variables are defined in appendix 1.

**Figure 1a:**

*Long-term IPO stock cumulative return and benchmark stock cumulative return for all IPOs listed in 1996-2004 where the benchmark is a book-to-market-ratio-and-size-matched firm*
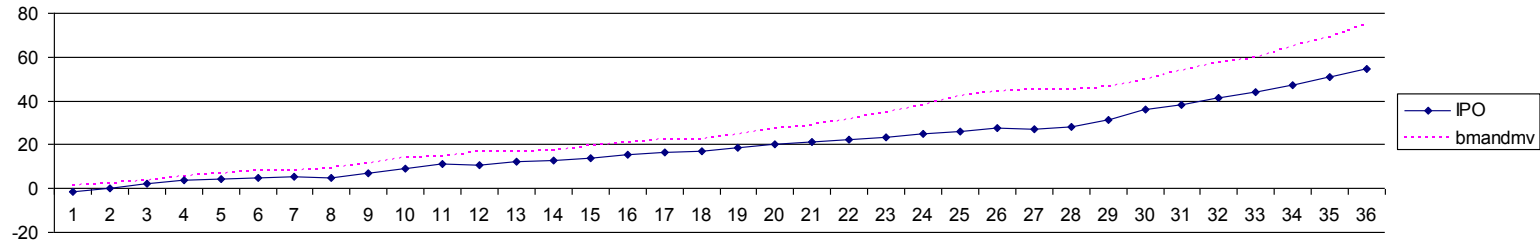


This graph shows the long-term IPO stock cumulative return and benchmark stock cumulative return from the first trading month starting from the second trading date until 3 years later. 'IPO' is the average cumulative return for IPOs, and 'bmandmv' is for the book-to-market-ratio-and-size-matched firms. The returns are expressed in percentage.

**Figure 1b:**

*Long-term IPO stock cumulative abnormal return (CAR) for IPOs offered in 1996 and 2000-2002 where the benchmark is a book-to-market-ratio-and-size-matched firm*
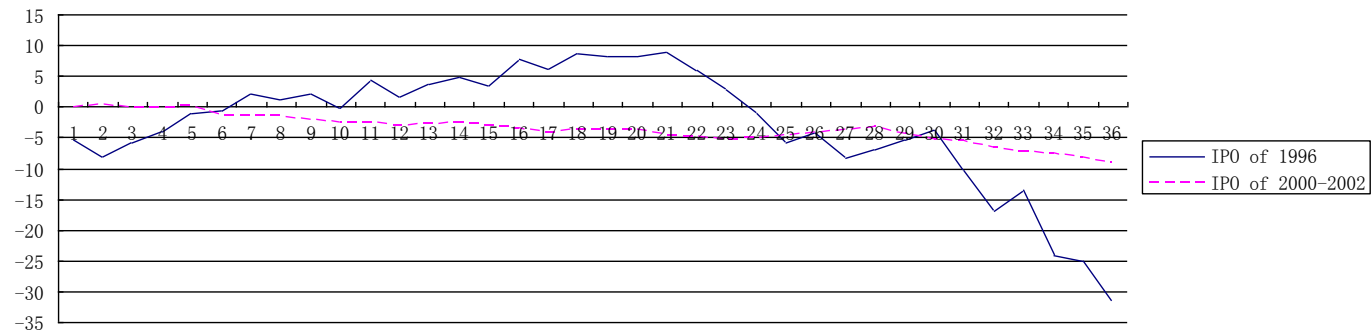


The graph compares the 3-year cumulative abnormal returns of IPOs offered in 1996 with that offered in 2000-2002. The returns are expressed in percentage.

*Variable definitions*

| | |
|---|---|
| AGE | Years between the IPO firm establishment day and IPO offering day. |
| BHAR | It is calculated by IPO buy-and-hold return, minus book-to-market-ratio–and-size-matched firm's buy-and-hold return during the same period. In my thesis, I have two periods. One is 2-year holding period. The other is 3-year holding period. They are denoted as BHAR_2years, and BHAR_3years, respectively. |
| BVPS | Book value per share, calculated by total asset minus total liability, divided by outstanding shares before the IPO year. |
| CAR | It is calculated by IPO cumulative return, minus book-to-market-ratio–and-size-matched firm's cumulative return during the same period. In my thesis, I have two periods. One is 2-year holding period. The other is 3-year holding period. They are denoted as CAR_2years, and CAR_3years, respectively. |
| CHGNI | 2-year or 3-year change of net income starting from the year prior to the IPO, divided by the market value on the first trading day (MV). The market value is calculated by the closing price on the first trading day multiplied by the total outstanding shares after the IPO. (($NI_{t+1} - NL_1$)/MV, ($NI_{t+2} - NL_1$)/MV) In my thesis, I have two periods. One is 2-year holding period. The other is 3-year holding period. They are denoted as CHGNI_2years, and CHGNI_3years, respectively. |
| CHGOI | 2-year or 3-year change of operating income starting from the year prior to the IPO, divided by the market value on the first trading day (MV). The market value is calculated by the closing price on the first trading day multiplied by the total outstanding shares after the IPO. (($OI_{t+1} - OL_1$)/MV, ($OI_{t+2} - OL_1$)/MV) In my thesis, I have two periods. One is 2-year holding period. The other is 3-year holding period. They are denoted as CHGOI_2years, and CHGOI_3years, respectively. |
| CPA | A dummy variable. It is equal to one if an IPO is audited by one of the following eight largest auditors in China ---Beijing CPA, Beijing Zhonghua CPA, Shanghai CPA, Shanghai Dahua CPA, Lixin CPA, Sheko Zhonghua CPA, Shenzhen Zhonghua CPA and Sheko Xinde CPA. Otherwise it is equal to zero. |
| EPS | Measured as net income divided by total outstanding shares before the IPO year. Net income is after-tax profit one year before the IPO year. |

| EVENT | A time dummy variable. It is equal to one if an IPO firm adopts the new accounting standard. Otherwise it is equal to zero. Although the new accounting standard was released on Jan. 1, 1998, few IPO firms adopted it in their 1998 annual financial reports. The majority of the A-share IPO firms adopted it in their 1999 annual financial reports. It means a firm that issued an IPO in 2000 or after adopted the new accounting regulation in its prospectus that showed last year's annual financial report. Consequently, EVENT is equal to one if a firm issued an IPO in 2000 or after. Otherwise it is equal to zero. |
|---|---|
| EX | A stock exchange dummy variable. It is equal to one if an IPO is listed in the ShangHai Stock Exchange. Otherwise it is equal to zero if an IPO is listed in the ShenZhen Stock Exchange. |
| $FDR = \dfrac{P_1}{P_0} - \dfrac{I_1}{I_0}$ | $P_1$ is IPO closing price on the first trading day, $P_0$ is the offering price, $I_1$ is the market index on the first trading day and $I_0$ is the market index on IPO offering day. Because there are two stock exchanges in the Chinese stock market, $I_1$ refers to the ShangHai A-share index for IPOs listed in the ShangHai Stock Exchange, and ShenZhen A-share index for IPOs listed in the ShenZhen Stock Exchange. |
| FOR | A dummy variable. It is equal to one if IPOs have previously or simultaneously issued B shares. Otherwise it is equal to zero. |
| GOV | Measured as state shareholdings divided by total outstanding shares after the IPO. |
| GOVSQ | Square of the variable of GOV |
| IND | An industry dummy variable. There are 6 industries based on the 1999 industry classification standard. They are banking and finance; transportation and related industry, public facilities and power industry; civil engineering construction and real estate; farming, forestry, food industry, conglomerate, estate development and operation, information industry and wholesale trade; manufacturing, mining and smelting; retail trade, hotel and tourism. I delete the industry of banking and finance in my regressions because there is a special accounting standard for this sector in China. |
| LAG | A discrete variable, if months between the offering day and the listing day <1 then LAG=1; if 1<= months <3 then LAG =2; if 3<= months <6 then LAG=3; if 6<= months <12 then LAG=4; if months >=12 then LAG=5. |
| LEGAL | Defined as legal shareholdings divided by total outstanding shares after the IPO. |
| LEGALSQ | Square of the variable of LEGAL |
| LEV | Measured as IPO year-end total liability divided by IPO |

| | |
|---|---|
| | year-end total asset before the IPO year. |
| MRTN | The index return in the 30 trading days before the listing day. For IPOs listed in ShangHai Stock Exchange, I use ShangHai A-share index. Otherwise I use ShenZhen A-share index. |
| OFP | IPO offering price per share. |
| OIOA | Operating income one year before the IPO year, divided by the asset at the end of that year. |
| OIPS | Operating income per share one year before the IPO year. |
| RELPE | The relative PE ratio is defined as IPO firm's PE ratio minus median PE ratio of all the listed firms in the same industry as the IPO firm at the IPO issuance date. |
| ROA | Measured as net income one year before the IPO year divided by total asset at the end of that period. |
| STDR | The standard deviation of the IPO firm's after-market stock return from the second trading day until the 22nd trading day. |
| TAPS | Total asset per share, calculated by total asset divided by outstanding shares before the IPO year. |
| UW | A dummy variable. It is equal to one if an IPO is underwritten by one of the following six largest underwriters in China—Guotai Securities, Nanfang Securities, Jun'an Securities, Shenyin wanguo Securities, Haitong Securities and Huaxia Securities. Otherwise it is equal to zero. |

**Appendix 2**:

*Expected signs of the explanatory variables used in the offering price regression*

| Variables | Expected signs |
|---|---|
| Earnings Per Share (EPS) | + |
| EPS*EVENT | + |
| State Ownership (GOV) | - |
| Legal Ownership (LEGAL) | Undetermined |
| State Ownership Square (GOVSQ) | Undetermined |
| Legal Ownership Square (LEGALSQ) | Undetermined |
| Foreign Ownership Dummy (FOR) | + |
| Underwriter Dummy (UW) | + |
| CPA Dummy (CPA) | + |
| Leverage (LEV) | - |
| Aftermarket Stock Return Standard Deviation (STDR) | - |
| Firm Age (AGE) | + |

*Expected signs of the explanatory variables used in the underpricing regression*

| Variables | Expected signs |
|---|---|
| Return On Asset (ROA) | **-** |
| ROA*EVENT | **-** |
| State Ownership (GOV) | Undetermined |
| Legal Ownership (LEGAL) | Undetermined |
| State Ownership Square (GOVSQ) | Undetermined |
| Legal Ownership Square (LEGALSQ) | Undetermined |
| Foreign Ownership Dummy (FOR) | Undetermined |
| Underwriter Dummy (UW) | Undetermined |
| CPA Dummy (CPA) | Undetermined |
| Leverage (LEV) | + |
| Aftermarket Stock Return Standard Deviation (STDR) | + |
| Firm Age (AGE) | **-** |
| Prior Market Return (MRTN) | + |
| IPO PE Minus Industry Median PE (RELPE) | **-** |
| Time Lag (LAG) | + |

*Expected signs of the explanatory variables used in the long-term stock performance regression*

| Variables | Expected signs |
|---|---|
| Change of Net Income (CHGNI) | + |
| CHGNI*EVENT | + |
| Underpricing (FDR) | **-** |
| State Ownership (GOV) | Undetermined |
| Legal Ownership (LEGAL) | Undetermined |
| State Ownership Square (GOVSQ) | Undetermined |
| Legal Ownership Square (LEGALSQ) | Undetermined |
| Foreign Ownership Dummy (FOR) | + |

**Appendix 3:**

*Summaries and comparisons of different accounting methods under different accounting standards*

| Methods | 1992 Regulation | 1998 Regulation | IAS |
|---|---|---|---|
| Bad debt allowance | Allowance based on a government-approved percentage from 0.3% to 0.5% | Allowance determined by the company | Same as the 1998 regulation |
| Inventory valuation | Historical cost | Revaluation required based on lower of cost or net realizable value | Same as the 1998 regulation |
| Investment valuation | Both current and long-term investments based on historical cost | Current and long-term investments revalued based on lower of cost or market | Same as the 1998 regulation in terms of earnings effect, though upward revaluations allowed to increase equity |
| Equity/Cost method | Equity method used for more than 50% ownership | Equity method required for 20%-50% ownership | Same as the 1998 regulation |
| Organization costs | Amortized over more than 5 years | Amortized over less than 5 years | Amortized over less than 20 years, but with amortization over less than 5 years common |
| Revenue recognition | Revenue recognized when goods shipped and payments or promises of payments received | Revenue recognized when risks and rewards of ownership of goods transferred to buyer, no continuing managerial involvement and control over the goods, payments or promises of payments received, and costs are reliably measurable | Same as the 1998 regulation |
| Consolidation | Consolidation when more than 50% ownership | Consolidation when more than 50% ownership or control over an enterprise including joint ventures | Same as the 1998 regulation |

**Appendix 4:**

*Income statement format for the listed company in China*

<div align="center">Company name</div>
<div align="center">For the year ended December 31, xxxx</div>

Sales revenue
Minus: Sales discounts and returns
Net sales revenue
Minus: Cost of goods sold
      Sales-related taxes
Main operating income
Plus: Other operating income
Minus: Provisions for declining value of inventory
     Sales expenses
     Administrative and managerial expenses
     Financial expenses
Operating income
Plus: Investment income
    Subsidy income *
    Non-operating income **
Minus: Non-operating expenses ***
Pre-tax income
Minus: Income tax
Net income

Source: *The accounting system for companies limited by shares* issued by the Ministry of Finance in 1998
* Subsidy income includes subsidy received from the government. For example, the firm recognizes the subsidy income when it receives refunds of value-added tax from the government.
** Non-operating income includes gains on disposal of assets, gains on asset revaluation, gains from debt restructuring, and donation received from others.
*** Non-operating expenses include losses on disposal of assets, losses on asset revaluation, losses from debt restructuring, donation, and penalty expense. Penalty expense is recognized when companies in China pay fines to the government because of violations of laws or regulations.