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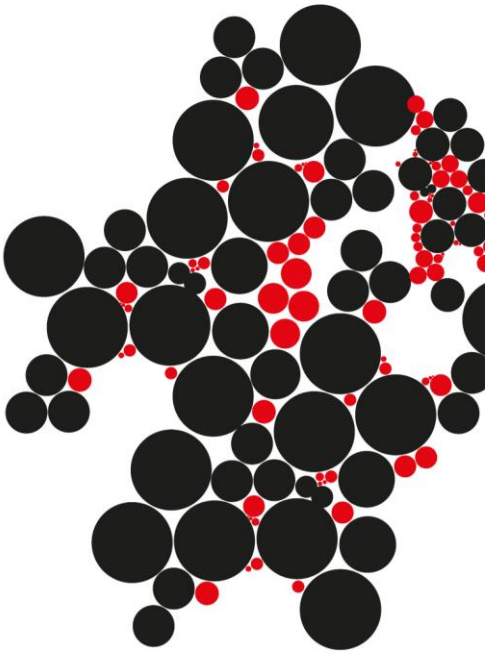

EXPLAINING CHINESE IPO UNDERPRICING BASED ON INFORMATION ASYMMETRY

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Abstract

Many previous studies indicated the extremely high IPO underpricing existed in Chinese market, and their explanations are mixed. Researchers suggested many possible theories to explain this difference phenomenon, among them the information asymmetry theory was the most commonly used one. As time passed and market developed, we want to examine if the theory still suitable to explain Chinese IPO underpricing.

Here in the study we measured the underpricing degree of 786 Chinese IPOs from 2006 to 2012 by Market-adjusted initial return. Our sample period experienced both hot issue market (2006-2007) and cold issue market (2008-2012), and the fixed pricing mechanism in pervious study is replaced by bookbuilding. We reviewed information asymmetry theory and employed several most related factors, by using an OLS regression to test if these factors have impacts on IPO underpricing degree.

Our results show some differences from previous studies. We found that the winner's curse hypothesis can partly support the underpricing in Chinese IPO as the proportion of state-owned shares is positively related to underpricing. While for other commonly suggested factors such as duration time, underwriter and auditor reputation, and former retained ownership, our result cannot provide significant relationships. So we carefully reject the suggested hypotheses as they failed to explain the phenomenon.

Furthermore, our result could contribute to companies' and investors' knowledge about the impact of non-financial factors on share pricing during IPO process.

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Chapter 1

Introduction

1.1 Background

Companies nowadays are facing more challenges and opportunities. More capitals are needed as they need to invest in profitable projects and business; and they also need to use new capital to finance the company more effectively. Among alternative ways of raising capital, initial public offering is one common applied way in a variety of markets. An initial public offering (IPO)[1] is a company sells its shares, on a securities exchange, for the first time. Through this process, a private company transforms into a publicly traded enterprise . When companies need additional equity capital than just raising from a small number of investors, they generally decide to "go public" by selling the stock to a large number of investors in the market .

Among several ways of raising capital, IPO seems has a stronger attraction and motivation than others. Through IPO, firms can gain not only capital to improve the financing ability but also more popularity through the market. For the market, more IPOs can help the market developing, and prompt the standard operation of these public companies. For most mature markets such as US, the number of initial public offerings has varied from year to year, and these IPOs raised 488 billion dollars in gross process, with an average of 78 million dollars per deal in 2001 (Ritter & Welch, 2002). However, Figure 1.1 [2]presents the globe IPO market from 2010 to 2011; it shows that Asia-pacific market began to hold a leading place

[1] http://en.wikipedia.org/wiki/Initial_public_offering

[2] http://www.ey.com/Publication/vwLUAssets/Global_IPO_trends_2012/$FILE/Global_IPO_trend_2012.pdf

which raised capital around 67% of global IPO activity. While European and U.S. market were both around 15% of global IPO activity. Moreover, Chinese market is probably the largest IPO market in the world.

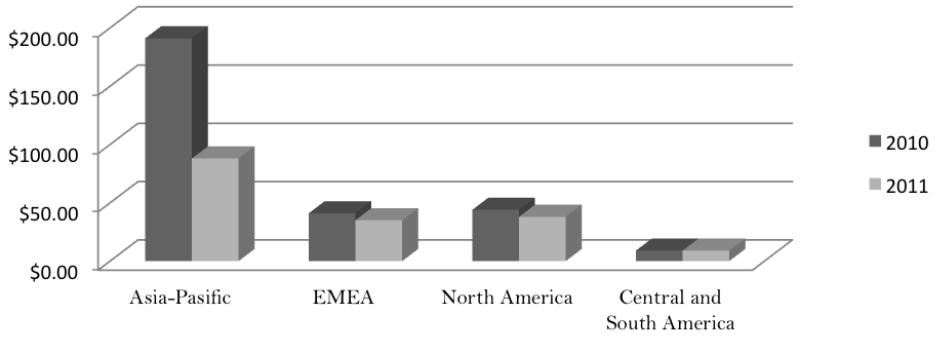

Figure 1.1: 2010 and 2011 global IPOs capital raised by region, US$b

Although some theories suggest small firms and most entrepreneurs would keep away from the complex public process and market environment, the fact is that more and more companies choose to use equity financing to operate. Nowadays, Chinese companies with good growth opportunities and requiring more capital are free to turn to the market. Two main stock markets in Shanghai and Shenzhen attracted a large number of companies to get listed. Figure 1.2[1] shows the increasing capital been raised from 2008 to 2010.

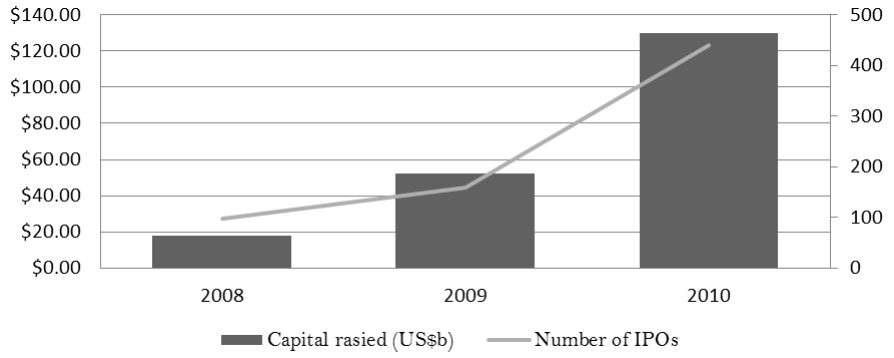

Figure 1.2: Greater China IPOs

Among the issuing activities, underpricing attracted a lot of researchers. Underpric-

[1] http://www.ey.com/Publication/vwLUAssets/Global_IPO_trends_2012/$FILE/Global_IPO_trends_2012.pdf

ing is a common phenomenon in a variety of markets; it is the pricing of an initial public offering (IPO) below its market value. When the offering price is lower than the first-day market closing price, the stock is considered to be underpriced. Among several previous studies, the heavily underpriced Chinese IPOs caught our attention because it was quite different from that in mature markets such as US. The data provided by Ritter documented that from 1993 to 2000 the average first-day IPO return in US market was 22.98%, and the highest initial return was 57% in 1999. While in China during the 1993-1998 period, the average underpricing of IPOs for A- and B-share are 178% and 11.6% (E. Chang, Chen, Chi, & Young, 2008), during the period from 1996 to 2000 the underpricing was 129.16% (Chi & Padgett, 2005), and similar number also can be found in Mok and Hui (1998) 's study that A-share IPOs were 289% underpriced.

1.2 Problem Discussion

As we can find that extremely high underpricing exists in Chinese IPO market than other markets, how to explain this phenomenon becomes an interesting topic. A number of reasons have been advanced for the new issues underpricing phenomenon. For example, the asymmetric information hypothesis (Ritter & Welch, 2002) which including the winner's curse hypothesis, the cascades hypothesis, the signaling hypothesis, the market incompleteness hypothesis (Ibbotson & Ritter, 1995) and etc. Entities such as underwriter, sponsors, and auditors also suggested playing important roles in underpricing. Because these entities also take part in the issuing and pricing activities, such as providing service ,attracting investors and giving advice about allocation and pricing (Beatty & Ritter, 1986; Ruud, 1993). In addition, the information quality also influences IPO pricing, Lin and Tian (2012) noted that a higher degree of accounting conservatism is needed in a situation with greater information asymmetry to enhance the information quality. The survey[1] of Corporate Credibility Index of listed companies made by Economic Observer Research Institute and The Economic Observer in China, which aims to measure the credibility and set the credibility standards, also presents a negative relationship between the disclosure information quality and IPO underpricing level.

[1] http://finance.sina.com.cn/nz/jjgcbxr100/

Besides the information asymmetry theory, other explanations for IPO underpricing are also been suggested. Some indicated the aftermarket performance could be the reason of underpricing, as Ritter and Welch (2002) documented that the higher trading volume in the aftermarket, the greater underpricing will be. Moreover, IPO,E. Chang et al. (2008) noted that the initial return in the secondary market is negatively related to the IPO offering prices. In addition, the allocation of shares could have impact on IPO pricing, because the unfairness of share allocation between institutional investors and individual investors may influences the IPO pricing. Furthermore, IPO offering mechanisms are found to be different in variety markets, the choice of mechanism also may result in a different level of underpricing (Ritter, 2003).

Moreover, researchers not only focus on the concepts of rational decision making from traditional finance perspectives, but also try to use behavioral finance concept to explain IPO underpricing For example, C.-H. Chang (2011) studied a social comparison perspective on IPO underpricing. The social comparison theory suggested when individuals confused about a situation; they often turn to learn from the general behavior of public and then make their decisions. Therefore, IPO issuers and underwriters who are not certain about firm values would refer to similar IPO issuing firms in the same industry which went public earlier to determine the IPO offer price.

Furthermore, for Chinese market perspective, researches suggested some explanations based on some specific market characters (Chen, Firth, & Kim, 2004; Gu, 2003), such as the extremely long duration time between offering and listing (Chen et al., 2004; Guo & Brooks, 2009; Mok & Hui, 1998), and the effect of underwriter (Guo & Brooks, 2008). However, most of these researches are based on the information asymmetry theory.

1.3 Research Question

As IPO involves several entities which may possess nonpublic information, we suggest the information asymmetry theory should be concerned. Furthermore, for Chinese market perspective, D. Su and Fleisher (1999) proposed that there is a large degree of microeconomic uncertainty and information asymmetry inherent.

Although several researches discussed the explanation of IPO underpricing in China, results are mixed and some do not provide empirical supports for their suggestions such as (Gu, 2003). In addition, the data which researchers used are almost before 2004, while many regulatory changes and developments occurred in Chinese market after that.

The establishment of Chinese stock market is in the early 1990s, during years of development, the market has transformed from a tightly-controlled system to a more market-oriented system. The former dominated offering mechanism is the fixed price method which is quite different from other mature stock markets. The offering price is chosen months before market trading starts, and in the great majority of offerings there was no feedback mechanism through market demand that allowed adjustment in the offer price. And there was a quota system which used to prevent cash-starved, poor-quality state owned enterprises from flooding the market with shares. The system first adopted in 1993, the State Planning Commission determined the quantity of equity to be issued each year and the China Securities Regulatory Commission (CSRC) would then divide this quota up among the provinces and ministries. If a company wanted to go public, it had to be selected by provincial government with a quota before asking CSRC for approval, which prevented many firms from getting listed (Sun, Wu, & Tong, 2008). However, after been experienced many regulatory changes, the regulatory framework become more fine-tuned with additional restrictions: bookbuilding-like offering mechanism had been introduced, quota system had been abolished, and more issuers were allowed to participate in IPO market.

As the market setting is changed from former studies, current study about Chinese IPO may provide different results due to the new data, market environment and different applied methods and measurements. Furthermore, theories such as winner's curse and signaling are used to explain underpricing in most markets, however the number of researches done on recent Chinese market is limited. Despites the high underpricing in China, the specific market condition and the growing awareness of the importance of IPO among both academic and real market operating, the IPO underpricing in china becomes an interesting topic to study.

In consequence that previous studies are only hypothetical, the results may not

provide strong evidences to support their hypotheses in current Chinese market. The proposal of this thesis is to find out if and how information asymmetry among different involved entities influences the Chinese IPO underpricing. In order to explain and understand the information asymmetry among main entities, we will examine them with regression model under the sample period from 2006 to 2012. By experiencing different market conditions, we would like to test if information asymmetry theory can explain the IPO underpricing in China. Therefore, the main research question is formulated as follow:

How does information asymmetry explain the high IPO underpricing in China?

The present study measures the Chinese IPO underpricing the first-day market adjusted initial return. The combined database consisted of 786 IPOs with no missing information issued in Chinese A-share market. Furthermore, we examine our regression on two different market conditions, 2006 to 2007and 2008 to 2012 as the former period experienced hot issue market, while the later period is during the cold issue market and bear market. The result of this paper will extend the existed literatures by testing more current data and state clearly about the improved Chinese IPO market performance. Our result on winner's curse and adverse selection problem shows difference with former studies, and under the bookbuilding mechanism, the underwriter's effect is still not as important as it does in mature markets. To some extent, the auditor reputation and former ownership can explain the underpricing; but for the whole sample period, they can't explain the underpricing significantly. As some hypotheses had been confirmed in other mature markets, our research provides empirical results to show these hypotheses cannot be supported in Chinese IPO market.

1.4 Thesis Outline

The remaining part of this thesis is organized as follows. Chapter 2 is the literature review; information asymmetric theory of IPO will be explained. Chapter 3 provides a clear description of Chinese IPO market settings and developments, in this section, the regulatory changes, IPO process and the current basic institutional settings will be introduced. Further, Chapter 4, the hypothesis will be formulated and followed

with Chapter 5, which the methodology and data collection will be discussed. In Chapter 6, variable definitions, statistical summary and fitness of data will be calculated. The empirical research and result will be present in Chapter 7. And a robustness test will be followed. The conclusion and limitation of the thesis, and suggestions for further study will be allocated in the last part.

Chapter 2

Literature Review

In this section, the most relevant literature and theories about information asymmetry, and IPO underpricing will be introduced. This review will help to make theoretical foundation hypotheses.

Nowadays, there are many investigations concentrated on explaining IPO underpricing. A large number of hypotheses are based on the information asymmetry, as it is a common phenomenon exists among markets. The information asymmetry theory assumes that one of the entities which involved in the IPO procedure has more information than the others, in our research, we observe the three main entities: issuer, underwriter, and investor. As each entity has its own financial aim, the IPO pricing will greatly depend on which of these entities possess perfect information about the issuing firm, and which entities must rely on the others to report the information to them. These may largely reflect the underpricing degree.

When information asymmetry exists among investors, Rock (1986) proposed famous winner's curse hypothesis that information asymmetry exists between informed and uninformed investors. In order to attract and keep more uninformed investors to subscribe, IPOs need to be underpriced. For investor and issuer, information asymmetry also exists. As insiders need to reduce the adverse selection problem caused by information asymmetry, they would like to reveal information to distinguish themselves from other issuers. Moreover, insiders will keep certain amount of shares for themselves to reduce their wealth losses through IPO, and will there be rewarded at seasoned equity offerings (E. Chang et al., 2008). While between issuer and underwriter, the underwriter usually has superior information about the

market than issuer, because it is professional and is employed to provide training and assistance about the stock issuing to the issuers. Due to underwriters superior information and skill, the information asymmetry should be reduced.

2.1 Investors-Winner's curse hypothesis

Winner's curse will result if there in the market, two kinds of investors exist: informed and uninformed investors. As Rock (1986) indicated that when oversubscription occurs, it is assumed to result exclusively from large orders placed by investors who have favorable information about the prospects of the offering. So due to the information asymmetry, these investors are called "informed investors" and they will only buy shares that provide them expected return; while for all the left investors who allocate all least desirable issues, are called "uninformed investors". Even if these uninformed investors get all of the shares which they demand, it is because the informed investors do not want to buy these shares, which is so called "winner's curse". In order to induce uninformed investors to subscribe shares, it is optimal for issuers to underprice IPOs to ensure the launch a success. Rock (1986) proposed that in order to solve the problem, issuers will underprice their offerings which allowed the uninformed investors to receive positive returns on their investments and induce them keep practice in the IPO market.

Normally, firms would like to fill their subscriptions as quickly as possible to raise the amount of capital they need and to float in the exchange market. So the duration time from offering to listing is considered as the time that issuers take to finish selling their shares. As Rock (1986) indicated the winner's curse that there is information asymmetry among informed investors and uninformed investors, informed investors would like to subscribe more shares if they know the issue is a profitable one, which crowd out uninformed investors who are less familiar with these issues. If the level of informed demand is high, then issuers would finish the issue more quickly and do not need to use underpricing to attract the uninformed investors. On the other hand, if there are more uninformed investors in the market, which shows that the issue is not attractive and then issuers need to spend more time in attracting investors and underpricing their issuers to compensate uninformed investors to subscribe. So Jenkinson (1990), Brooks, Fry, Dimovski, and Mihajilo (2009) and Lee, Taylor, and Walter (1996) suggested that one of the

most important factors which can affect the public's demand for the shares is likely to be the performance of the overall market between the date the issue announces its offering and the day trading begins, and they used the duration time as the proxy to the informed demand. Therefore, we consider that the time gap would affect the IPO underpricing level.

In addition, we will mention in the next chapter that IPO process in China is a way for government to transfer the shares to public after 2006. Because most issuing companies in China are state-owned enterprise, it is necessary for the government to own a certain part of the shares following IPOs. When the majority investors in the market compare with government who fully knows the company and market, investors are more likely to be the uninformed investors in Rock (1986) 's model. Furthermore, Chi and Padgett (2005) indicated that the success of any IPO not only affects the company's reputation, but also the government's credibility, so government can't afford any possible failure in IPO market. D. Su and Fleisher (1999) and Chen et al. (2004) also found that IPO underpricing is positively related to shares held by government, because government may be motivated by matters other than profitability and share price maximization, such as the transfer process successful and develop the IPO market. So for government, it needs the issuers to underprice the IPOs by "leave money on the table" to keep the uninformed investors in the market and ensure the success issuing.

2.2 Issuers and Investors - Adverse Selection

The earliest theories of IPO underpricing were based on adverse selection (Rock, 1986). Typically, the adverse selection problem known as 'lemon proble' exists in the market. Because of the information asymmetry, investors cannot ascertain the value of the offering; therefore they are only willing to pay an average price. Thus, it is an advantage for low-quality issuers, because their IPO values are normally below the average, so they would be pleasure to offer their shares at the price; while for high-quality issuers, they will suffer losses by accepting the low price and selling their shares at a cheaper price. In order to avoid this loss caused by information asymmetry, high quality issuers would like to show the market their qualities in order to distinguish themselves from others and avoid IPO misevaluation.

Consequently, as issuers are better informed than investors, they would like to disclosure information to the market in order to decrease the adverse selection problem. Moreover, IPO underpricing is directly related to the insider wealth losses. When issuers decide to offer shares to the public, they are facing the wealth loss from the offering, so they would like to minimize their wealth losses by having a reasonable pricing of IPO. These motivations induce issuers to spend more on promoting and marketing their issues to reduce the information asymmetry, and then the cost of promoting could include those associated with choosing a reputable underwriter or auditor.

Underwriter an auditor reputations are two important factors indicated by various literature. In research done by Booth and Smith (1986), they assumed that investors in the market perceived the quality of issue firms to decide whether the issue is worth investing. One important criterion for investors to judge the value of the issuers is the underwriter. Normally, prestigious underwriters would only like to underwrite high quality issues because there is smaller possibility to have the issue failure. Therefore, issuers who hire prestigious underwriters are viewed as effectively 'leasing' the brand name of the underwriter. What is more, prestigious underwriters are superior to reduce the information asymmetry between issuers and investors, high quality issuers intend to impress investors by have their IPO underwritten by prestigious underwriters.

During the IPO process, auditors address accounting issues and prepare the financial disclosures required in the prospectus. As prospectus is the most important disclosure document that provides investors about the financial security, investors believe that better auditor helps providing more accurate information about the firm's value. Besides, Titman and Trueman (1986) 's research presented that an entrepreneur with favorable information about the firm's value would like to choose a prestigious auditor than an entrepreneur with less favorable information. So company with favorable information would like to hire a high reputation auditor, and then it will benefit from having its financial statements more accurately analyzed, and it will reveal its long-term profitability.

Beside the reputation of underwriter and auditor, issuers themselves also reveal their values to the market. As Beatty and Ritter (1986) indicated, investors are

not clear about the IPO firms biases offering prices lower than the unknown future market price, so issuers would like to provide investors information about their qualities. Then the percentage of pre-IPO retained shares would logically show the market about the firm value (Allen & Faulhaber, 1989; D. Su, 2004). The pre-IPO ownership includes top management, general partner of lead venture capital firms and other shareholders (Kennedy, Sivakumar, & Vetzal, 2006), and the behavior of retained ownership means that former shareholders have favorable private information and they believe the value of the share will increase in future, so they retain the shares for later value increasing. As they reveal the market their quality information, less necessary for them to underprice their issues because of more informed demand in the market. While for low-quality companies, former owners are not optimistic about the firm so they would prefer to sell the share, get the money and run. So the insiders would not retain the shares, and in order to compete with other companies in the market, they have to underprice their shares in order to attract more investors. On the contrary, to underprice a firm's initial offering is seen as the behavior for only good firms, because they expected to recoup this loss after their performances are realized (Allen & Faulhaber, 1989). So the underpricing is what Ibbotson, Sindelar, and Ritter (1988) called "to leave a good taste in investors' mouths", and allow the firm insiders to sell future offerings at a higher price than would otherwise be the case. While low-quality firms may not consider underpricing to show their qualities because they do not expect to recoup their investments in underpricing through after-market SEOs. The best way for low-quality issuers is to 'take the money and run' when their stocks are initially offered (Lin & Tian, 2012). Thus, the more amount of insider retention ownership provides information to investors to reduce the information asymmetry, but the impact on underpricing is not clear.

2.3 Underwriters and Issuers

Besides the investor and issuer, underwriter also plays an important role in going public. It is the organization that actually responsible for pricing, selling, and organizing the issue; and it may provide additional services according to the contract. In former studies, there is a substantial body of theoretical and empirical studies which indicates the importance of underwriter. It helps to decrease the information asymmetry between issuers and prospective investors during the IPO

process. Normally for the sell-side, Benveniste and Wilhelm (1997) emphasized that underwriters can benefit issuers with more gross proceeds. The reason is that underwriters can give optimal pricing and allocating advices depend on the investor information, and these can reduce the average amount of underpricing.

Nevertheless, information asymmetry between issuers and underwriters would lead to IPO underpricing. Baron (1982)'s model suggested that issuers are assumed to have no access to information of market. Furthermore, they cannot observe the work of underwriters, so they optimally delegate the offer price decision to underwriters. Because underwriters are believed to have better information than issuers about conditions prevailing in capital markets and the demand for the issuing company's shares, then the price will be set lower than would prevail in the absence of information asymmetries (Muscarella & Vetsuypens, 1989).

Due to this, the underwriter may underprice the IPO to fulfill its own needs, and there are several motivations. Based on underwriter's professional evaluation of the issue, when the issue value is lower than the optimum, it will underprice the shares in order to increase the possibility of successful issue (Gannon & Zhou, 2008). The underwriter would underprice the shares in order to save marketing costs. It was pointed out by Baron and Holmström (1980) that underwriter is motivated to fix a low placement price in order reduce the cost, and the work of the marketing and distribution of securities phase. Furthermore, the underwriter would like to build a long-time relationship with the buy-side as it repeats underwrite business with potential purchasers. Due to these motivations, the underwriter would like to use underpricing to ensure the successful issue and make a profit.

So a potential conflict of interest exists between issuers and underwriters: issuers would like to maximize the capital raised by pricing their IPO higher; while underwriters would not want to sell at a high price which may lead to the failure of the issue and hurt their reputations. Moreover, if the underwriting agreement is a best efforts agreement, underwriters would not want to buy the issues at a high price, which may reduce its profit in later resell process.

In the nutshell, underwriters may take advantage of the information asymmetry, and underprice the IPO to fulfill their own financial aims.

2.4 Summary of related literature

In this section, we will present the summary of previous empirical researches, with the possible determinants of IPO underpricing. The signs are based on literature reviews, which can clearly present the relationships between the determinants and underpricing.

Table 2.1: Summary of the pervious empirical findings

Determinants	Previous Studies		Sign
	Evidencefrom Chinese market	Evidence from other markets	
Duration time	Guo and Brooks (2009)	Brooks et al. (2009)	+
	L. Tian (2011)	Lee et al. (1996)	+
	Mok and Hui (1998)		+
	Chi and Padgett (2005)		-
State-owned shares	Mok and Hui (1998)		+
	Chen et al. (2004)		+
	Neupane and Thapa (2012)		Mixed
		Beatty and Ritter (1986)	-
Underwriter Reputation	C. Su and Bangassa (2011)		-
	Gao (2010)		No
		Titman and Trueman (1986)	-
		Kennedy et al. (2006)	-
Auditor reputation		Firth and LiauTan (1998)	-
		Beatty (1989)	-
		Jensen and Meckling (1976)	-
		Keasey and Short (1997)	+
Former ownership retention		Kennedy et al. (2006)	+
		Grinblatt and Hwang (1989)	+
	D. Su (2004)		-

Chapter 3

Institutional Settings of Chinese Market

In this section, the Chinese institutional setting of IPO will be introduced. A brief understanding of Chinese market characteristics will be provided, and we will highlight the special settings.

3.1 Chinese A-Share Authorizing System

The China Securities Regulatory Commission (CSRC), which is a governmental sector that "authority to implement a centralized and unified regulation of the nationwide securities market in order to ensure their lawful operation "[1]. It used to be an administrative authorizing system that determined an annual quota for new shares to be issued every year. And it is allocated among the provinces and state-industrial commissions according to criteria that support regional or industrial development goals, in consideration of the balance among provinces and industries (Chi & Padgett, 2005). Before 1999, the fixed-price offering was set to the after-tax profits per share multiplied by a price-earning ratio (P/E ratio) of 15; it was re-imposed to 20 in 2002. Although P/E ratios are different among industries, CSRC imposed the P/E ratio ceiling on all companies, regardless of the difference among them. Furthermore, underwriter's responsibility is to help the issuer to win the quota set by government but not about allocation and offering.

[1] http://www.csrc.gov.cn/pub/newsite/zjhjs/

Until March, 2001, the Chinese government abolished the quota system and replaced with a verification system, the adoption of the approval system began operated. The approval system made the IPO issuing procedure became simplify and efficiency. And the new system provided investment banks opportunities to recommend qualified firms to CSRC for IPO approval (Zhou & Zhou, 2010). A company which intends to go public needs to hire an underwriter which provides training and assistance about stock issuing, in the meanwhile the company has to pass the examination concerning the laws and regulations about IPO issuing. After getting the permission from the CSRC, the IPO can start offering in public market (Guo & Brooks, 2009). It can be learnt that China moved to a standard registration system which allow firms to make decisions of going public by themselves, and the price can be set completely by the market. As the price is no more controlled by the P/E ratio, it leads to more rational pricing; and compare to former extremely high first-day return, the average degree of underpricing is expected to decrease.

Another important development in Chinese IPO market is in 2005, the book-building mechanism was introduced; and later in 2006, the on/offline bookbuilding developed gradually and became the main mechanism in current Chinese IPO market. In 2009, the latest reform taken place that CSRC set new rules to further improve the restraint mechanisms for pricing, subscription, placement and bookbuilding. Since 2009, online and offline subscription can't be made at the same time; and subscription limitation was set for online account. These will be explained later in thesis.

3.2 Offering Mechanism

Currently there are three major offering mechanisms in the world: bookbuilding, auction and fixed-price. Bookbuilding, which is widely used around the world such as U.S. and UK market. The investment banker elicits indications of interest from institutional investors to set the IPO price and allocate the shares (Biais & Faugeron-Crouzet, 2002). It typically starts with the setting of a file price range, and the commencement of a road show which might last two weeks. During the road show institutional investors are canvassed in regard to the state of their demands, while underwriters gain useful information about pricing. Then at the price meeting, which typically occurs one day before trading, the offer price will be

set at the most recent price range (Ritter, 2003).

The second one is the auction mechanism, which is commonly used in France. Investors submit limit orders and then the auctioneer sets the price as a function of aggregate demand. In auction mechanism, the price does not clear in the market (Biais & Faugeron-Crouzet, 2002). In Singapore and Finland, fixed price offering are used, whereby investors submit demands at the fixed price which set by underwriters and posted in prospectus (Biais & Faugeron-Crouzet, 2002).

The currently applied major offering method in China is the online/offline bookbuilding, which was introduced on 1st January 2005. For online/offline bookbuilding, issuers set the price range, then the strategic, institutional and individual investors subscribe online and offline. And due to the amount of subscription and price investors suggested, issuers set the final offering price. In China, individual investors cannot participate off line; and for strategic and institutional investors, who subscribed on/offline, cannot participate though the other platform. The process of online/offline enquiry is shown in the Figure 3.1.

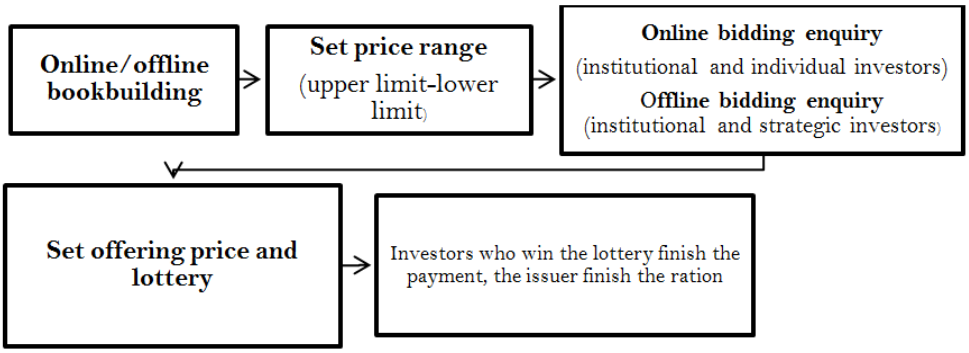

Figure 3.1: On/offline bookbuilding

The on/offline bookbuilding method is similar with bookbuilding in mature market. The new offerings are allocated to the successful subscribers through the electronic trading system (Guo & Brooks, 2009). Investors bid for fixed quantities,and they need to pay a full subscription deposit. For investors who did not get the bid, their repayment will be done around one week after subscription (Yu & Tse, 2006).

While compared to the bookbuidling applied in mature markets, there are some additional restrictions for online/offline bookbuilding. The offering is mainly to attract institutional investors, because a large proportion of shares are allocated in offline bookbuilding, while individual investors can only participate in online subscription. This makes individual investors expose to a disadvantage position, only limited shares are allocated in online offering while more subscriptions come from institutional investors, which leads to a low odd of winning the lottery for individual investors. Moreover in China, there is no right for underwriters to allocate shares, and they can not screen the subscribers.

Besides bookbuilding, other mechanisms also exist in Chinese IPO market. The online fixed pricing which is applied through the electronic trading system; and the rights issue, which the issuer issues rights to buy a part of its shares, to the general public through bookbuilding process. After the change in the mechanism, the bookbuilding becomes the major offering method, and the road show brings more information to issuers and underwriters, which helps to set offering price. With the improvement of offering mechanism, we expect the offering price to be more rational and the degree of underpricing decreases.

3.3 IPO Process in China

In this section, we will give a brief introduction of IPO process in China tgrough Figure 3.2. The IPO offering is at the primary market; it is between the issuers and investors. While the listing is for shares that to trade at the secondary market, it is the trading between sellers and buyers, the issuers are not involved. The submit reports about underwriting and offering to the CSRC should be handed within 15 days after the offering, and issuers have to accomplish all necessary procedures and qualifications before it listed in stock exchanges. Here in our research, we define the offering data as the day of prospectus registration, because it is the first time investors get to know about the offering, and the issuers are officially entering the offering process. The length between allocation and listing date is normally based on the completeness of information disclosure and the normalization of the offering process. The more missed information would lead to longer examining and auditing time before the permission to list in stock exchanges. In addition, between the allocation and listing date, IPO subscribers' investment is locked up

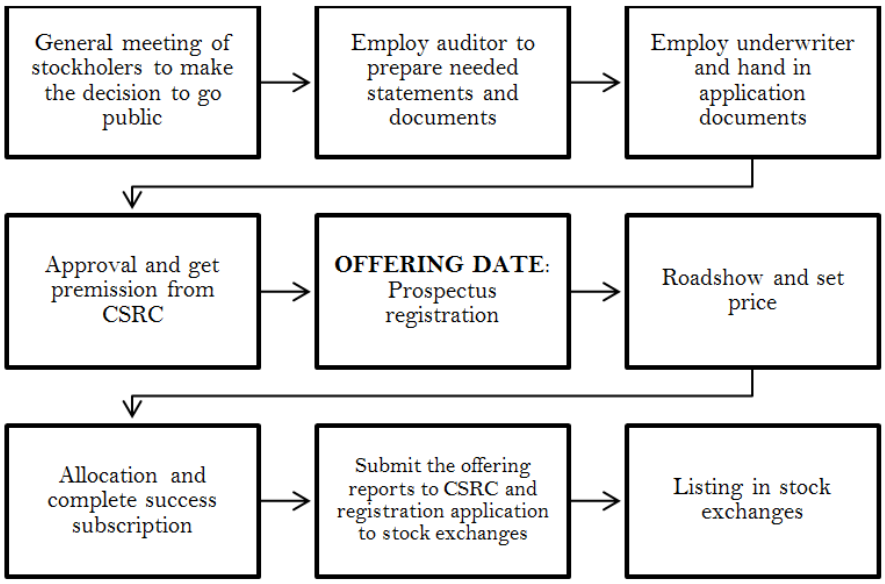

Figure 3.2: Brief IPO process in China

(L. G. Tian, 2003), the period leaves time for investors to gain information through other channels and consider their next actions in the secondary market.

3.4 Stock Exchange Markets and Share Types

Currently there are two organized stock markets in China, one is the Shanghai securities exchange and the other one is the Shenzhen stock exchange. These two largest stock markets are also in charged by CSRC. The two exchange markets used to be no difference except the geography before 2001, companies tend to choose the close-by exchange to be listed. While the government made decision to develop the Shanghai Stock Exchange and reinforce its position as a financial center, the Shenzhen Exchange stopped new issue since September 2000. After May 2005, Shenzhen Exchange started new issues again, but only for small and median enterprises. As the size of the enterprises can influence the IPO pricing, the underpricing level in two exchanges is also expected to be different.

Chinese A-shares are traded in former mentioned two markets which are hold by domestic (PRC) investors, while B-shares are for foreign investors. The studies done by Chan, Wang, and Wei (2004), Fabrizio (2000) and Mok and Hui (1998) illustrated that A-share is quite different from B-share in IPO underpricing. As

two shares are segmented and given their ownership and institutional differences (Mok & Hui, 1998), the underpricing in B-share is quite smaller with 11.6% against 178% in A-share. In addition, most of B-shares are issued after been listed in a Chinese exchange. Affected by former studies and considered these conditions, here we postulated that they are also different in the extent of the underpricing of their IPOs and our research only focus on A-share.

For a firm which is permitted to go public in China, usually there are five types of shares in the firm: state-owned shares, legal entity shares, employee shares, ordinary A-shares and ordinary foreign shares. Among these shares, the last two types are tradable shares known as A-share and B-share; the other types of shares are known as not-tradable shares because they can't be sold in the market (Guo & Brooks, 2008). In 2005, CSRC announced a new pilot program, inviting a first batch of four companies to transform not-tradable shares to tradable shares by compensating existing shareholders through various ways such as bonus shares, cash, and options (Beltratti & Bortolotti, 2006). And after that, CSRC kept on initiated the program of share reform, until the end of March 2006, 769 listed companies had either competed or initiated their not-tradable shares reform process. The reform aims to transfer the ownership to develop the market and represents a significant fact that IPOs in China used to represent the process of transferring state ownership to individual investors which is much different from IPOs in other countries.

Chapter 4

Hypotheses Development

The literature review done in last chapter has recommended several theories and hypothesis which might contribute to explain IPO underpricing. However in former studies, due to the difference between mature and developing markets, some of them may not adopt to Chinese market. So following, the most related factors which may have influences on the underpricing of Chinese IPO will be introduced. These factors include the time gap, the state-owned shares, the reputation of underwriter and auditor, the former ownership retention, and the quality of disclosure information. And for each factor, a hypothesis will be formulated.

4.1 Information Asymmetry Among Investors

The following two hypotheses are related to the information asymmetry among investors; they are formulated to test the winners curse among informed and uninformed investors, and help to explain the research question.

4.1.1 The Duration Time

The number of days between offering and listing is one key determinant of the underpricing (Mok & Hui, 1998). For former studies, the duration time was defined as the elapsed between the announcement day of an IPO and the first day of market trading (Guo & Brooks, 2009; D. Su & Fleisher, 1999). Here in our study, we still defined the offering date as the date of prospectus registration, although during our study period bookbuilding is the mainly used mechanism, and the price is no longer published in the prospectus while at the time of allocation. The date of

prospectus registration is the first time investors get to know about the issuers, and then investors will begin to seek for information and make their subscription decisions. As mentioned in former chapter, normally firms would like to fill their subscriptions as quickly as possible to raise the amount of capital they need. If the level of informed demand is high, and then issuers can finish the issue more quickly and do not need to use underpricing to attract the uninformed investors. Thus, the numbers of duration time can be used as the proxy to the informed demand. Hence, we will calculate the duration time since the prospectus registration date.

The length between the offering and listing is quite different across countries; former studies documented the average time to listing in Malaysia is 27 days between 1989 and 2000 while in Australia the average is 59 days between 1994 to 2004 (Brooks et al., 2009). However in china, Mok and Hui (1998) documented the time is quite longer than that in other countries which reached 200 days in early years. Due to this extremely long duration time in China, we formulate the hypothesis:

- *Hypothesis 1: the longer duration period, the higher underpricing will be.*

4.1.2 The State-Owned Shares

In China, the state-owned share is consisted of State-owned legal person share and State shares. And before the issuing, government already owned a part of the firm's shares. So compare to the government, other investor in the market can be considered as uninformed investors according to Rock (1986)'s model. Due to the possibility that government retained shares not only for the profitability, it uses the retention to make itself more influence in urging management of companies to follow state policies. Furthermore, Chen et al. (2004) suggested that a large number of shares on the hands of the state implies there will be marketability problems when the A-shares start trading, so in order to induce investors to subscribe IPOs where the state owned large part of the shares, the new issuers need to underprice IPO. According to the former studies, we assume that government is rich in information, so in order to keep the uninformed investors, government will require the issuers to underprice the IPO. Overall, we formulate the following hypothesis.

- *Hypothesis 2: the more proportion of state-owned shares, the more underpricing will be.*

4.2 Information Asymmetry between Issuer and Investor

The adverse selection theories focused on information asymmetry between issuers and investors. As reputations of underwriter and auditor are evident to show that issuers' value to the market, investors would consider the information and reduces the possibility of making wrong decisions. So the hypotheses are formulated to test the relationship between reputation and IPO underpricing level. Moreover, the retained ownership signals the market with the company's private information, so we also expect a relationship exists with underpricing degree.

4.2.1 Underwriter Reputation

Underwriters are employed during IPO process to help issuers with the offering. Issuers can understand the market and investors based on the information underwriters provided. And for the buy-side, through events such as roadshow and other channels, the underwriter provides the issuer information to the investors. As underwriter's reputation is based on its service quality, the more prestigious underwriter is more skilled in IPO issuing and is likely to inform investors better. So the underwriter reputation may be the proxy to judge the degree of information asymmetry, and the underpricing level. Furthermore, prestigious underwriters don't want to expose themselves to risk of issue failure which brought from low quality issuers, so they may refuse low quality issuers in order to protect their reputations. As a result, prestigious underwriters only consider underwriting high quality issuers, and IPOs underwritten by them are relatively the high quality ones. This also leads to less misevaluation by investors. So issues been underwritten by more prestigious underwriters are suggested to be less information asymmetry with investors.

- *Hypothesis 3: the more prestigious underwriter that issuer hired, the less underpricing will be.*

4.2.2 Auditor Reputation

For issue companies, they are required to hire auditors to have their financial statements audited during the IPO process. Normally, an entrepreneur with favorable information about its value chooses a higher quality auditor. Because

the higher quality auditor allows investors to make a more precise estimate of the firm's value (Titman & Trueman, 1986). It can be learnt that the reputation of auditor has been concerned as an important factor that influences the issue price. As a traditional view that prestigious auditors provide high quality auditing service, the quality is the joint probability of detecting and reporting material financial statement errors; and the level of accuracy of information the auditor supplies to investors (Firth & Smith, 1992). When a firm sells shares for the first time, the true value of the firm is imperfectly known by the investors, so the entrepreneur tries to reduce information asymmetry by more prestigious auditors and enhances the quality of their services. Then, the better service quality of the auditor would provide the market with the true value of the firm, and the investors can judge the issue with accurate information. Therefore, the employment of a 'national known' auditor will increase the offering price (reduce the initial return). Thus, we predict this hypothesis:

- *Hypothesis 4: the prestigious auditor that issuer hire, the lower underpricing will be.*

4.2.3 Retained Former-Ownership

As many researches indicate the percentage of retained shares would logically represent the value of the firm (Brealey, Leland, & Pyle, 1977; Keasey & Short, 1997), the firm value is positively related to the equity retained. Brealey et al. (1977) suggested that the level of shares retained by the entrepreneur can perfectly reveal its private information. Also, Titman and Trueman (1986) indicated that the level of retained former ownership can be viewed as an observable decision made by entrepreneur to provide information. If the company insiders choose to retain a large portion of the shares, that is because based on their information, they expect the shares to go up in value. Moreover, Grinblatt and Hwang (1989) tested the relation between the fractions of equity retained by issuers and underpricing, a positive relationship was provided.

So information asymmetry between issuers and investors should be reduced, as the retained former ownership expresses the high quality of the firm, and so does the undervaluation by investors. As issuers reveal the market their quality information by the portion of retained ownership, there is less necessary for them to underprice

issues. So we formulate the following hypothesis:

- *Hypothesis 5: the more proportion of former ownership retained, the less underpricing will be.*

4.3 Information Asymmetry between Underwriter and Issuer

For the information asymmetry between issuers and underwriters, because issuing firms are likely to be asymmetrically well informed about their own business situation, then this information asymmetry can affect pricing because issuers have an incentive to misrepresent themselves to potential investors as higher quality than they actually are. In order to overcoming this, underwriter is employed to provide information and advice for reasonable pricing. While Baron (1982)'s model noted that IPO underpricing may result when there is a considerable information between issuers and underwriters. Issuers are seeking for a maximized capital raised from initial offering while underwriters would not like to advice a high offering price Because underwriters may take advantage of their superior knowledge of market conditions to underprice offerings, which permits them to reduce the IPO marketing costs and help the underwriter to maintain better relationship with the buy-side such as large institutional investors for future business. This information asymmetry also gives underwriter advantage so they will give the optimal pricing advice on their stances.

Many previous studies investigate the relationship between underwriter reputation and IPO underpricing, and some of them suggested a negative relation between underwriter reputation and underpricing as we mentioned in previous section that prestigious underwriters use their superior skills to reduce the information asymmetry between issuers and investors. However, in more recent studies by examining American IPOs in 1990s, the result changed. Loughran and Ritter (2003) documented there is a positive relationship between the reputation and underpricing. As the result for this relationship is mixed, we suggest that prestigious underwriters have more sustainable relationships and future repeated business with their long-term clients. While for less prestigious underwriters, they would like to underprice more for seeking and maintaining clients, and saving more marketing

costs for their own business developing plan. Therefore, we suggest that prestigious underwriter would underprice issue less, and the hypothesis remains the same with Hypothesis 3:

- *Hypothesis 3: the more prestigious underwriter that issuer hired, the less underpricing will be.*

Chapter 5

Method and Data

In this section, based on the previous literature review, the main methodology will be introduced to tackle the research question. In order to confirm the hypotheses and research question, the OLS regression model will be formulated. Firstly, the measure for IPO underpricing will be determined. And then we will discuss the variables as well as the method. Furthermore, information for the data and the selection criteria will be introduced.

5.1 Measurement of IPO underpricing

Based on the previous literature review and referred to the definition of IPO, there are variety ways of measuring the IPO underpricing. One of most used one of the extent of the IPO-Underpricing could be measured as the difference between the first trading price and the issue price. In this research, IPO underpricing is defined as IPO initial return at the end of the first day. The degree of IPO underpricing, consistent with previous studies, we employ the methodology used by Aggarwal, et al. (1993) to measure the first day initial return for IPO, which is also been used by other researchers such as Chen et al. (2004), Mok and Hui (1998), and Yu and Tse (2006).

$$RAWIR = (P_1 - P_0)/P_0 \tag{5.1}$$

Where P_1 is the closing price on the first day of trading, P_0 is the IPO offering price. In most studies, the first day trading price on the first exchange trading is taken into account in analyses the price effects of initial public offerings. For example,

Lim and Saunders (1990) used the closing price on the first trading day, while Carter and Manaster (1990) calculated it as the price appreciation between the offering price and a secondary market trading price two weeks later. And in order to make the initial return of a share comparable to another, researchers customary to quote the initial return in relation with the issue price and multiply with 100 to get a proportional return.

Because the above calculation only provides information that the stock is underpriced or overpriced, since there is no standard of comparison. Furthermore, the raw initial return doesn't take the overall market effect into account, so the level of underpricing should be adjusted by the return of the market. Therefore, here the market-adjusted underpricing is used, which can value underpricing more accurately. The market-adjusted initial return equals to raw initial return minus the A-share composite index return from the IPO date to its first trading date. And the market-adjusted initial return will be calculated as follow:

$$MAIR = RAWIR - (I_1 - I_0)/I_0 \tag{5.2}$$

Where I1 is the closing price of the A-share composite index on the first trading date and I0 is the closing price of the A-share composite index on the IPO date. And $(I_1 - I_0)/I_0$ is the A-share composite index return from the IPO date to the first trading date. The index here will be the SHSE or SZSE A-share composite index on the offering day. In our research, the market-adjusted initial return will be used as the measurement of IPO underpricing.

5.2 Research method

In our research, we would like to employ the variables based on information asymmetry for Chinese IPOs, to find out if these factors affect underpricing significantly in Chinese market. Based on previous studies, regression analysis and meta-analysis are usually used to estimate the relationship between possible factors and IPO underpricing. In Yu and Tse (2006)'s research, they used multiple linear regression model to examine the explanatory power of several determinants of IPO underpricing; in Chen et al. (2004)'s study, they employed a cross-sectional model to explain underpricing, which incorporates variables that have been examined in previous

studies. While Guo and Brooks (2008) used Ordinary Least Squares (OLS), which are estimated using White Heteroskedasticity consistent standard errors, to analyze underpricing of IPOs. In statistics, ordinary least squares (OLS) is a method for estimating the unknown parameters in a linear regression model. This method minimizes the sum of squared vertical distances between the observed responses in the dataset and the responses predicted by the linear approximation[1] . Moreover, Daily, Certo, Dalton, and Roengpitya (2003) employed meta-analytic to identify empirical research relevant to the correlates of IPO underpricing, which enables the researcher to aggregate the results across separate studies on a given topic in order to obtain an estimate of the nature of the relationship between two variables, and the procedure corrects for a variety of statistical artifacts.

In order to test all hypotheses of last section, we will use the OLS regression model consisted of relevant variables based on the previous studies. Moreover, we will employ four related factors as control variables to the regression. So the OLS regression is formulated as:

$$\begin{aligned} MAIR_{1st} =& \alpha + \beta_1 DT + \beta_2 REPU + \beta_3 REPA + \beta_4 GOV + \beta_5 RO \\ &+ \beta_6 BB + \beta_7 AGE + \beta_8 SIZE + \beta_9 Ex + \varepsilon \end{aligned} \tag{5.3}$$

Where: $MAIR_{1st}$ is the market-adjusted initial return of IPO at the first day listed in Chinese Exchanges; $\alpha = constant$; DT is the duration time that the days elapsed between offering and listing of IPO; $REPU$ is the underwriter reputation; $REPA$ is the auditor reputation; GOV is the proportion of state-owned shares on total shares after IPO process; RO is the proportion of former ownership retained. Besides the relevant variables are the control variables: BB is a dummy variable of bookbuilding which code one (1) if the IPO's price set by bookbuilding mechanism, otherwise code zero (0); AGE is the firm age which measured as the number of years from the setting date of the company to the date of the IPO; $SIZE$ is the number of firm's shares before offering; Ex is another dummy variable for issuing exchange, IPOs issued in Shanghai code (1), otherwise IPOs issued in Shenzhen code (0). ε is a random error term.

For the regression, the market-adjusted initial return is the dependent variable, and

[1] http://en.wikipedia.org/wiki/Ordinary_least_squares

the prestige of involved entities, the stock ownership and the time delay are independent variables. The main experimental variables are $DT, REPU, REPA, GOV$ and RO. The duration time and state-owned shares variables are characteristics unique China, while reputation of underwriter and auditor, and the retained former ownership are more common in most markets.

Besides the relevant variables, to control for the mechanism effect, we use a dummy variable of bookbuilding mechanism to measure whether an IPO firm applies bookbuilding during the offering process. Compared with former Chinese IPOs, most of them used fixed priced during offering; the new introduced bookbuilding mechanism is supposed to help reduce information asymmetry, because the process increases the information exchange level among participators of IPO. As this mechanism is new to Chinese market, different observation from former test would be interesting. So in the regression, bookbuilding as a control variable will be included to help observing the influence of the mechanism. And we expect a negative coefficient for bookbuilding and underpricing in regression.

Firm age is defined as the number of years from the setting date of the company to the date of the IPO. As suggested by Chen et al. (2004) and Lee et al. (1996) that the information asymmetry is less for older companies as there are more publicly available information about them. What's more, longer operating history of company may provide market participants with information which can reduce uncertainty (Beatty, 1989). In order to control for the issue age effect, we employ this variable as control variable. Here we expect a negative coefficient for firm age with underpricing level.

As mentioned before, two stock exchanges in China are not only different in geography, but also differenced in the company size. The IPOs issued in Shenzhen securities Exchange are small and median enterprises, the company size compared with that issued in Shanghai securities Exchange is smaller. Also, Chen et al. (2004) and Gao (2010) documented the effect of the firm size to IPO underpricing that information asymmetry is higher for small firms because they may attract less analysts and investor attention, and therefore, their IPOs may suffer more from information asymmetry. Here we make this control variable a dummy variable, IPOs issued in Shanghai code 1, otherwise issued in Shenzhen code 0. So we predict

a negative relation between the exchange and underpricing.

Besides, the firm size will be used as control variable in our research. It is defined as the number of shares before offering, as investors cannot forecast if the offering will be successful before the issuing finished, so the number of shares before offering is more reliable. Information asymmetry is lower for large size companies as there is more publicly available information on them and they attract more analysts and investor attention (Chen et al., 2004; Gao, 2010; Lee et al., 1996) , therefore we need to control for the firm size effect, and we assume it negatively related to IPO underpricing degree. .

The proposed relationship between variables and measurement will also be shown in summary in Table 5.1.

For this regression, we will first measure each variable with the mean, the median, the standard deviation, the minimum, the maximum and the number of samples. Then the correlation between the variables will be tested, the results will provide us the information if there is any coherence between two variables. The levels of significance will show if the relationships exist significantly. R^2 will give information of explanation power of the regression.

5.3 Sample data

As this research focuses on the underpricing of Chinese IPOs which are successfully issued, the dataset of this research is based on primary and secondary data such as database and website. In this research, all available information of Chinese IPO in A-share were collected from GuoTaiAn (GTA) database, which is a leading global data provider of Chinese financial market, industries and economic. All the explanatory variables are calculated based on the data from GTA database. Further, some supplementary data are added into the research data gained from website.

We choose the data of successfully issued IPOs in A-share at two main securities exchanges from GTA database from January 2005 to December 2012. For the time period perspective, because most researches on Chinese A-share IPOs were done before 2005, while IPOs issued before 2005 have a lot of problems such as

unusual rules on issuing, listing and trading, pricing and allocation mechanisms, etc. As the reform certainly affected and improved the IPO process such as the use of bookbuilding, therefore we assume the underpricing degree also changed, so the data before 2005 will be excluded in this research. And we also exclude 2013, as CSRC currently pause the IPO from offering in Chinese market. It can be learnt that until 29th August 2013, there were 656 IPOs are still waiting for offering permission form CSRC, so there is no IPO in 2013 .

A total of 1170 successfully issued IPOs in Chinese market as A-share from January 2005 to December 2012, and these IPOs were their first time issue. Among these IPOs, 151 were listed in Shanghai securities Exchange and 1019 are listed in Shenzhen securities Exchange. Among IPOs which listed in Shenzhen securities Exchange, 663 IPOs were listed in Small and Median Enterprise Board which is one part of Shenzhen securities Exchange, and 355 IPOs were listed in Growth Enterprise Market (GEM) which is also a part of Shenzhen securities Exchange. Furthermore, we exclude foreign-owned B- and H- shares, because most of them are not issued at the first time, they usually issued after been listed in a Chinese exchange.In addition, we eliminate IPOs with missing important data, such as underwriter information, first day prices, and the prospectus registration date.

After apply this criteria, 786 IPOs left and there is no IPO offered in 2005 left in our database. As a result, we exclude the IPOs in 2005 and our sample starts from June 2006 to October 2012. A sample of 786 A-share IPOs will be used in this analysis. And the data is analyzed by Excel, SPSS and Eviews.

Table 5.1: Summary of variables relationship and measurement

Variables	Relatioinship with MAIR	Measurement
DT	+	The number of days between offering and listing date
GOV	+	The sum of State-owned legal person share and State shares, divided on the company's total shares
$REPU_1$	+	Proceeds divided on total market share, and then rank into 3 groups (1st, 2nd, and 3rd)
$REPU_2$	+	Number of managed IPOs, and then rank into 3 groups (1st, 2nd. and 3rd)
$REPA_1$	+	Ranking by Chinese Institute of Certified Public Accountants (CICPA)
$REPA_2$	+	Audit fee divided on total market share, and then rank into 3 groups (1st, 2nd, and 3rd)
RO_1	-	The sum of each senior managers retained shares divided by the total shares
RO_2	+	Issue size divided on total shares
BB	-	IPO applied bookbuilding code 1, otherwise 0
AGE	-	The number of years from the setting date of the firm to the date of the IPO
EX	-	IPO listed in Shanghai securities exchange codes 1, otherwise 0
SIZE	-	The total shares of the firm before offering

Chapter 6

Variable Definitions and Descriptive Statistics

This section is mainly about the underpricing and other independent variables. According to former studies, we first partition the underpricing statistics on the basis of the listing year; the definitions and calculations will be given in order to have an in-depth insight of these variables; then follow with a summary of all the descriptive statistics for IPO underpricing.

6.1 The underpricing

Now we proceed to apply the method mentioned in the methodology section, to estimate the returns on the IPOs by the market-adjusted initial return. Mean of the measurement will be calculated and the trend of IPO underpricing from 2006 to 2012 will be presented in Figure 6.1, and each year's market-adjusted initial return will be calculated and present in Table 6.1. Firstly, the index in our research will be the SHSE or SZSE A-share composite index on the listing day. Secondly, we will only choose to look for underpricing at the first trading day (t=1) because of the database limitation.

The Figure6.1 shows the market adjusted initial return from 2006 to 2012 the trend of IPO underpricing degree increased from 2006, it met the peak in 2007, and then continued decreasing since 2008, finally reached a stable level from 2010 to 2012. Although during some years, the underpricing level is higher than other years, but the overall underpricing degree was not as high as before, furthermore, in 2011 and

2012 it maintained underpricing degree around a low number at 24%.

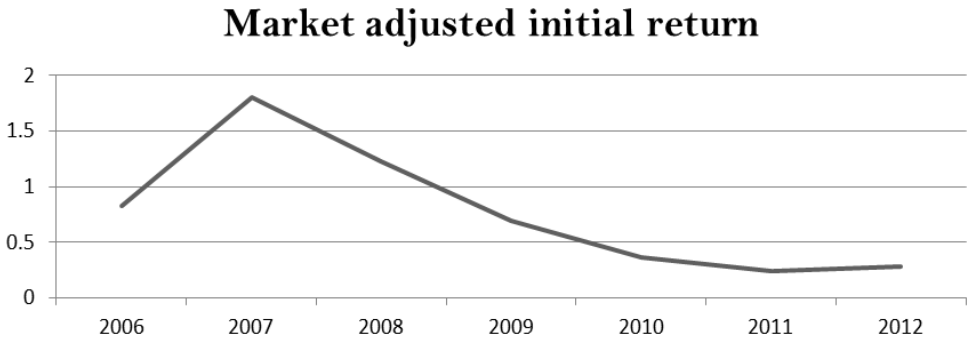

Figure 6.1: Means of MAIR from 2006-2012

Table 6.1: Summary statistic of IPO MAIR in China (2006-2012)

Year	**Market-adjusted Initial Return (T=1) (%)**					
	Mumber	Mean	Median	Maximum	Minimum	S.d.
2006	66	82.78	69.08	352.76	-1.23	0.6152
2007	118	180.12	160.63	562.51	32.13	1.0907
2008	74	122.43	88.67	441.15	25.00	0.9256
2009	80	69.04	62.23	205.44	-0.49	0.3838
2010	78	36.50	31.92	138.87	-3.39	0.2978
2011	220	24.45	16.57	185.97	-18.64	0.3045
2012	150	24.67	15.25	608.02	-20.94	0.5533

The summary statistics of the market-adjusted initial return over the sample period is presented in Table 6.1. The sample includes all 786 Chinese IPOs in the dataset from 2006 to 2012 period on the first day calculated for each year. The table provides the number of observations each year, the mean and median of market-adjusted initial return. The description of 2007 is outstanding as Chinese IPO market experienced a hot issue market and raised more than 400 billion RMB. The most important thing happened in this year's IPO market is a lot of high market value Chinese-funded Enterprises which listed in Hong Kong Exchange returned to A-share, and issued successfully in A-share. Moreover, many financial institutions issued IPOs together in 2007. Then the value of $MAIR$ decreased in later years. As the table also presents other values, the standard deviation indicates the data points are spread out over a larger ranger of values in 2007 than other years. Furthermore, the description of year 2010 to 2012 shows that the

underpricing degree is much lower than before. As we can learnt from Ritter's IPO Underpricing Database that the IPO underpricing in US market in the period from 2006 to 2012 is around 12%, the result indicates that Chinese IPO underpricing is getting closer to developed market than before.

6.2 Duration time

The duration time is the time gap between an IPO's offering and listing date; the variable measure will be calculated as the number of days. In this measurement, we include the weekends during the time gap. As in China, although stock exchanges don't work during the weekends, investors still can seek and gain information about IPO. The statistics of this variable will be presented. Table 6.2 indicates whole sample during the overall period from 2006 to 2012, the trend of duration time length decreased. The mean is much smaller when compared with former study done by Guo and Brooks (2008), which documented that the mean of duration time from 1984 to 2005 is 203 days and the maximum is 4046 days.

Table 6.2: Descriptive Statistic of Duration Time (2006-2012) (day)

Year	**Duration time between offering and listing date**				
	Mean	Median	Maximum	Minimum	S.d.
2006	21	17	77	0	11.7454
2007	24	23	54	0	10.6770
2008	38	39	80	4	18.2879
2009	33	30	117	1	22.5292
2010	38	35	376	1	45.3345
2011	19	13	119	1	15.0565
2012	32	14	154	1	34.0131

6.3 Ownership structure

The government controlled shares and insider retention are considered in our research, so the definitions and measurements for these two variables will be introduced as follow.

6.3.1 The proportion of state-owned shares

The state-owned share is consisted of state-owned legal person share and state shares, so it will be calculated as the sum of these two shares after the IPO process. Then the variable is the sum divided by the company's total shares. The statistic summary of this variable in the period from 2006 to 2012 is presented in Table 6.3.

One interesting observation is that after 2007, the proportion of state-owned shares dropped sharply, and the median and minimum are 0 at most years. This can be explained by the reform of Chinese share market, because during 2065 to 2007 most companies accomplished the transfer of state-owned shares, so since 2008 the proportion became to decrease. Additionally, there are also many companies founded after the market reform, compared with older companies, the ownership structure is different.

Table 6.3: Descriptive Statistic of proportion of State-owned shares (2006-2012)

Year	**Proportion of atate-owned shares (%)**				
	Mean	Median	Maximum	Minimum	S.d.
2006	25.68	8.49	77.86	0	0.2919
2007	21.51	0	86.29	0	0.2822
2008	15.03	0	79.99	0	0.2612
2009	13.38	0	76.29	0	0.2406
2010	8.10	0	83.37	0	0.1969
2011	3.14	0	74.11	0	0.1217
2012	6.17	0	83.68	0	0.1838

6.3.2 Former retained ownership

In order to differentiate from the state-owned shares, it is excluded from the former retained ownership. And managers as insiders who know well about the company operation, we consider senior managers are the insiders of a company and normally they have superior information than other employees and outsiders. Therefore we suggest using the share that senior managers retained as a proxy to measure retained shares as insider's shares, the more retained senior managers shares, the higher underpricing degree will be. The variable RO_1 will be calculated as the sum of each senior manager's retained shares divided by the total shares.

In order to examine whether the result in the last section is robust, another measurement RO_2 will be used. As we learnt from literature that for high quality issuers, as insiders do not want to experience large wealth loss to sell their shares at IPO price which is usually lower than the true value of shares, they intend to keep more proportion of shares and sell less (D. Su, 2004). So here we consider that the smaller issue size compare to the total equity, the more former owners retained the shares of the company. TThe proportion of retained shares is similar for these 786 issuers. Our data is quite different from former study, as E. Chang et al. (2008) documented that little managerial ownership is one specific characteristic in China, while in our study, the average retained managerial ownership is 27%, and for RO_2 the mean is 25%. The statistic summary of this variable is presented in Table 6.4.

Table 6.4: Descriptive Statistic of former retained ownership (2006-2012)(%)

Year	**Mean**		**Median**		**Maximum**		**Minimum**		**S.d.**	
	RO_1	RO_2	RO_1	RO_2	RO_1	RO_2	RO_1	RO_2	RO_1	RO_2
2006	12.50	30.47	0.15	28.96	69.36	54.29	0	3.94	0.1842	0.0991
2007	19.83	23.96	5.46	25.16	75	37.92	0	2.19	0.2565	0.0608
2008	25.73	24.04	15.55	25.05	76.48	30	0	9.63	0.2686	0.0381
2009	28.92	24.07	27.90	25.04	68.81	40	0	10.00	0.2541	0.0487
2010	30.95	24.73	32.67	25.07	72.59	30.59	0	10.45	0.2569	0.0289
2011	34.07	24.26	40.76	25.00	73.51	31.25	0	3.36	0.2513	0.0341
2012	27.31	23.97	20.15	25.00	79.07	29.96	0	9.89	0.2541	0.0352

6.4 Underwriter and auditor reputation

Auditors and underwriters play significant roles in underpricing because they are in charge of issuers' financial condition; advising pricing for these IPOs. As the reputation is hard to measure, based on former studies, proxies for underwriter reputation will be employed. Motivated by research done in European by Torstila (2001) suggested that IPOs backed by prestigious underwriters have higher spread than those backed by inexperienced underwriters. As we know that the fee charged by underwriter is consisted of gross spread, management fee and other underwriting fee, while management fee and underwriting fee normally is fixed, so prestigious underwriters help raised higher gross spread. The proxies for Auditor Reputation will be set in a familiar principle but based on the audit fee.

6.4.1 Underwriter reputation

Overall, there are 75 underwriters who manage or co-manage at least one IPO over the entire sample period from 2006 to 2012.

The measurement of underwriter's reputation will related to the gross proceeds, it is based on the hypothesis of Megginson and Weiss (1991) and used by C. Su and Bangassa (2011), that the greater the relative market share of IPOs managed by the underwriter, the more prestigious the underwriter. So influenced by former studies (Guo & Brooks, 2008; Neupane & Thapa, 2012; C. Su & Bangassa, 2011), we calculated the underwriter reputation as the ratio of total gross proceeds raised by each underwriter to total gross proceeds raised in the market over the sample period 2006 to 2012. All underwriters that managed at least one A-share over the entire sample period are ranked into 3 groups according to the gross proceeds until 2012, and underwriters are classified into three ranks according to their market shares: 1st rank, 2nd rank and 3rd rank. 1st rank is assumed to be the most prestigious underwriters while 3rd stands for the least prestigious group with the low gross proceeds. The class width is defined as the upper limit minus low limit, and then divided by three as we want to assign underwriters into three groups. The upper limit of each group is not included in its own group. Due to the limitation of the database, for more than one underwriter managed the IPO perspective, we only count the main underwriter because we can not find the managed proportion of shares for each underwriter. The ranking and underwriter information is listed in Table 6.5.

Table 6.5: Descriptive Statistic of $REPU_1$ (2006-2012)

Rank of underwriter	**Range of relative market share**	**Total relative market share**	**Numbers of IPOs**	**No. of underwriter**
1st rank	8.77%-13.15%	23.89%	38	2
2nd rank	4.39%-8.77%	31.41%	134	5
3rd rank	0.01%-4.39%	44.70%	614	68
Total	0.01%-13.15%	100%	786	75

For robustness test, we employ another measurement for underwriter reputation.

Influenced by the ranking[1] given by Securities Association of China (SAC) and C. Su and Bangassa (2011), we assume that if an underwriter has managed more IPOs, it is much better known by investors and therefore higher reputation it has. Here we calculated the numbers of deals for each underwriter who managed IPO as main underwriter and also rank them into 3 groups as $REPU_1$, the ranking is presented in Table6.6.

Table 6.6: Descriptive Statistic of $REPU_2$ (2005-2012)

Rank of underwriter	Range of relative IPO number	Total relative market share	Numbers of IPOs underwritten	Numbers of underwriter
1st rank	56-84	9.12%	167	2
2nd rank	29-56	11.93%	175	5
3rd rank	1-29	78.95%	444	68
Total	1-84	100%	786	75

Besides the tables, the data shows that underwriters in Chinese market average managed 10 IPOs; furthermore, the most prestigious underwriter managed 84 IPOs. The detailed list of underwriters will be placed in Appendix A.

6.4.2 Auditor reputation

For auditor reputation, we use the ranking[2] from Chinese Institute of Certified Public Accountants (CICPA) given in 2012. The ranking is the result of considering factors including the business, the number of Certified Public Accountant (CPA), and punishment of CPA. In the sample there are 47 auditors who managed at least one IPO. We employ the ranking as the measurement of auditor reputation, the highest reputation auditor ranked 1 while the lowest ranked 47. Furthermore, for measurement $REPA_1$ we predict a positive relation with $MAIR$. For auditor perspective, the Big 4[3] auditors are at the top of the list with 64 IPOs been audited, while 10 national well-known auditors followed behind and audited more than 400 IPOs.

[1] http://www.sac.net.cn/ljxh/xhgzdt/201305/t20130529_62416.html
[2] http://www.cicpa.org.cn/top100/top2012.html
[3] http://en.wikipedia.org/wiki/Big_Four_%28audit_firms%29

For the robustness test, we need another proxy for this variable. Former studies identified that reputation of auditor can be measured by more than one way, Chahine and Filatotchev (2011) noted in research that by paying higher audit fees, IPO firms may benefit by the high audit quality and reduce information asymmetry; and Watkins, Hillison, and Morecroft (2004) also suggested that audit fees are generally assumed to be positively related to audit quality. Influenced by former studies and the measurement for underwriter reputation, here we employ the ratio of audit fee to total market audit fee, and then classify auditors into 3 ranks: 1st rank, 2nd rank and 3rd rank according to the ratio. 1st rank is assumed to be the most prestigious auditors while 3rd stands for the least prestigious group with the low audit fee.The result is presented in Table6.7. Even some auditors performed will in overall business, we only consider the performance in IPO business which may result difference to $REPA_1$'s ranking.

Table 6.7: Descriptive Statistic of $REPA_2$ (2005-2012)

Rank of Auditor	**Range of relative market share**	**Total relative market share**	**Numbers of IPOs audited**	**Numbers of auditor**
1st rank	9.74%-14.59%	37.12%	177	3
2nd rank	4.89%-9.74%	20.86%	108	3
3rd rank	0.036%-4.89%	42.02%	500	41
Total	0.036%-14.59%	100%	786	47

Besides the table, the data also shows that Top-10 auditors earned more than half proportion of market share, and the most earned auditor get 70.5% of market share. Moreover, for these 10 top auditors, they have provided financial services to 432 IPOs which is almost the half amount of total issued IPOs.For more details, Appendix B will present the full information of auditors.

6.5 Summary statistic of variables

After explain the definition and calculation of variables, a summary of the descriptive statistics for these variables for the whole sample period (T) will be presented in Table 6.8. Combine with former observations of each year, it can be learnt that the market condition is quite different. In order not avoid the market effect on IPO underpricing, we will divide the sample period into two parts and give separate

analysis to check if the results still can confirm our hypotheses. As we learn from report[1] done by Communication of Finance and Accounting, that Chinese A-share market in 2007 is a hot issue market, IPO raised more than 477 billion RMB which was not only the highest record of Chinese market, but also the top of globe market, while US market ranked second with less than 4 billion dollars. But 2008 for Chinese market was a cold market, although IPO market raised 103 billion RMB, compared with that in 2007, the capital amount decreased more than 79%. Moreover, another report[2] documented that the 7th bull market of Chinese stock market started from 2005 to 2007; while the 7th bear market was from 2008 as the effect of American sub-prime mortgage crisis, and it lasts until now. Thus, we decide to split our sample time into 2 periods: 2006 to 2007 and 2008 to 2012, and name the time period T_1 and T_2. The statistic description of mean and median is present in Table 6.8, and for full detail information, it is listed in Appendix C.

Table 6.8: Summary statistic of IPO (2006-2012)

Varibales	**T(2006-2012)**		T_1**(2006-2007)**		T_2**(2008-2012)**	
	Mean	Median	Mean	Mediam	Mean	Median
MAIR	0.6772	0.4187	1.4543	1.1348	0.4447	0.3006
DT	28	19	23	21	29	17
GOV	0.1102	0	0.2313	0	0.0741	0
RO1	0.2721	0.2104	0.1729	0.0236	0.3018	0.3080
RO2	0.2469	0.2501	0.2648	0.2532	0.2415	0.2500
BB	0.9733	1	0.9724	1	0.9736	1
AGE	7.8944	7	5.9834	5	8.4661	8
EX	0.1361	0	0.1934	0	0.1191	0
SIZE	1,758	83.84	6,450	92.57	344.9	81.69

Table 6.8 presents the summary descriptive statistics for all variables of 786 observations. Although the overall $MAIR$ is still high, and in some years, an extremely high $MAIR$ of 600% also existed. While comparing with former studies done on Chinese market, the number decreased, and became closer to other mature markets. The average duration time period is 28 days, and table presents that in cold issue market issuers took longer time to sell their shares than in hot issue market. Furthermore, we can observe that the proportion of shares is decreas-

[1] http://www.cnki.com.cn/Article/CJFDTotal-CKTX200920067.htm
[2] http://wenku.baidu.com/view/64daf03431126edb6f1a10dd.html

ing from 2006 to 2012. While for the two measurements of retained ownership, the average values are both less than 30%. We exclude the underwriter and auditor reputation in this table as we measure these two variables based on the whole sample period performance, and these variables are measured in ranks. For reputation perspective, combine with Table 6.5, 6.6 and appendix, it can be indicated that most underwriters have the same amount of market share around 1.3%. And for auditors, the average market share is around 2%. Further information of these two variables can be found in previous sections and Appendix A and B.

Among the control variable perspective, the Bookbuilding and Exchange are dummy variables. The summary presents that more than 96% IPOs offered their issues by applying bookbuilding mechanism. And 679 IPOs are issued in Shenzhen Exchange while the left are issued in Shanghai Exchange. The companies issued during this period with an average 8 years' history, and in later period issuers tend to have longer history. In addition, the unit of Firm size is million, and the average firm size in T_1 is obviously much larger than that in T_2.

The different observations in two time periods may lead to different analysis results in next chapters.

6.6 Muilticollinearity

As the multicollinerity could affect the OLS regression if there is a high correlation between independent variables, so in order to fit the model well, before the test of the regression we calculate the correlation coefficient. The parson correlation is used to analyze the coefficients between $MAIR$ and other variables, including independent and control variables. Table 6.9 presents the Person correlation coefficients between major variables. As shown in the Table 6.9, the majority of variable correlations are less than 0.40, the issue of multicollinearity presents not serious. Besides, the two auditor reputation variables are correlated, and so does the retined ownership and state-owned shares. Therefore, these variables will be used in both main test and robustness test.

Table 6.9: Correlation coefficient matrix

	MAIR	DT	GOV	REPU1	REPU2	REPA1	REPA2	RO1	RO2	BB	AGE	EX	SIZE
MAIR	1												
DT	-.019	1											
GOV	.132**	-.038	1										
REPU1	-.012	.088*	-.151**	1									
REPU2	.008	-.133**	.129**	.178**	1								
REPA1	.023	-.015	-.132**	.132**	-.042	1							
REPA2	.059	-.012	-.005	.071*	-.058	.595**	1						
RO1	-.070	.016	-.446**	.134**	-.071*	.077*	.073*	1					
RO2	.078*	-.008	-.080*	.208**	.038	.162**	.100**	.046	1				
BB	-.306**	-.017	.004	.020	.092*	-.003	-.061	-.007	.025	1			
AGE	-.238**	.001	-.147**	.055	.021	-.032	-.063	.012	-.071*	.093**	1		
EX	-.092**	-.133**	.457**	-.257**	.121**	-.150**	-.128**	-.311**	-.239**	.066	.018	1	
SIZE	.099**	.033	.051	.028	.053	-.017	-.004	-.046	.048	.002	-.027	.026	1

6.7 White Heteroskedasticity test

Influenced by former study (Guo & Brooks, 2008), we will employ the White Heteroskedasticity test to test the presence of heteroskedasticity in the application of OLS regression. If the heteroskedasticity present in the model, it can invalidate the significance of statistical tests,and the variances do not vary with the effects being modeled. So besides the correlation test in last section, the White Heteroskedasticity test will be done and the result is presented in Table 6.10.

Table 6.10: Heteroskedasticity Test: White

F-statistic	0.908901	Prob. F(87,593)	0.7055
Obs*R-squared	80.12454	Prob. Chi-Square (87)	0.6861
Scaled explained SS	334.2560	Prob. Chi-Square (87)	0.0000

Table 6.10 indicates the F-statistic is 0.9089 with P-value of 0.71 which is much greater than 0.05. In this case we are working at a 5% significance level, it is clear that there is no presence of heteroskedasticity. Since heteroscedasticity is not present in the model, the OLS estimate should be optimal. Therefore, we will employ these variables in both main and robustness tests.

Chapter 7

Empirical research and analysis

As the statistic description in last section shows some difference in variable values in two periods, we decided to make our test into two parts. First, we test our variables through the whole sample period, and then followed with tests done in two separated periods to check if our result can be confirmed in different market conditions.

7.1 Research analysis over all period (T)

The result of OLS regression for the whole sample period (T) is computed by SPSS and presented in Table 7.1.And results of 2006 to 2007 (T_1) and 2008 to 2012 (T_2) can also been observed. The measurement of underpricing degree is $MAIR$ on the first day. And for reputation and former retained ownership, $REPU_1$, $REPA_1$ and RO_1 will be used in this regression. The t-value with significant level is listed below the coefficient.

The Table 7.1 first indicates the OLS regression tests T period with all independent variables and the result indicates the model is reasonably well specified with the significance level of 1% (F statistic is 18.696) and adjusted R square on 16.9%.

Learn from the table, we can see that during the whole sample period, only state-owned shares has a significant relationship with market-adjusted initial return; while all the other proposed relationships turn out to be insignificant.
For the duration time and the market-adjusted initial return, we predict there is a

Table 7.1: Regression results of $MAIR$ (2006-2012)

Variables	Time periods		
	T (2006-2012)	T_1 (2006-2007)	T_2 (2008-2012)
(Constant)	2.432	2.255	2.320
	(10.726)***	(3.614)***	(13.288)***
DT	-0.001	-0.005	0.001
	-1.229	-0.620	0.699
GOV	0.580	0.228	0.352
	(3.891)***	0.631	(2.828)**
REPU1	-0.015	-0.087	0.018
	-0.279	-0.691	0.419
REPA1	0.001	0.001	-0.002
	0.551	0.231	0.176
RO1	-0.153	0.660	-0.056
	-1.266	(0.089)*	-0.637
BB	-1.467	-0.457	-1.831
	(-8.553)***	-0.965	(-14.127)***
AGE	-0.031	-0.013	-0.013
	(-5.448)***	-0.614	(-3.147)***
EX	-0.402	-0.768	-0.173
	(-4.260)***	(-2.972)***	(-2.430)**
SIZE	0.000	0.000	0.000
	(2.762)***	0.824	0.571
Number of observation	786	181	605
R^2	17.8%	11.4%	30.1%
Adjusted R^2	6.7%	18.2%	29.1%
F statistics	(18.696)***	(2.445)***	(28.524)***

***significance level of 1%, ** significant level of 5%, * significant level of 10%

positive relationship while result presents an opposite one. Former studies treat duration period as the proxy to the level of informed demand, because issuers who take shorter time to finish selling their shares, the more informed demand in the market. Due to the winner's curse, issuers do not need to spend more time and compensation to attract uninformed investors. Otherwise, the time between offering and listing would be longer as the level of informed demand is low, and in order to attract more uninformed investors to subscribe, the level of underpricing would also increase. Previous studies done in Australia supported the relationship between the duration time and market-adjusted initial return but our result not. Our result may be explained by the situation in Chinese market. the long duration time implies the issuer is not favorably considered by government, its regulatory agencies and the stock exchanges (Chen et al., 2004). Thus, so far the result does not support Hypothesis 1.

For shareholder structure, as we predict, the proportion of state-owned shares positively related to the level of underpricing; and statistically significant at 1% level. Our result is consistent with Chi and Padgett (2005), Guo and Brooks (2008) and L. Tian (2011). There are some conjectures for explaining the relationship. According to our hypothesis, when compared with investors in the market, government is the insider and one of the former owners, who are rich in firm information. Since the government knows more than investors about the quality and the risk of issuing companies, so it may force the issuer to lower the price to ensure the issue success. Secondly, the large proportion of state-owned shares may cause some marketability problems, so in order to induce and convince investors, issuers will underprice their issues. Moreover, high government ownership increases agency costs for public investors and reduces the liquidity of a firm's stock, as Bradshaw, Liao, and Ma (2013) indicated that tax costs and agency costs are a dividend to the state, but a cost to other shareholders. Therefore, investors need more compensation which is greater underpricing for these high costs. For this circumstance, greater underpricing is required. So the finding permits our hypothesis 2.

While regarding to the proportion of former retained ownership, although a negative coefficient is presented, an insignificant relationship can be learnt. We expected that the more proportion of shares that insiders retained, it signaled issue's higher quality. As less information asymmetry between investors and issuers, a reasonable

price should be set with less undervaluation and underpricing. In our research, the proportion of senior managers retained shares is the measurement for this variable, but result shows no significance. This possibly because senior management who control or influence the company would like to underprice less the company in which they have a larger stake of ownership, so they do not want to experience a wealth loss during IPO process (L. Tian, 2011). Therefore, the result cannot support to our hypothesis 5.

Turning to underwriter and auditor reputation, our result does not demonstrate the significantly influences on underpricing. In previous chapters, we predict a negative relationship as the level of underpricing can be minimized by the experiences and skills of more prestigious underwriters and auditors, because they are more professional in advising odder prices, issuing risk control, etc. (Beatty & Ritter, 1986; Guo & Brooks, 2008).

For the $REPU_1$, we expected to find a positive coefficient. However, the result in our research supports there is no such relationship between underwriter reputation and underpricing. The result consistent with Gao (2010), as their results showed underwriter reputation has no impact on underpricing during 2006 to 2008. Furthermore, C. Su and Bangassa (2011) employed three measurements for underwriter reputation, two coefficients for these measure are statistically insignificant. This may be explained by that more prestigious bankers began to underwrite younger, more uncertain and unproven new issues in the 1990s, which they avoided before (Dimovski, Philavanh, & Brooks, 2011; Loughran & Ritter, 2003). Moreover, in mature market underwriters not only giving pricing advice, but also have the right to allocate the shares. As underwriters induce informed investors to revel truthful information, which help issuers and underwriters understand the market demand and share value. Then underpricing serves as a reward for information revelation, so underwriters can distribute that reward selectively to informed investors. While given the fact that the government control plays a more important role that underwriters are not allow to allocate shares, the underwriter influence the share price less than other countries. The less important role for underwriter may lead to less explanatory power of underwriter reputation in our study. Thus, the result consistent with these former studies, and suggest the underwriter reputation cannot fully explain the underpricing, so Hypothesis 3 cannot be supported.

For auditor reputation perspective, Titman and Trueman (1986) suggested that high auditor quality provides more useful information to investors in assessing the value of the IPO firm. When compared to other auditors, high reputation ones have a comparative advantage in establishing the reported information related to the firm value, and will reduce application errors and increase the information disclosure through accounting reports. These high quality financial statements provide information to the market which reduced both information asymmetry and the underpricing level. For our variable $RUPA_1$, we expected a positive relationship with $MAIR$, but the result is not. As no significant relationship been provided, it may be explained by Datar, Feltham, and Hughes (1991) and Firth and LiauTan (1998) that the function of auditor is only attestation. The audit reports reflect the true value of firm, and the brand of auditor does not influence the firm's value. So our result indicates that auditor plays no significant role in reducing underpricing, and it cannot support to Hypothesis 4.

The discussion of four control variables as follows, the coefficients are all negatively and significant related to market-adjusted initial return, except Firm Size. For bookbuilding perspective, this dummy variable is aim to control for the possibility that the bookbuilding mechanism lead to less underpricing than other mechanisms such as fixed-price, as it is a new development of Chinese IPO issue. The result indicates that issuers who applied bookbuilding mechanism have less underpricing; this may be explained by the less information asymmetry between investors and issuers. Because the bookbuilding process helps issuers and underwriters to gain more information about the market and set reasonable offering price; while investors can also gain useful information about the real value of the issuing companies and make more reasonable decision. Compared to former Chinese IPOs' offering mechanism, bookbuilding has the advantage in reducing the information asymmetry, so does the underpricing degree. So our result indicates that bookbuilding contributes to the underpricing decreasing in Chinese IPO.

Secondly, for the issue age, the result shows a negative relation towards market-adjusted initial return which is significant at 1% level. It is the same as we predicted that longer history firms have more publicly available information than young firms, investors can access to more information which can help make their decision of

investment. As less information asymmetry for older firms, the issues are less underpriced.

While regarding to the control variable Exchange, as the companies issued in two exchanges has the difference in the company size, that issues in Shanghai Exchanges are normally bigger than in Shenzhen Exchange, we predict big companies have less underpricing as they attract more analysts which would provide more information to investors than the small and median companies. The result permits our assumption with negative relationship significant at 1% level.

While for firm size perspective, we suggested it is negatively related to $MAIR$ while the result shows an opposite relationship. The result indicates that larger companies in China would underprice more, which may be explained by that large companies are more likely to recoup the underpricing loss, so they underprice more to attract uninformed investors.

In conclusion, the outcomes from Table7.1 for T time period, except the impact of the proportion of state-owned shares on market-adjusted initial return can be proved, other cannot be supported. Furthermore, control variables as the bookbuilding mechanism, Issue age and stock exchangesare consistent with the hypotheses that we built in previous section.While Firm Size turn out to be positively related to underpricing degree.

7.2 Research analysis on different time periods

In order to compare different time periods to prior whole sample period, we carry out this analysis based on two time periods. In this analysis, we still employ the same variables as before, and the same methodology is applies. When we present and analyze the results, the two sample sizes include T_1 period from 2006 to 2007 and T_2 period of 2008 to 2012.

7.2.1 T_1 period (2006-2007)

The Table 7.1 indicates the OLS regression with all variables for T_1 period and the result indicates the model is also reasonably well specified with the significance level of 1% (F statistic is 2.445) and the adjusted R square on 6.7%.

The result during this period shows some difference with the whole sample period. All the relationships are insignificant in this period except the retained former ownership, and it is significant at 10% level.
The impact of ownership changed in this period. The result shows no significant relationship between the proportion of state-owned shares and market-adjusted initial return. However, former retained shares and MAIR are positively related to each other and significant in 10% level. It can be explained by that the percentage of retained shares would logically reveal the value of the firm, so the more shares been retained, the higher quality the firm is been signaled (Allen & Faulhaber, 1989; Grinblatt & Hwang, 1989). In former researches, there is a basic intuition underlying that high-quality firms are willing to bear and recoup this cost which modeled by Gale and Stiglitz (1989) that there is a possibility that equity will be sold in two stages, primary and secondary market. As former shareholders would not choose to sell their shares at time of IPO as the price is lower than the real value of the share. Insiders retain their shares to prevent the wealth from losing. When the shares are traded in the secondary market, the market will adjust the share with its real value, which is higher than the offering price. In this situation, whether the shareholders sell or not sell their retained shares, they experienced an increase of the value. Otherwise the insiders will choose to sell the shares at the time of IPO if they think the IPO price overvalued the shares, because they have to obtain the value before the market adjust the price downward to the meet the real value of the company (Karlis & Stumph, 2000).

Turning to the reputation of underwriter and auditor in this period, the result remains the same, and neither of the relationships is significant.

In addition, for the relationship between Bookbuilding, Age, Firm Size and $MAIR$, none of them is significant; only Exchange remains the same relationship with $MAIR$. The result indicates that investors seem not view bookbuilding mechanism as a relevant factor in IPO pricing during this period. It may explained by the background that in T_1 period bookbuilding was still fresh to Chinese market, issuers and investors were not familiar with the new mechanism. Furthermore, as the hot issue market may attract more inexperienced investors who do not know much about the market, these investors would not consider firm age as a relevant factor

during their subscription decisions. Then their optional subscriptions are important information for issuers, which would affect the price setting of IPO. While for Firm Size, during this time period, a lot of large companies issued.The insignificant relation may be explained by this market background. As most IPOs are issued by large firms, then investors would not consider the size as an important determinant which induces them to subscribe. So in this period, these three factors did not affect the pricing much.

7.2.2 T_2 period (2008-2012)

While for T_2 period 2008 to 2012, the result in Table 7.1 shows that the result is significant at 1% level (F statistics is 28.524) with a much higher adjusted R square on 29.1% than former two tests, which indicates the goodness-of-fit of this regression has better explanatory power than former two.

For this period, the result remains the same with the main test, as none of the proposed relationships can be confirmed except the state-owned shares.

Chapter 8

Robustness test

Due to the insignificance of retained former ownership, we will use another measurement which introduced in former chapter for this variable, and test if it has impact on the market-adjusted initial return. So does the auditor reputation and underwriter reputation. So in this chapter, we will employ new measurements for these variables to have a robustness test. For underwriter reputation $REPU_2$, influenced by the ranking[1] given by Securities Association of China (SAC) and C. Su and Bangassa (2011), we assume that if an underwriter has managed more IPOs, it is much better known by investors and therefore higher reputation it has. Here we calculated the numbers of deal for each underwriter who managed IPO as main underwriter and also rank them into 3 groups as $REPU_1$. For auditor reputation $REPU_2$, we employ the ratio of audit fee to total market audit fee, and then classify auditors into 3 ranks: 1st rank, 2nd rank and 3rd rank according to the ratio. 1st rank is assumed to be the most prestigious auditors while 3rd stands for the least prestigious group with the low audit fee. The information of underwriters and auditors are listed in Appendix A and B. While for former retained ownership RO_2, the measurement will be calculated as the ratio of issue size to total equity. Besides, the dependent variable, the other independent variables and the control variables remain the same as former test.

The summary of the variables was shown in Table 6.8 of Chapter 6, and the OLS regression result is presented in Table 8.1. To further address the different market periods, the sample period will be split into T_1 and T_2 periods to check if

[1] http://www.sac.net.cn/ljxh/xhgzdt/201305/t20130529_62416.html

the results remain the same with our previous findings.

The result for T (2006-2012) period indicates robust test with all independent variables is reasonably specified with the significance level of 1% (F statistic is 18.165) and adjusted R square on 16.9%. The fitness of the regression has the familiar result with former test. By comparing with the former test, we find that the result of robustness test remains the same. No significant relationships exists expect the state-owned shares.

So we turn to the result of T_1 period, there we find that both $REPU_2$ and RO_2 show a significant relationship with $MAIR$.

For auditor reputation, the result supports to our hypothesis that IPO audited by the more prestigious auditor would have less underpricing level. The result suggests that during 2006 to 2007 the reputation of auditor affect the quality of the prospectus, and deliver more accurate information to the investors. The services provided by prestigious auditors efficiently reduce the information asymmetry, so the underpricing level decreased. This result is constant with former studies done by Beatty (1989).

While for the retained former ownership, our result shows a negative relationship with $MAIR$ which is opposite to our prediction. Influenced by D. Su (2004)'s study, we use the issue size divided by the total share of the company as the measurement for this variable. It mentioned that to minimize the wealth loss, the owner-issuer offers to sell fewer shares to the public initially and retains a larger proportion of firm's equity. But our result may be explained by that the size of the issue may not only be affected by the shareholders' personal desires but also the companies' financial desires. If a larger size been issued by company, it may attract more investors' attention and induce more subscription(Gao, 2010).

The robustness on T_2 period shows that the state-owned shares and reputation of auditors have impacts on IPO underpricing, while others remain the same.

The opposite relationship from our hypothesis about auditor reputation existed in this time period: the more prestigious auditor issuers employed, the higher level of

Table 8.1: Robustness test results (2006-2012)

Variables	Time periods		
	T (2006-2012)	T_1 (2006-2007)	T_2 (2008-2012)
(Constant)	2.109	2.146	2.443
	(8.642)***	(3.197)**	(11.882)***
DT	-0.001	-0.005	0.001
	-1.081	-0.714	0.861
GOV	0.628	-0.170	0.388
	(4.504)***	-0.518	(3.298)***
REPU2	0.024	-0.014	0.023
	0.700	-0.137	0.910
REPA2	0.010	0.245	-0.044
	0.293	(2.451)**	(-1.793)*
RO2	0.732	-2.036	-0.264
	1.328	(-2.051)**	-0.463
BB	-1.489	-0.333	-1.848
	(-8.638)***	-0.710	(-14.245)***
AGE	-0.030	-0.017	-0.013
	(-5.346)***	-0.865	(-3.188)***
EX	-0.357	-0.701	-0.188
	(-3.775)***	(-2.754)***	(-2.625)***
SIZE	0.000	0.000	0.000
	(2.667)*	0.829	0.590
Number of observation	786	181	605
R^2	17.9%	14.7%	30.4%
Adjusted R^2	16.9%	10.2%	29.3%
F statistics	(18.765)***	(3.264)***	(28.840)***

***significance level of 1%, ** significant level of 5%, * significant level of 10%

IPO underpricing will be. Learn from former studies, prestigious auditors may be associated with higher-quality IPOs because they have their reputation to uphold (Razafindrambinina & Kwan, 2013), and evidence provided by Beatty (1989) noted that larger and less risky IPO clients tend to be accepted by 'Big Four' auditors; and for prestigious auditors' high auditing charges, low quality firms are less likely to be their clients. So influenced by these researches, we assume that during T_2 period, auditors started to provide service to poor quality issuers which need higher level of underpricing to attract investors and ensure the successful issue. This may explain the result in T_2 period.

In short, even though there are some significant relationships existed in different test period, the main result remains the same. In Chinese IPO market only the state-owned share portions has signficant impact on undepricing.

Chapter 9

Conclusion and Recommendations

9.1 Summary and conclusion

As Chinese market is different from others and IPO underpricing has attracted a lot of attentions in academic community, many researches were developed to explain the phenomenon in China. This thesis investigates the Chinese IPO market from 2006 to 2012. More specifically, we focused on the underpricing phenomenon and information asymmetry. Our study examines the degree of underpricing for 786 IPOs issued from 2006 to 2012. We used the market adjusted initial return as our measurement for underpricing degree, and the average degree is 67.72%. The underpricing degree is much lower than that in early years which indicates that IPO pricing became more reasonable since the development of the IPO market took place in recent years.

Among large amounts of theories, we investigate possible explanations for the level of underpricing based on information asymmetry theory, especially among the three entities involved in IPO process, namely investors, issuers, and underwriters. Influenced by winners curse hypothesis, adverse selection hypothesis, and Baron's model about underwriter, we assumed several factors and formulated hypotheses. We use OLS regressions to explore the relationships among these factors and IPO underpricing. According to the OLS regression in Chapter 7 and robustness test in Chapter 8, some of our hypotheses can be confirmed.

- *Hypothesis 1: the longer duration period, the higher underpricing will be.*

According to our results, the relationship between duration time and underpricing degree cannot be observed. Even though the relation has been confirmed in former studies on both China and Australia, our result shows no significant relation. Furthermore, our robust result remained the same. So we did not get sufficient evidences from the empirical study, and here we carefully reject Hypothesis 1.

- *Hypothesis 2: the more proportion of state-owned shares, the more underpricing will be.*

Our second hypothesis is confirmed based on all periods except the 2006 to 2007period in the main test. Both main test and robustness test present the positive relationship exists between the proportion of state-owned shares and market-adjusted initial return. return . Thus, Hypothesis 2 can be supported.

- *Hypothesis 3: the more prestigious underwriter that issuer hired, the less underpricing will be.*

Earlier empirical studies performed to explore the impact of underwriter reputation on IPO underpricing show different results. While for our tests, all results show no significant relation. So Hypothesis 3 can't be supported.

- *Hypothesis 4: the prestigious auditor that issuer hire, the lower underpricing will be.*

For auditor reputation, the results for main and robustness test show no significant relations. Even though in 2008 t0 2012 period, the robustness test result indicated that more prestigious auditor increase the underpricing level, the opposite relationship cannot support our hypothesis. Thus, we should carefully reject Hypothesis 4.

- *Hypothesis 5: the more proportion of former ownership retained, the less underpricing will be.*

We did not get sufficient evidences from the empirical study to support the relation between former retained ownership and underpricing. Although two tests provide significant results in 2006 to 2007 period, the relationships are opposite to each other and our predictions. Hence, we should carefully reject Hypothesis 5.

The test and analyze in the research provide the answer for our main research question:

How does information asymmetry explain the high IPO underpricing in China?

Although IPOs have been a popular topic in academic research for some time, and information asymmetry theory logically explained this phenomenon in many countries, our result provides a different consequence.

Following the discussion of each hypothesis, our result shows that even though some of the applied explanatory variables are revealed to be statistically significant in different time periods, the results on the whole time period indicate most factors we suggested have no significant impact on Chinese IPO underpricing. The information asymmetry theory cannot fully explains the underpricing phenomenon in China. The adverse selection hypothesis and Baron's model about underwriter cannot explain the underpricing phenomenon, and the winner's curse hypothesis is only partly been confirmed. The reputation of underwriter and auditor did not play active roles to reduce information asymmetry, and so did the retained former ownership. The evidence for these hypotheses is either mixed or weak, only the government hold shares proportion plays an significant role in IPO pricing. These suggest a weak explanatory ability of the information asymmetry theory but a strong power from government on Chinese IPO underpricing

9.2 Limitation

Obviously our research suffers from several limitations, although the result provides support for some hypotheses, the limitations may leads to some insignificant results in our test. The limitations in our research are as follow:

Firstly, the sample period in this research is relatively longer than some studies in mature market. And during the time period, the market experienced different conditions which may have effects on the result.

Secondly, there are more than 400 IPOs are excluded, and the database is not perfect. The majority of data is difficult to assess, for example, CCER database provides more specific data than GTA which can be used to measure the explanatory variables more accurate.

Finally, the methodology also has some limitations, as we only measure the market-adjusted initial return on first trading day while many other researches defined underpricing in short- and long-term. And the proxy for retained former ownership in our study may not very accurate, so better measurements should be applied.

9.3 Future Research

During the literature review, there are several interesting topics for future studies based on IPO underpricing. Some topics will be listed as follow.

Firstly, the signaling hypothesis hasnot been supported in Chinese IPO market, as underpricing can be explained in terms of a strategy for firms to signal their value to investors. By apply signaling models and investigate whether underpricing is a deliberate signal of firm quality, the result would be helpful in explaining Chinese IPO underpricing.

Secondly, the allocation of issues on institutional and individual investors is an interesting topic. As China applied the online/offline bookbuilding and subscription; furthermore, there is no right for underwriter to neither make the decision of the allocation nor screen the inquirers, the allocation decision is made by issuer. The preference of issuer's allocation may have impact on issue prices. Furthermore, the amount of institutional and individual investors are quite different, if this difference has impact on underpricing can be learnt.

Thirdly, the performance of Chinese IPOs offered in other markets such as US market and their underpricing degrees. Whether these IPOs still suffer a high degree

underpricing or not, by observing the process of listing overseas and examining relative factors, we can clearly understand the difference and which factors will influence on the underpricing.

Finally, the difference between A- and B-share IPOs also attracts attention. As the huge difference in underpricing degree, the study on Chinese investors and foreigner investors behavior can be done to explain the underpricing. The information disclosure and information quality for these two types of investors may not be the same. So the study will also contribute to the explaining of A-share extremely underpricing.

Appendix A

Underwriter Reputation

Table A.1: Underwriter Reputation

Underwriter	Dearls	Ratio	$REPU_1$ ranking	$REPU_2$ ranking
Guo Xin Securities Co., Ltd	84	5.00%	2	1
Ping An Securities Co., Ltd	83	4.12%	3	1
Citi Cs Securities Co., Ltd	29	4.74%	2	2
Guangfa Securities Co., Ltd	45	2.22%	3	2
Newone Securities Co., Ltd	41	2.11%	3	2
Tai Hua United Securities Co., Ltd	30	1.51%	3	2
Haitong Securities Co., Ltd	30	1.34%	3	2
First Captial Securities Co., Ltd	17	13.15%	1	3
Essence Securities Co., Ltd	21	10.74%	1	3
China International Capital Co., Ltd	10	8.45%	2	3
Tebon Securities Co., Ltd	6	7.19%	2	3
UBS Securities Co., Ltd	5	6.04%	2	3
Guotai Junan Securities Co., Ltd	11	4.31%	3	3
Goldman Sachs Gaohua Securities Co., Ltd	3	4.29%	3	3
China Securities Co., Ltd	19	2.62%	3	3
Greatwall Securities Co., Ltd	11	2.17%	3	3
Founder Securities Co., Ltd	7	2.04%	3	3
Orient Securities Co., Ltd	13	1.43%	3	3
Boci China Securities Co., Ltd	5	1.39%	3	3
Ever Bright Securities Co., Ltd	26	1.17%	3	3
China Galaxy Securities Co., Ltd	7	1.06%	3	3
Minsheng Securities Co., Ltd	21	0.86%	3	3
Long one Securities Co., Ltd	18	0.84%	3	3
Guo Yuan Securities Co., Ltd	16	0.77%	3	3

Table A.2: Underwriter Reputation

Underwriter	Dearls	Ratio	$REPU_1$ ranking	$REPU_2$ ranking
China Jianyin Investment Securities Co., Ltd	10	0.64%	3	3
SinoLink Securities Co., Ltd	18	0.64%	3	3
Zhong De Securities Co., Ltd	8	0.62%	3	3
Hong Yuan Securities Co., Ltd	13	0.53%	3	3
Industrial Securities Co., Ltd	12	0.52%	3	3
SooChow Securities Co., Ltd	14	0.49%	3	3
Qi Lu Securities Co., Ltd	8	0.46%	3	3
AVIC Securities Co., Ltd	5	0.45%	3	3
Bo Hai Securities Co., Ltd	7	0.43%	3	3
Northeast Securities Co., Ltd	10	0.37%	3	3
SeaLand Securities Co., Ltd	6	0.35%	3	3
Guo Du Securities Co., Ltd	5	0.28%	3	3
Pacific Securities Co., Ltd	4	0.27%	3	3
Shenyin & Wanguo Securities Co., Ltd	8	0.27%	3	3
Southwest Securities Co., Ltd	7	0.26%	3	3
Dong Guan Securities Co., Ltd	6	0.25%	3	3
United Securities Co., Ltd	6	0.22%	3	3
Hua Xi Securities Co., Ltd	3	0.21%	3	3
China Dragon Securities Co., Ltd	7	0.20%	3	3
Chang Jiang Securities Co., Ltd	4	0.18%	3	3
Dong Xing Securities Co., Ltd	4	0.18%	3	3
China Minzu Securities Co., Ltd	5	0.16%	3	3
Heng Tai Securities Co., Ltd	4	0.16%	3	3
Rising Securities Co., Ltd	4	0.16%	3	3
Cinda Securities Co., Ltd	3	0.15%	3	3
Cai Tong Securities Co., Ltd	1	0.15%	3	3
Guo Lian Securities Co., Ltd	3	0.14%	3	3
Golden Sun Securities Co., Ltd	2	0.13%	3	3
Hong Ta Securities Co., Ltd	4	0.13%	3	3
Nanjing Securities Co., Ltd	3	0.13%	3	3
Fortune Securities Co., Ltd	3	0.12%	3	3
Gold State Securities Co., Ltd	3	0.11%	3	3

Table A.3: Underwriter Reputation

Underwriter	Dearls	Ratio	$REPU_1$ ranking	$REPU_2$ ranking
Guangzhou Securities Co., Ltd	2	0.10%	3	3
Weat Securities Co., Ltd	2	0.10%	3	3
Zhe Shang Securities Co., Ltd	2	0.09%	3	3
Credit Suisse Founder Securities Co., Ltd	1	0.09%	3	3
Hua Ying Securities Co., Ltd	1	0.08%	3	3
New Times Securities Co., Ltd	2	0.08%	3	3
Shou Chuang Securities Co., Ltd	1	0.07%	3	3
DSSC Securities Co., Ltd	3	0.07%	3	3
Beijing Securities Co., Ltd	2	0.07%	3	3
China Fortune Securities Co., Ltd	1	0.07%	3	3
CLSA Securities Co., Ltd	1	0.06%	3	3
China Investment Securities Co., Ltd	1	0.04%	3	3
Century Securities Co., Ltd	1	0.04%	3	3
Ai Jian Securities Co., Ltd	2	0.04%	3	3
Central China Securities Co., Ltd	1	0.03%	3	3
Xiang Cai Securities Co., Ltd	1	0.02%	3	3
CITIC WT Securities Co., Ltd	1	0.02%	3	3
BNP Paribas China Securities Co., Ltd	2	0.02%	3	3
Shanxi Securities Co., Ltd	1	0.01%	3	3

Appendix B

Auditor Reputation

Table B.1: Auditor Reputation

Auditor	Deals	$REPA_1$	$REPA_2$	Ratio
Pan-China CPA	133	7	1	14.59%
Ernst & Young PLL	33	3	1	11.54%
Deloitte	11	2	1	10.99%
BDO China Shu Lun Pan CPA	88	5	2	9.36%
KPMG China	5	4	2	5.88%
PricewaterhouseCoopers	15	1	2	5.62%
HPTJ CPA	33	20	3	3.27%
RSM China CPA	39	6	3	3.27%
ShineWing CPA	38	8	3	3.08%
Da Hua CPA	37	10	3	2.88%
Shenzhen Pengcheng CPA	46	31	3	2.85%
DAXIN CPA	28	11	3	2.38%
China Audit International CPA	23	26	3	2.09%
Jiangsu Gongzheng Tianye CPA	20	28	3	2.07%
GP CPA	25	35	3	2.07%
Reanda CPA	19	17	3	1.57%
Grant Thornton CPA	19	13	3	1.45%
Xhonghua CPA	13	24	3	1.28%
Shandong Huide CPA	12	43	3	1.14%
Jiangsu Tianheng CPA	14	30	3	1.01%
Jonten CPA	3	21	3	0.98%

Table B.2: Auditor Reputation

Auditor	Deals	$REPA_1$	$REPA_2$	Ratio
Baker Tilly China CPA	10	12	3	0.98%
Fujian Huaxing CPA	9	37	3	0.91%
Beijing Xinghua CPA	10	19	3	0.86%
Zhonglei CPA	13	16	3	0.81%
Yongtuo CPA	7	25	3	0.72%
CHCN CPA	8	9	3	0.71%
Zonzun CPA	9	29	3	0.66%
Chonghui CPA	5	15	3	0.65%
Shanghai CPA	8	40	3	0.64%
Peking CPA	6	23	3	0.51%
Shandong TianHengXin CPA	7	44	3	0.43%
Zhonfxi CPA	6	39	3	0.41%
Union Power CPA	5	18	3	0.38%
Jiangsu Suya CPA	3	27	3	0.32%
Sichuan Huaxin (Group) CPA Firm	3	33	3	0.23%
ZhengYuanHeXin CPA	2	41	3	0.20%
Asia-Pacific (Group) CPA	3	38	3	0.18%
Huayin CPA	2	42	3	0.17%
Sigma CPA	2	34	3	0.16%
Sichuan Junhe CPA	2	47	3	0.15%
Wuzhou Songde United CPA	4	22	3	0.13%
Yataizhonghui CPA	1	14	3	0.11%
Contiental CPA	2	32	3	0.11%
Beijing Tianyuanquan CPA	2	36	3	0.11%
Shanghai Donghua CPA	1	46	3	0.06%
Guangdong Hengxindelv CPA	1	45	3	0.036%

Appendix C

Summary of variables

Table C.1: Summary of variables (2006-2012)

Variable	Mean	Median	Max	Min	S.d.
MAIR	0.6772	0.4187	6.0803	-0.2094	0.8441
DT	28	19	376	0	25
GOV	0.1103	0	0.86	0	0.2266
RO1	0.2727	0.2104	0.7907	0	0.2574
RO2	0.2469	0.2501	0.5429	0.0219	0.0516
BB	0.9733	1	1	0	0.1613
AGE	8	7	27	0	44.9594
EX	0.1361	0	1	0	0.3429
SIZE	1757702749	83836579	2.86509E+11	26000000	17084417372

Table C.2: Summary of variables (2006-2007)

Variable	Mean	Median	Max	Min	S.d.
MAIR	1.4543	1.1348	5.6251	-0.0123	1.05889
DT	23	21	77	0	10.9599
GOV	0.2313	0	0.86	0	0.2865
RO1	0.1729	0.0236	0.75	0	0.2357
RO2	0.2648	0.2527	0.5429	0.0219	0.0814
BB	0.9784	1	1	0	0.1639
AGE	6	5	20	0	3.8400
EX	0.1934	0	1	0	0.3949
SIZE	64.E+09	92574258	2.87E+11	31920000	3.51E+10

Table C.3: Summary of variables (2008-2012)

Variable	**Mean**	**Median**	**Max**	**Min**	**S.d.**
MAIR	0.4447	0.3006	6.08025	-0.2094	0.5962
DT	29	17	376	0	28
GOV	0.0741	0	0.84	0	0.1910
RO1	0.3018	0.3080	0.7907	0	0.2561
RO2	0.2415	0.2500	0.4	0.0336	0.0372
BB	0.9735	1	1	0	0.1605
AGE	8.4661	8	27	0	5.1111
EX	0.1190	0	1	0	0.3238
SIZE	344984652	81690000	1.8E+10	26000000	1.396E+9

References

Aggarwal, R., Leal, R., & Hernandez, L. (1993). The aftermarket performance of initial public offerings in Latin America. *Financial Management*, 42–53.

Allen, F., & Faulhaber, G. R. (1989). Signalling by Underpricing in the IPO Market. *Journal of Financial Economics*, *23*(2), 303–323.

Baron, D. P. (1982). A model of the demand for investment banking advising and distribution services for new issues. *The Journal of Finance*, *37*(4), 955–976.

Baron, D. P., & Holmström, B. (1980). The investment banking contract for new issues under asymmetric information: Delegation and the incentive problem. *The Journal of Finance*, *35*(5), 1115–1138.

Beatty, R. P. (1989). Auditor reputation and the pricing of initial public offerings. *Accounting Review*, 693–709.

Beatty, R. P., & Ritter, J. R. (1986). Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics*, *15*(1), 213–232.

Beltratti, A., & Bortolotti, B. (2006). The nontradable share reform in the Chinese stock market. *Fondazione Eni Enrico Mattei Note di Lavoro Series Index*, *15*.

Benveniste, L. M., & Wilhelm, W. J. (1997). Initial public offerings: going by the book. *Journal of Applied Corporate Finance*, *10*(1), 98–108.

Biais, B., & Faugeron-Crouzet, A. M. (2002). IPO auctions: English, Dutch,... French, and internet. *Journal of Financial Intermediation*, *11*(1), 9–36.

Booth, J. R., & Smith, R. L. (1986). Capital raising, underwriting and the certification hypothesis. *Journal of Financial Economics*, *15*(1), 261–281.

Bradshaw, M., Liao, G., & Ma, M. S. (2013). Avoidance of Tax Avoidance and Agency Cost of State Ownership: Evidence from China. *Available at SSRN 2239837*.

Brealey, R., Leland, H. E., & Pyle, D. H. (1977). Informational asymmetries, financial structure, and financial intermediation. *The Journal of Finance*, *32*(2), 371–387.

Brooks, R., Fry, T. R. L., Dimovski, W., & Mihajilo, S. (2009). A duration analysis of the time from prospectus to listing for Australian initial public offerings. *Applied financial economics*, *19*(3), 183–190.

Carter, R., & Manaster, S. (1990). Initial public offerings and underwriter reputation. *The Journal of Finance*, *45*(4), 1045–1067.

Chahine, S., & Filatotchev, I. (2011). The effects of corporate governance and audit and non-audit fees on IPO value. *The British Accounting Review*, *43*(3), 155–172.

Chan, K., Wang, J., & Wei, K. C. (2004). Underpricing and long-term performance of IPOs in China. *Journal of Corporate Finance*, *10*(3), 409–430.

Chang, C.-H. (2011). IPO underpricing: A social comparison perspective. *International Review of Economics & Finance*, *20*(3), 367–375.

Chang, E., Chen, C., Chi, J., & Young, M. (2008). IPO underpricing in China: New evidence from the primary and secondary markets. *Emerging markets review*, *9*(1), 1–16.

Chen, G., Firth, M., & Kim, J.-B. (2004). IPO underpricing in Chinas new stock markets. *Journal of Multinational Financial Management*, *14*(3), 283–302.

Chi, J., & Padgett, C. (2005). Short-run underpricing and its characteristics in Chinese initial public offering (IPO) markets. *Research in International Business and Finance*, *19*(1), 71–93.

Chowdhry, B., & Sherman, A. (1996). International differences in oversubscription and underpricing of IPOs. *Journal of Corporate Finance*, *2*(4), 359–381.

Daily, C. M., Certo, S. T., Dalton, D. R., & Roengpitya, R. (2003). IPO underpricing: A metaanalysis and research synthesis. *Entrepreneurship Theory and Practice*, *27*(3), 271–295.

Datar, S. M., Feltham, G. A., & Hughes, J. S. (1991). The role of audits and audit quality in valuing new issues. *Journal of Accounting and Economics*, *14*(1), 3–49.

Dimovski, W., Philavanh, S., & Brooks, R. (2011). Underwriter reputation and underpricing: evidence from the Australian IPO market. *Review of Quantitative Finance and Accounting*, *37*(4), 409–426.

Fabrizio, S. (2000). Asymmetric Information and Underpricing of IPOs: the

Role of the Underwriter, the Prospectus and the AnalystsAn Empirical Examination of the Italian Situation. *Economic Research Department of the Italian Securities Exchange Commission*.

Firth, M., & LiauTan, C. K. (1998). Auditor quality, signalling, and the valuation of initial public offerings. *Journal of Business Finance & Accounting*, *25*(12), 145–165.

Firth, M., & Smith, A. (1992). Selection of auditor firms by companies in the new issue market. *Applied Economics*, *24*(2), 247–255.

Gale, I., & Stiglitz, J. E. (1989). The informational content of initial public offerings. *The Journal of Finance*, *44*(2), 469–477.

Gannon, G., & Zhou, Y. (2008). Conflicts of interest and China's A-share underpricing. *International Review of Financial Analysis*, *17*(3), 491–506.

Gao, Y. (2010). What comprises IPO initial returns: Evidence from the Chinese market. *Pacific-Basin Finance Journal*, *18*(1), 77–89.

Grinblatt, M., & Hwang, C. Y. (1989). Signalling and the pricing of new issues. *The Journal of Finance*, *44*(2), 393–420.

Gu, A. Y. (2003). State ownership, firm size, and IPO performance: evidence from Chinese A share issues. *American Business Review*, *21*(2), 101.

Guo, H., & Brooks, R. (2008). Underpricing of Chinese A-share IPOs and short-run underperformance under the approval system from 2001 to 2005. *International Review of Financial Analysis*, *17*(5), 984–997.

Guo, H., & Brooks, R. (2009). Duration of IPOs between offering and listing: Cox proportional hazard modelsEvidence for Chinese A-share IPOs. *International Review of Financial Analysis*, *18*(5), 239–249.

Ibbotson, R. G., & Ritter, J. R. (1995). *Initial Public Offerings* (Vol. 9; R. J. et Al., Ed.). Elsevier Science B.V.

Ibbotson, R. G., Sindelar, J. L., & Ritter, J. R. (1988). Initial Public Offering. *Journal of Applied Corporate Finance*, *1*(2), 37–48.

Jenkinson, T. J. (1990). Initial public offerings in the United Kingdom, the United States, and Japan. *Journal of the Japanese and International Economies*, *4*(4), 428–449.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360.

Karlis, P., & Stumph, C. (2000). Informational Asymmetry and the Demand for

IPOs: An Explanation of Underpricing.

Keasey, K., & Short, H. (1997). Equity retention and initial public offerings: the influence of signalling and entrenchment effects. *Applied financial economics*, *7*(1), 75–85.

Kennedy, D. B., Sivakumar, R., & Vetzal, K. R. (2006). The implications of IPO underpricing for the firm and insiders: Tests of asymmetric information theories. *Journal of Empirical Finance*, *13*(1), 49–78.

Lee, P. J., Taylor, S. L., & Walter, T. S. (1996). Australian IPO pricing in the short and long run. *Journal of Banking & Finance*, *20*(7), 1189–1210.

Levis, M. (1990). The winner's curse problem, interest costs and the underpricing of initial public offerings. *The Economic Journal*, *100*(399), 76–89.

Lim, J., & Saunders, A. (1990). *Initial public oferings: the role of venture capitalists.* [Charlottesville, Va.] : Research Foundation of the Institute of Chartered Financial Analysts, c1990.

Lin, Z. J., & Tian, Z. (2012). Accounting conservatism and IPO underpricing: China evidence. *Journal of International Accounting, Auditing and Taxation*.

Loughran, T., & Ritter, J. (2003). Why has IPO underpricing changed over time?

Megginson, W. L., & Weiss, K. A. (1991). Venture capitalist certification in initial public offerings. *The Journal of Finance*, *46*(3), 879–903.

Mok, H. M. K., & Hui, Y. V. (1998). Underpricing and aftermarket performance of IPOs in Shanghai, China. *Pacific-Basin Finance Journal*, *6*(5), 453–474.

Muscarella, C. J., & Vetsuypens, M. R. (1989). A simple test of Baron's model of IPO underpricing. *Journal of Financial Economics*, *24*(1), 125–135.

Neupane, S., & Thapa, C. (2012). Underwriter reputation and the underwriter-investor relationship in IPO markets. *Journal of international financial markets, institutions and money*.

Razafindrambinina, D., & Kwan, T. (2013). The influence of underwriter and auditor reputations on ipo under-pricing. *European Journal of Business and Management*, *5*(2), 199–212.

Ritter, J. R. (2003). Differences between European and American IPO markets. *European Financial Management*, *9*(4), 421–434.

Ritter, J. R., & Welch, I. (2002). A review of IPO activity, pricing, and allocations. *The Journal of Finance*, *57*(4), 1795–1828.

Rock, K. (1986). Why new issues are underpriced. *Journal of Financial Economics*, *15*(1), 187–212.

Ruud, J. S. (1993). Underwriter price support and the IPO underpricing puzzle. *Journal of Financial Economics*, *34*(2), 135–151.

Su, C., & Bangassa, K. (2011). The impact of underwriter reputation on initial returns and long-run performance of Chinese IPOs. *Journal of international financial markets, institutions and money*, *21*(5), 760–791.

Su, D. (2004). Leverage, insider ownership, and the underpricing of IPOs in China. *Journal of international financial markets, institutions and money*, *14*(1), 37–54.

Su, D., & Fleisher, B. M. (1999). An empirical investigation of underpricing in Chinese IPOs. *Pacific-Basin Finance Journal*, *7*(2), 173–202.

Sun, Q., Wu, Y., & Tong, W. H. S. (2008). Why would chinese firms list overseas? In *Efa 2008 athens meetings paper.*

The Mendeley Support Team. (2011). *Getting Started with Mendeley.* London: Mendeley Ltd. Retrieved from `http://www.mendeley.com`

Tian, L. (2011). Regulatory underpricing: Determinants of Chinese extreme IPO returns. *Journal of Empirical Finance*, *18*(1), 78–90.

Tian, L. G. (2003). Financial regulations, investment risks, and determinants of Chinese IPO underpricing. *Working Paper, PekingUni-versity Management School*.

Titman, S., & Trueman, B. (1986). Information quality and the valuation of new issues. *Journal of Accounting and Economics*, *8*(2), 159–172.

Torstila, S. (2001). What determines IPO gross spreads in Europe? *European Financial Management*, *7*(4), 523–541.

Watkins, A. L., Hillison, W., & Morecroft, S. E. (2004). Audit quality: A synthesis of theory and empirical evidence. *Journal of Accounting Literature*, *23*(1), 153–193.

Yu, T., & Tse, Y. K. (2006). An empirical examination of IPO underpricing in the Chinese A-share market. *China Economic Review*, *17*(4), 363–382.

Zhou, Z.-g., & Zhou, J. (2010). Chinese IPO activity, pricing, and market cycles. *Review of Quantitative Finance and Accounting*, *34*(4), 483–503.