School of Accounting

Earnings Management, Underpricing and Post-issue Stock Performance of SME IPOs in the PRC

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

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Abstract

In recent years, small and medium enterprises (SMEs) have become an increasingly important contributor to the economy, and the initial public offering (IPO) of SMEs is very active in the People's Republic of China (PRC). While raising countless important questions, IPO issues of SMEs in the PRC have received little empirical attention, particularly in respect of the impact of pre-IPO earnings management on stock performance over short and long horizons. The primary objective of this thesis is twofold. Firstly, to investigate the relationship between earnings management and the level of underpricing of SMEs in the PRC, and secondly, to examine the association between earnings management and post-issue stock performance of SMEs in the PRC.

The analysis is based on a sample of 464 IPOs listed on the Shenzhen Stock Exchange (SZSE) SME board, which is separate to the main boards, during 2006 to 2010. In this thesis, higher pre-IPO total discretionary accruals are found to be associated with higher underpricing and poorer post-issue stock performance. However, when total discretionary accruals are decomposed into current and long-term components, the associations are insignificant. The results are robust with respect to several alternative measures of earnings management and stock performance. The findings also show on average SMEs in the PRC have positive three-year post-issue stock returns relative to various benchmarks. Findings from this thesis add to the literature because SME IPOs in the PRC perform differently from large firms due to the unique features of SMEs.

The results of this thesis have important contributions with implications for various parties. For instance, the findings could potentially help investors to evaluate risks associated with SMEs in the PRC and to make rational investment decisions. The empirical evidence from the SME board in the PRC provides insights which could be applied to SMEs in other emerging markets. Results from this thesis may also help authorities and regulators in the PRC to decide whether they need to strengthen the monitoring of the IPOs and ensure the healthy growth of the capital market. For example, the PRC authorities may encourage voluntary disclosure by issuers and strengthen the oversight on opportunistic behavior and provide a more effective screening function.

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Abbreviations

ASBEs	Accounting Standards for Business Enterprises
ChiNext	China Next Board
CICPA	Chinese Institute of Certified Public Accountants
CSRC	China Securities Regulatory Commission
GEM	Hong Kong Growth Enterprises Market
HKEx	Hong Kong Stock Exchange
IPO	Initial public offering
IFRSs	International Financial Reporting Standards
NYSE	New York Stock Exchange
PRC	People's Republic of China
PT	Particular transfer
R&D	Research and development
SHSE	Shanghai Stock Exchange
SMEs	Small and medium enterprises
SOEs	State-owned enterprises
ST	Special treatment
SZSE	Shenzhen Stock Exchange
VC	Venture capital

Related thesis publications

Journal articles

Gao, J., Cong, L. M., & Evans, J. P. (2014). Earnings management, IPO underpricing and post-issue stock performance of Chinese SMEs. *The Chinese Economy* (forthcoming).

Conference papers

Gao, J., Cong, L. M., & Evans, J. P. (2014). Earnings management, IPO underpricing and post-issue stock performance of Chinese SMEs. *Proceedings of the 37th European Accounting Association Annual Congress held in Tallinn, Estonia, 20th – 23rd May 2014.*

Gao, J. 2012. A literature review on earnings management and IPO anomalies. *Proceedings of Curtin Business School Doctoral Colloquium held in Perth, Australia, 28th – 29th August 2012*.

Chapter 1: Introduction

1.1 Introduction

Over the past decade scholars have investigating how the quality of financial reporting during the initial public offering (hereafter IPO) can affect the IPO firms' stock performance. Researchers note two anomalies associated with IPO performance, excessive initial returns (termed 'underpricing') and negative post-issue stock performance. The underpricing phenomenon has been widely observed in various regions, including the United States (US) (Ritter, 2011), United Kingdom (UK) (Coakley et al., 2009), Australia (Dimovski & Brooks, 2004), Canada (Aintablian & Mouradian, 2007) and Japan (Arikawa & Imad'eddine, 2010). Post-issue stock performance has also been documented in countries such as the US (Brav et al., 2000), UK (Gregory et al., 2010), Taiwan (Wen & Cao, 2013) and Thailand (Chorruk & Worthington et al., 2010).

Prior scholars who have sought to understand the contributions with the firm to the above-mentioned IPO anomalies generally found that financial reporting quality, particularly earnings quality, was associated with these anomalies. The main explanation is that asymmetric information is high within the IPO setting and earnings management tends to exist before the IPO (DuCharme et al., 2000). The solid earnings number in the IPO documents then leads to overenthusiasm towards the IPO shares when they are offered for sale. However, when information asymmetry is reduced in the long term, investors realize the true value of a firm which results in negative post-issue stock performance (Roosenboom et al., 2003; Teoh, Welch et al., 1998a).

IPO anomalies have also been detected in the capital market of the People's Republic of China (hereafter PRC). Specifically, it has been found that the level of underpricing for PRC firms has been much higher than that in Western countries (e.g. Cheung et al., 2009; Gannon & Zhou, 2008; Chi & Padgett, 2005a; Chen et al., 2004). Whereas IPO anomalies have been well documented in the large PRC firms,

particularly State-owned enterprises (SOEs) [1], little attention has been given to small and medium enterprises (SMEs) in which the asymmetric information problem is exacerbated. SMEs in this thesis refer to those enterprises that are mature or will soon be mature and listed in the SZSE SME board, which is separate to the main boards. Specifically, due to the short history of the PRC SME board, only a few anecdotal studies have reported a high level of underpricing in the PRC SMEs (e.g. Wang & Li, 2013; Cao, 2010), whereas the empirical evidence on SMEs' long-term stock performance is rare. Corresponding with under-researched SME IPO issues, little research has been done on the determinants of stock performance in SMEs.

With the general shift of the PRC government from an export-driven economy to one of domestic consumption (Chen, 2013), SMEs have become an increasingly important contributor to the PRC's economy. Accordingly, many SMEs in the PRC have sought to list on either domestic or foreign capital market exchanges to acquire equity funds to support their firms' expansion. The dynamics of the PRC capital market have also changed from mainly supporting SOEs to helping market-responsive SMEs (World Federation of Exchanges, not dated). To provide a direct channel to raise funds for SMEs, the government has established the SME board as an incomplete second board under the current Shenzhen Stock Exchange (SZSE) board (Li, 2005). Although in 2014 more listing opportunities are provided for SMEs, the supply of listing options are still outweighed by the demand for listing slots. In addition, listing requirements are rigorous for SMEs. Accordingly, an SME IPO with a strong financial position is likely to be given listing priority and offered greater opportunities to acquire necessary equity funding than less financially attractive counterparts. Earnings management, which is a purposeful intervention in the financial reporting process with the intention to obtain some private gain (Schipper, 1989), can inflate reported earnings by using asset-scaled proxies (i.e. discretionary accruals) determined at the discretion of management (Teoh, Welch et al., 1998a). Hence there are strong incentives for SME issuers to engage in earnings management by adopting discretionary accruals to increase their listing opportunities.

[1] SOEs are firms owned by the local, provincial and national governments.

Whereas incentives to manipulate earnings may exist, environmental and institutional conditions may provide further inducement for manipulation. The IPO is widely recognized as an event for which there is asymmetric information between insiders (i.e. informed issuers) and outsiders (i.e. uninformed investors) (DuCharme et al., 2000). For example, insiders have knowledge about the 'true' worth of the business, while outsiders know little about the firm's prospects. It is further assumed that asymmetric information problems are minor for old and large firms, owing to their well-established track record and reputation (Honjo & Harada, 2006). Relatively, SMEs lack publicly available, uniform and detailed accounting and other information (Caneghem & Campenhout, 2012). As a result, the SMEs have been referred to as 'acutely informationally opaque' or in a 'worsened' information asymmetry situation (Ou & Haynes, 2006; Berger & Udell, 1998).

Further exacerbating the asymmetric information problem for PRC SMEs is the poor legislative and supervisory system governing the PRC domestic equity market. The lack of public scrutiny (by authorities and regulators) resulting from a poor regulatory system is likely to negatively affect the quality of financial information. For instance, in a weak investor protection country such as the PRC, IPO firms have been found to adopt financial reporting strategies (e.g. earnings management) at the time of the IPO by making use of the asymmetric information climate (Chen et al., 2014). In addition, the PRC's unique institutional characteristics, such as financial regulations and listing lag, also intensify the investment risks on PRC IPOs and lead to mispricing by investors (Tian, 2011). Moreover, some SMEs in the PRC have been involved in lawsuits for concealing material information and distributing exceptionally high dividends to original shareholders (Fung et al., 2007). This evidence indicates that if a significant asymmetric information gap persists in an environment with a weak capital market regulatory system, the quality of financial reporting is questionable.

Notwithstanding, there has been heightened enthusiasm by domestic and international investors to invest into the PRC during the past decade which has intensified the effect of earnings management on IPO stock price. Due to a *herd* mentality, driven by a perception of the need to be in the PRC market or be left

behind (Fromlet, 2007), investors have tended to overlook questionable accounting data, thereby giving scope for great earnings management at the point of listing and leading to mispricing of new shares. Consequently, an investor may pay substantially more for the IPO stock at the time of listing than what the stock is 'truly' worth. When additional information is disclosed later, the firm's deficiencies are highlighted and the stock price is likely to plunge, resulting in a substantial loss to investors.

Concerns about major asymmetric information gaps, poor legislative and institutional structures and investors' overenthusiasm on new issues have raised the following question: is earnings management a critical factor for SME IPO stock performance over short and long horizons? While there is prior research on the determinants of IPO anomalies within the PRC capital market, researchers have overwhelmingly focused on large established firms or SOEs (e.g. Shen et al., 2014; Kao et al., 2009). To date, very little research, if any, has been conducted on SME IPO issues with reference to earnings management.

1.2 Research objectives and questions

Given the severe asymmetric information problem surrounding the IPO process and SMEs, earnings management is presumed to dominate the SME IPO market in the PRC. Therefore, it is important to test if pre-IPO earnings management is associated with higher underpricing and poorer post-issue stock performance that are conditions detrimental to the investor's interests. The primary objective of this thesis is twofold. Firstly, to investigate the relationship between earnings management and the level of underpricing of SMEs in the PRC and secondly, to examine the association between earnings management and post-issue stock performance of SMEs in the PRC. The main research questions (RQ) of this thesis are stated as follows:

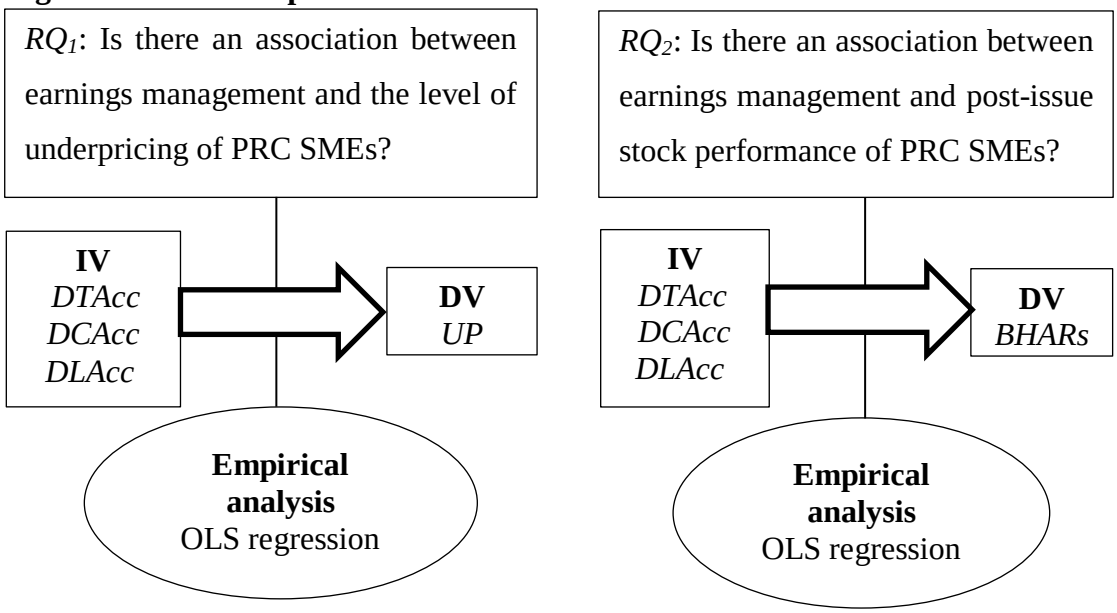
RQ_1: *Is there an association between earnings management and the level of underpricing of PRC SMEs?*

RQ_2: *Is there an association between earnings management and post-issue stock performance of PRC SMEs?*

Figure 1.1 presents the research process of this thesis. As illustrated in Figure 1.1, this thesis examines the two main research questions employing a quantitative

paradigm. The level of underpricing and post-issue stock performance are employed as dependent variables. The possible use of total, current and/or long-term discretionary accruals by an issuer to manage earnings is applied as independent variables to test earnings management. OLS regressions are adopted to test the two main research questions. In addition to the main objectives and research questions, an analysis of factors (e.g. incentive of earnings management, underwriters' reputation, and global financial crisis) that influence the relationship between earnings management and IPO stock performance is conducted. The main theory adopted in this thesis is asymmetric information based on the expectation that investors have limited information about SME IPOs compared with issuers.

Figure 1.1 Research process



Legend:
DTAcc, *DCAcc* and *DLAcc* denote total, current and long-term discretionary accruals respectively; and *UP* and *BHARs* denote underpricing and post-issue stock performance respectively.

The empirical evidence is drawn from a sample of publicly listed PRC SMEs that are listed on the SZSE SME board.

1.3 Motivation

The underlying motivation for this thesis is the increasing importance and implications of the 'hot issue market' on the SME board in the PRC. One aspect of this has been significant underpricing (Wang & Li, 2013; Cao, 2010). Risks associated with SMEs are more likely to be ignored due to great investor optimism (Helwege & Liang, 2004). The problem of asymmetric information tends to be

greater for SMEs because SMEs have fewer resources to improve the credibility of accounting data pertinent to the IPO process and in particular by not engaging a high-quality auditor or underwriter. The exacerbated asymmetric information gap and unassured quality of financial reporting in SMEs acts to intensify investor's risks. In the accounting and finance literature, however, little attention has been paid to the SME IPOs. Arguably, research on IPO issues on the SME board would enhance investors' confidence and improve the development of SMEs.

The second motivation for this thesis is to build on the existing evidence on stock performance of IPOs by examining the PRC SMEs. Prior scholars have extensively investigated the IPO stock performance of large firms over short and long periods in the global markets (e.g. Chan et al., 2004; Mok & Hui, 1998). Underpricing and mixed post-issue stock performance have been found all over the world (Song et al., 2014; Wen & Cao, 2013; Ritter, 2011; Chen et al., 2010). However, academic research focused on SME IPO anomalies has been limited with the only empirical evidence coming from developing countries, such as, Sri Lanka (Samarakoon, 2010) and Thailand (Chorruk & Worthington, 2013; Allen et al., 1999). Similar to IPO studies in the global markets, the PRC IPO studies have concentrated on SOEs or large firms listing on the main boards and the findings have been consistent with those in the international markets (e.g. Song et al., 2014; Lin & Tian, 2012; Chi et al., 2010). However, the empirical research focusing on PRC listed SMEs is limited, particularly in respect to IPO issues. Owing to their unique operating environment and specific characteristics, PRC SMEs may have a different pattern of stock performance than large firms and foreign SMEs. This research, therefore, has sought to complement the extant IPO literature and has added important new comprehensive (both over the short-term and long-term) evidence on SME IPOs in the PRC.

The third motivation for this thesis is to examine the SME IPO anomalies from the perspective of earnings management. Previous scholars have found several influencing factors that have contributed to IPO anomalies, such as underwriters' reputation (Su & Brookfield, 2013; S. C. Chang et al., 2010), P/E ratio (Cheung et al., 2009) and the imbalance between supply and demand in the IPO market (Tian, 2011; Chang et al., 2008; Chi & Padgett, 2005a). What is missing from this line of study is

attention to factors influencing IPO stock performance over the short-term and long-term periods. Shen et al. (2014) and Kao et al. (2009) have researched factors influencing IPO stock prices over the short term and long term, but they have not examined such factors in the context of SMEs. Even though the likelihood of earnings management was found to be higher in SMEs, it has rarely been mentioned in the SME IPO literature (Aharony et al., 1993). Overall, some researchers have attempted to examine SME IPO anomalies in the PRC[2], but few of them have measured the determinants, such as, earnings management that are driving these anomalies. Given the fact that a high level of underpricing has occurred in the recent SME market (Wang & Li, 2013) together with the likelihood that earnings management has been more prevalent in SMEs, an examination of the influence of earnings management on stock returns of PRC SMEs is both timely and necessary. This thesis explores SME IPO stock performance from earnings management perspective.

Evidence generated from the PRC SME market may also provide insights into SMEs in other countries. SMEs play a major role in the global markets and contribute to social wealth through the creation of new businesses and jobs (Ernst & Young, 2012; Singh et al., 2010; Honjo & Harada, 2006). However, SMEs face additional challenges in their development. Asymmetric information, poor corporate governance and illegible financial status have been associated with poor returns and SMEs, leading to suspicion about the credibility of their financial information. These concerns may intensify investor's doubts and inhibit the steady growth of SMEs. The credibility of earnings in SMEs is a significant concern in various countries and great attention is being paid to the reliability of financial statements used by investors (Caneghem & Campenhout, 2012). Nevertheless, little attention has been paid to earnings quality and its relationship with IPO stock performance in SMEs. The findings in this thesis may provide some insights which could be applied to SMEs in other countries, in particular, in the emerging markets which share similarities with

[2] For example, Zhou and Lao (2012) and Anderson et al. (2013) investigated the stock performance of firms listing on the SZSE ChiNext, which is a newly established board for immature SMEs. Guo and Fung (2011) concluded that the high initial returns of firms listed on ChiNext board were driven by several factors, such as volatility, turnover ratio, winning lottery ratio and the P/E ratio. Cao (2010) and Wang and Li (2013) argue that influencing factors of underpricing are uncertain after comparing IPOs from the Hong Kong Growth Enterprises Market (GEM) and the SZSE SME board.

the PRC. Research findings on IPO issues of PRC SMEs may have implications for the global capital markets.

1.4 Main findings

In this thesis the association between pre-IPO earnings management and stock performance in PRC SME IPOs is examined by conducting cross-sectional analysis. The level of earnings management is measured by discretionary accruals (total, current and long-term), while initial raw returns (*UP*) represents underpricing and 36-month buy-and-hold abnormal returns (*BHARs*) are used to estimate post-issue stock performance.

Based on a sample of 464 IPOs[3] listed on the SZSE SME board as of 31 December 2010, results suggest that only total discretionary accruals had a significant impact on IPO stock performance over both short and long terms. More specifically, there was a positive and significant relationship between total discretionary accruals and the level of underpricing. Current and long-term discretionary accruals had negative and positive associations with underpricing respectively, but neither of these were statistically significant. The results indicate that only total discretionary accruals played an important role in underpricing, while current and long-term discretionary accruals had no significant influence on the initial returns of SME IPOs.

In the long term, IPO firms adopting aggressive total discretionary accruals prior to the IPO had experienced poor post-issue stock performance. Empirical evidence supports a negative and significant relationship between total discretionary accruals and post-issue stock performance. Current and long-term discretionary accruals were also found to be negatively related to long-term stock returns, but neither was significant. The results imply that only total discretionary accruals had a significant influence on post-issue stock performance, and neither current nor long-term discretionary accruals had such an influence. The results are robust with respect to alternative measures of earnings management and stock performance.

[3] None of the SME IPOs were delisted within three years after issuance (Shenzhen Stock Exchange, 2013a).

In contrast to the underperformance found in recent PRC IPO studies (e.g. Shen et al., 2014; X. Chang et al., 2010; Chan et al., 2004), the post-issue negative stock performance was not observed in PRC SMEs during the observation period. However, evidence in this study shows that on average PRC SMEs had positive long-term stock returns relative to various benchmarks. Although a significant and negative association between total discretionary accruals and post-issue stock performance was found, there was no evidence that pre-IPO earnings management induced post-issue underperformance.

Besides the main findings, there were also a number of additional findings. For example, the incentive of earnings management, issue size, underwriters' reputation and global financial crisis were found to influence the relationship between discretionary accruals and post-issue stock performance. In addition, it was noted that earnings management had a positive impact on the initial returns in the primary market rather than in the secondary market.

1.5 Significance and limitations of the thesis

Findings from this thesis have potential significance in several ways. Firstly, findings from the broad perspective of SME IPO stock performance enrich prior IPO literature about the PRC. This research presents evidence that PRC SMEs in the sample had a different pattern in stock performance compared with large firms and external SMEs (e.g. Su & Bangassa, 2011b; Gregory et al., 2010), that is, there was a high level of underpricing and small over-performance in the long term. Collectively, the results in this study show that the conventional wisdom which supports that long-term underperformance is present in the developed markets and in PRC large firms, does not apply to PRC SMEs. However, the post-issue over-performance of PRC SMEs corresponds with the better long-term performance reported in some developing markets, such as Thailand, Malaysia and Istanbul (Corhay et al., 2002; Durukan, 2002; Allen et al., 1999). New evidence is provided in this thesis that long-term underperformance is not a universal phenomenon. SME IPOs perform differently from large firms in the PRC and firms in the developed markets due to the inherent characteristics of SME IPOs in the PRC.

Secondly, this research adds insights into the earnings management behavior in SME IPOs in the PRC and the influence of this behavior on stock performance. Recent research (e.g. Shen et al., 2014; Nagata, 2013) who have examined earnings management during the IPO process have shed light on the practices of large firms and SOEs but not on SMEs where this phenomenon is more pronounced (Aharony et al., 1993). This work extends the earnings management literature in a number of respects. First, the earnings management behavior has been identified in SMEs, suggesting that the SME issuers are prone to manipulate earnings like their large counterparts. Second, this research has tested the effect of earnings management on the stock performance of SME IPOs. Consistent with prior literature, these results show that earnings management was driven by opportunistic management incentives, and while firms benefitted initially, a higher price was paid in the long term. In this regard, this study complements the recent work of prior scholars (e.g. Shen et al., 2014, S. S. Chen et al., 2013; S. C. Chang et al., 2010; Geng et al., 2010) who found that the quality of financial reporting was linked to IPO anomalies in large firms in various countries. This work complements and extends prior earnings management literature and gives witness to the considerable impact of pre-IPO earnings quality on stock performance in PRC SMEs.

Thirdly, the results from this thesis add new evidence on the role of asymmetric information. Asymmetric information was found to influence both the SME issuers' incentive to manage earnings and IPO stock performance in the PRC. The presence of information asymmetry provided SME issuers opportunities to promote their self interest at the investors' expense through earnings management as was the case in large firms (Richardson, 2000). The positive (negative) associations between total discretionary accruals and underpricing (post-issue stock performance) reported in this thesis indicate that investors overpriced the IPO firms' value at the point of listing due to this information gap. This overprice was reduced in the aftermarket, leading to a fall in the long-term stock price. The findings are consistent with prior scholars who have found that asymmetric information problems are acute in SMEs (Caneghem & Campenhout, 2012; Michaelas et al., 1999). The evidence overall indicates that the existence of information asymmetry between issuers and investors creates a context wherein the earnings management may serve as a major

determinant of short-term and long-term stock performance. Thus the findings facilitate the understanding of the information environment faced by SME IPOs.

Fourthly, the results of this thesis have important implications for numerous stakeholders. For example, findings in this thesis form a better understanding of PRC SME IPOs for both domestic and foreign investors. These results are useful to global investors who are increasingly investing in emerging markets like the PRC and for other users of financial reports of PRC listed firms (X. Chen et al., 2008). The results in this thesis are particularly helpful for those investors who are interested in IPOs on the SME board. The extremely high level of underpricing and long-term over-performance of SME IPOs is indicative of hot market features and reminds investors of the potential risks and the need for caution. The findings emphasize the importance for investors to understand earnings management so they can comprehend the earnings quality of PRC SMEs and make rational investment decisions. The relationship between pre-IPO total discretionary accruals and stock performance suggests investors need to price SME IPOs rationally and assess the impact of manipulated earnings. Investors also need to have a better understanding of the short-term and long-term components of discretionary accruals.

The findings of this thesis also have important potential implications for PRC securities exchange authorities and regulators particularly with reference to the IPO approval systems and surveillance on opportunistic behavior for the sake of a healthy development of the capital market. Findings suggest SME issuers tend to inflate earnings prior to going public, thereby affecting the fair value of the IPO firms. The results signal to PRC authorities the need for them to evaluate the level of flexibility allowed in accounting standards and the degree to which IPO firms manipulate earnings. Authorities and regulators may need to promote greater financial information disclosure and diversify the earnings evaluation methods to reduce the asymmetric information gap which might inhibit issuers from boosting accounting numbers to meet the listing criteria. Policies that can provide investor protection and curb speculation should be the focus of future PRC IPOs. A more integrated and systematic regulatory system will in turn help the steady development of the capital market.

Finally, the findings in this thesis contribute to knowledge of SME IPOs globally. Lessons from the recent financial crisis suggest that growing SMEs' long-term equity financing is crucial to diversify countries' financial systems (Asian Development Bank, 2014). However, earnings quality has been found to be low in SMEs and countries with weak investor protection (Ball & Shivakumar, 2005; Ball et al., 2000). Therefore, SMEs are more likely to be underinvested if they have great flexibility to choose financial reporting policies and those choices could affect the quality of accounting information and play an important role in the investment decisions (Chen et al., 2011). As a vehicle for growth, it would seem imperative for SMEs to provide sustainable earnings, otherwise investors' confidence is likely to be undermined and stock performance affected (Li, 2011). In spite of the important contribution of SMEs to world economies and likely differences from large firms, comparatively little is known about their earnings quality. Findings in this thesis may provide a 'stepping stone' for researchers to investigate the role of accounting information and stock performance of SMEs in emerging markets.

With reference to limitations in the study, this thesis relies on data from the SZSE SME board as of 31 December 2010. Because 2004 is the initial launch year of the SZSE SME board, this thesis does not provide empirical evidence for firms listed before 2004. To allow for adequate time to estimate the 36-month post-issue stock performance, firms listed after 2010 are not included in the sample as well. In addition, the study uses only data from publicly listed firms on the SZSE SME board which limits the generalization of the findings to all types of SMEs in the PRC (e.g. non-listing mature SMEs and SMEs listing on the ChiNext board[4]). Moreover, the analysis draws on financial information derived from financial reports and the IPO prospectus. While such data has been audited and there is an implicit assumption the information is accurate, this may not necessarily be true in some cases. Nonethelss, using annual report data ensures a degree of objectivity of the information source in this thesis.

[4] ChiNext is an independent board from the SZSE main board, ChiNext aims to provide solid support for the development of growth oriented venture enterprises stressing innovation.

1.6 Thesis outline

The remaining chapters are organised as follows. In Chapter 2 an introduction to the PRC capital market and its recent development are provided as well as specific features of IPO systems in the SME board. Chapter 3 reviews theories and explanations concerning IPO underpricing and post-issue stock performance. The literature on earnings management in the IPO market and studies related to underpricing and post-issue stock performance are presented. This chapter concludes well a theoretical framework and hypotheses. Following Chapter 3 is a discussion of the research design, secondary data and measurement of variables and in Chapter 5 the statistical analysis, empirical results and additional tests to verify the robustness of the main findings are given. In Chapter 6 the sensitivity tests are undertaken and the results are concluded while in Chapter 7 a discussion of the main contribution and direction for future research are provided.

Chapter 2: Institutional settings

2.1 Introduction

In this chapter an overview of the capital market in the PRC is given. The first section outlines the evolution and development of the capital market in the PRC. The second section introduces the supervisory system and includes a discussion of authorities, rules and regulations. The approval and pricing system of the IPO market are shown in the third section and the characteristics of the SME board are concluded in this chapter.

2.2 Capital market composition and development in the PRC

Over the last two decades the PRC has had tremendous growth as a transitional economy, transforming from a socialist planned economy to a market economy with socialist characteristics (Ong, 2006). The PRC government has sought to transform State-owned enterprises (SOEs) which commenced in the early 1990s (Kao et al., 2009). Parallel with these economic reforms, the Shanghai Stock Exchange (SHSE) was opened in 1990 and the Shenzhen Stock Exchange (SZSE) was opened one year later (Shanghai Stock Exchange Investor Education Center, 2007). SHSE and SZSE are based in the city of Shanghai and Shenzhen respectively and run independently with main boards. To expand direct financing channels for SMEs, the SME board was launched on 25 June 2004 for the SZSE and is in addition to its main board. The SME board was aimed at mature SMEs and as the pilot market for growing emerging firms[5]. Only the SZSE contains an SME board.

[5] The SZSE SME board is designed to supplement the SZSE main board. Smaller firms satisfying the main board listing standards are allowed higher individual recognition by being traded exclusively on the SZSE SME board. The SZSE's long-term plan is to completely split the SME from the main board. On 23 October 2009, the SZSE launched the ChiNext, which is an independent market from the SZSE main board. ChiNext aims to provide solid support for the development of growth oriented venture enterprises stressing innovation. The ChiNext is established as a capital platform for immature SMEs, with mechanisms of financing, investment and risk management differing completely from the SZSE main board and SZSE SME board. The SZSE does not have a current agenda to shift the SME board to ChiNext. Given the limited history of ChiNext, and special risks associated, a focus on SZSE SME IPOs is maintained to provide a cleaner and clearer data set.

There are two classes of shares traded[6] in the PRC capital market: A-shares and B-shares[7]. A-shares are exclusively purchased and traded on SHSE and SZSE (quoted in RMB) by domestic investors. B-shares are also traded on the main boards, but they are traded in foreign currencies mainly by international investors[8]. In brief, citizens in the PRC may buy and sell A-shares on the SHSE or SZSE board, whereas foreigners may purchase B-shares on the main boards or trade shares listed on the Hong Kong Stock Exchange (HKEx) and international markets (Gao, 2010). Moreover, firms listing on the PRC main boards can choose either SHSE or SZSE to issue A-shares or B-shares. However, firms listing on the SME board can only issue A-shares.

During the period 1990s to present, the PRC capital market has grown rapidly and by the end of 2013 had 2,389 firms listed on the main boards with a total market capitalization of more than RMB 23.9 trillion (CSRC, 2014). With only 53 listed firms in 1992 the number of listed firms has grown on average 20% annually since the capital market was established (Tian, 2011). By 2012 the capital market in the PRC has become the world's second largest in terms of market capitalization (Quandl, 2014) and is expected to surpass the US to become the world's largest economy by 2027 in terms of market exchange rate based on the forecast of Pricewaterhouse Coopers (2013). In line with the capital market development, the SME board has also experienced unprecedented growth. By June 2014, there were 719 firms listed on the SME board with a market value of 3.83 trillion RMB (Shenzhen Stock Exchange, 2014).

[6] Besides tradable shares, there are two kinds of non-tradable shares in the PRC capital market: State-owned and legal person shares (Wan & Yuce, 2007).

[7] Besides A-shares and B-shares, PRC firms can also issue shares on foreign markets. H-shares refer to the shares of companies incorporated in the PRC mainland, but listed on the HKEx. N-shares are issued by firms whose main business operations are in the PRC mainland, but listed on the New York Stock Exchange (NYSE).

[8] B-shares are traded in US dollar on SHSE and in Hong Kong dollar on SZSE. Since 2001, domestic investors in the PRC have been allowed to purchase B shares in foreign currencies and make deals. Nevertheless, because of various restrictions like currency transfer problems, very few PRC domestic investors trade in B-share market (Zero2IPO Research Centre, 2007).

2.3 Supervisory system of the capital market

2.3.1 Roles of the China Securities Regulatory Commission (CSRC)

The CSRC is the official institution established to supervise and regulate stock exchange activities. It is a ministry rank unit directly under the leadership of the State Council (Huang, 2011). The main responsibilities of CSRC include formulating policies, laws and regulations concerning nationwide securities markets and overseeing and supervising issuing and trading securities. Overall, the CSRC is the primary oversight agency of the two main boards as well as the SME board.

One of the important roles undertaken by the CSRC is to approve the applications from firms engaging in IPOs. An application package, including financial and non-financial information, is used by the CSRC to correlate with the listing criteria. The major responsibility of the CSRC is to screen out low quality firms relative to the preceding period and ensure that only healthy firms gain access to the capital market in the PRC (Chen & Yuan, 2004). However, pre-listed firms have been found to engage in earnings management to meet the particular financial performance benchmarks in listing criteria (Aharony et al., 2000). Accordingly, although many low quality candidate firms are screened out at the application stage, some low quality firms gain access to the market by opportunistic behavior in the subjective screening procedures (Piotroski & Zhang, 2014).

Another important function of the CSRC is supervision. Its supervisory obligations include the following. Firstly, the CSRC is required to supervise the issuance and trading of equity shares, convertible bonds and securities investment funds. Secondly, the CSRC monitors the listing, trading and settlement of domestic contracts and firms engaging in overseas listing. Thirdly, the CSRC ensures the information disclosed by listing firms is accurate. Finally, the CSRC is also responsible for supervising senior management of institutions, such as investment consulting institutions. In summary, the basic functions of the CSRC are to supervise the exchange markets, listing firms and other intermediaries involved in the capital market (Javvin Press, 2008).

Ostensibly, to improve corporate governance and increase the legal protection for shareholders, the CSRC has taken a series of measures since 2000s (Wong, 2006). For example, a series of investigations were conducted by the CSRC in 2001 to inhibit malpractices and lawless actions in the capital market, such as earnings falsification and market manipulation. In the same year (2001), the minimum number of independent directors was included in the requirement of regulations to strengthen the supervision of listing firms and improve corporate governance as specified by the CSRC (Wong, 2006).

Although the primary objective of the CSRC is to protect the interest of investors and ensure the healthy development of the capital market, evidence has shown that some target-related policies issued by the CSRC have induced managers of listing firms to engage in earnings management (Hu et al., 2012). For instance, to meet rigid listing requirements, many firms have turned to earnings manipulation and eventually gained access to the capital market, even though the CSRC's objective was to guide capital resources toward the well-performing sectors (Chen & Yuan, 2004).

2.3.2 Rules and regulations

Compared with most Western economies, the capital market in the PRC is relatively new. It is probably the only market that has experienced so many significant and constantly-changing government regulations (Gao, 2010). In general, in the PRC there are two important pieces of legislation implemented to ensure the efficiency of the IPO market. The first piece of legislation was the *Securities Law*. As the first comprehensive securities legislation the *Securities Law* was introduced in 1999. It granted the CSRC "authority to implement a centralized and unified regulation of the nationwide securities market in order to ensure their lawful operation." (Friedman, 2002, p.485). The main purposes of this law are to regulate stock issuance, protect investors' interests and enhance the development of the market economy (CSRC, 2009). As described in the *Securities Law*, the merits-based regulations for securities offering are adopted in the PRC. According to those regulations, the substantive examination of the proposed offerings and the approval decisions are all to be conducted by the CSRC (Huang, 2011).

The second piece of legislation was the national *Company Law* issued in 1994. It stipulates the most important rules that clarify the regulations for issuing and transferring stocks in a systematic manner. The listing requirements for IPO firms are also illustrated in the *Company Law*, such as the minimum requirement of share capital and track records. The *Company Law* also regulates the content and format of information disclosed by listing firms (Cheung et al., 2009).

Also aimed at ensuring the healthy development of the capital market in the PRC are some specific rules cited in the *Company Law* concerning the stocks of listing firms with abnormal financial conditions. For instance, the regulations of special treatment (ST) were issued by the CSRC in 1998 for listing firms with abnormal financial conditions[9]. If a listing firm is labelled ST, it is limited in the increase and decrease of its share quotation (i.e. 5%) and the interim report for the firm is required to be audited. Any listing firm with losses for three successive years is designated as particular transfer (PT)[10]. A PT firm faces the risk of being delisted from the stock exchange by the CSRC. In order to further protect investors the SHSE and SZSE announced the latest delisting policy in June 2012. Operating income and the net asset value criteria were introduced to scrutinize underperforming firms (Liu et al., 2013). Under this policy, firms with negative net assets for three consecutive years, or with a reported annual operating income of less than 10 million RMB, will to be delisted. Despite these resolutions, the delisting rate for A-shares in the PRC is still significantly low (only 1.8%), whereas the rate hits 8% on Nasdaq and 6% on the New York Stock Exchange (NYSE) (Zhou, 2014).

Similar to the evolution of its legal framework in the capital market, the PRC's accounting regulatory system for listing firms has experienced numerous revisions and reforms. The first adopted accounting system was a Soviet accounting model based on the Soviet Union's system of accounting in the 1950s. It emphasized central

[9] For firms prefixed as 'ST', the abnormal financial conditions mainly refer to one of the unfavorable indicators of firms' operating performance as follows: (a) the net profits are negative in two consecutive fiscal years; (b) the net assets per share in one recent fiscal year is lower than the face value of the share; (c) no auditing report from an authorized account firm, or the auditing report from the accounting firm materially disagree with the financial statement; (d) any abnormal financial behavior identified by the CSRC or a stock exchange (Javvin Press, 2008).

[10] A PT share cannot increase more than 5% to avoid insider manipulation, but it can decline unlimitedly. PT shares can only be traded on Fridays (Z. Chen et al., 2008).

control for a socialist economy (Blake et al., 2000). After the establishment of SHSE and SZSE in the early 1990s, Accounting Standards for Business Enterprises (ASBEs) were issued in 1993 to supersede the former Soviet accounting model. This version of ASBEs was more aligned to Western standards than previous standards (Lin & Chan, 2000).

To assist the global expansion of firms from the PRC and increase the comparability of financial reports, a new set of ASBEs was released on 1 January 2007. It includes basic accounting standards and 38 specific criteria, of which 22 are newly promulgated. The new set of ASBEs provides guidance for the recognition, measurement, presentation and disclosure of general and specific transactions and industries and introduces some new accounting principles and measurement requirements (Heng & Noronha, 2011). Other than these characteristics, a feature of the new set of ASBEs is its convergence with International Financial Reporting Standards (IFRSs). Most of the new or revised standards make reference to the equivalent standards in the IFRSs. Principles and measures in the new ASBEs are also similar to those in the IFRSs. Consequently, financial statements prepared under the new set of ASBEs are more comparable with their foreign counterparts prepared under the IFRSs. In addition, the new rules adopted in the ASBEs provide clearer guidelines for accounting practice than used during the past regimes and inhibit earnings management. For instance, the requirement for disclosure of profit and loss is enforced and the reverse for allowance of current assets (e.g. bad debt allowance, inventory allowance) is restricted. However, the enlarged scope of utilization of a fair value measurement model provides more scope for earnings management.

The regulatory framework and accounting regulations in the PRC have improved in recent years. However, the entire legal system still lags behind because of its low starting level. The formal legal system adopted by the capital market in the PRC is targeted at SOEs and was mostly silent on newly created firms with different ownership structures (e.g. SMEs) (Zhu, 2000; Fang, 1995). Consequently, the capital market in the PRC is considered to over-perform other transition economies, but underperform with regard to the quality of the regulatory environment (Pistor & Xu, 2005). As indicated by the shareholder rights protection index developed by La Porta

et al. (1998), the PRC's capital market only scored 3[11], lower than the average score in other transitional economies (Pistor & Xu, 2005). In summary, the capital market in the PRC is governed by a poor regulatory framework. This regulatory framework provides shareholders little protection and provides opportunity for earnings management to be engrained in PRC SMEs during the IPO process (Kao et al., 2009).

2.4 IPO market in the PRC

Similar to the secondary market, the PRC's IPO market is subject to intensive government intervention (Gao, 2010). The characteristics and development of IPO approval and pricing system are described in the following subsections.

2.4.1 IPO approval system

The offering and listing process adopted in the PRC allocate listing opportunities is characterized by central government intervention. Prior to 2001, PRC authorities employed a quota system that allocated the number of listing opportunities within provinces and mega-cities (Su & Fleisher, 1999). Shares were distributed via a lottery system with 'winners' selected randomly among eligible investors (Chi & Padgett, 2005a). All candidates went through a complicated approval process, with an emphasis on the firms' historical profitability (X. Chen et al., 2008). Under this system, some scholars concluded that there was little incentive for firms' managers to adopt earnings management to induce higher IPO prices because the total amount of capital to be raised was fixed (Aharony et al., 2010). However, Chan et al. (2008) argued that under the quota system the regional government may acquiesce in earnings management behavior to maximize the quota allocation and avoid negative political implications of a failed IPO, providing issuers opportunities to undertake earnings management. In summary, the quota system led to an inefficient allocation of resources.

[11] Allen et al. (2005) assessed the level of legal shareholder protection in China and achieved the result of 3 score based on an indicator developed by La Porta et al. (1998). This indicator ranges from zero to six and is formed by adding when: "the country allows shareholders to mail their proxy vote to the firm, shareholders are not required to deposit their shares prior to the general shareholders' meeting, cumulative voting or propotional representation of minorities in the board of directors is allowed, an oppressed minorities mechannism is in place, the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than or equal to 10 percent, shareholders have preemptive rights that can only be waved by a shareholders' vote" (La Rorta et al., 1998, p.10).

In 2001 the CSRC introduced a verification system[12] to replace the quota system. Under the verification system, the issue size was flexible and underwriters were given the authority to recommend firms to apply to the CSRC for approval to go public (Liu, 2003). Although investment banks and issuers seemed to have more freedom to participate in the IPO process, the CSRC still had the final say on approvals by screening the operational and financial information of the nominated firms. Under this new system, managers had incentives to manipulate earnings in the financial statements to gain listing opportunities and raise more capital (Aharony et al., 2010).

In 30 November 2013, the CSRC introduced additional reforms to the IPO system by setting the registration system[13] as a development target for IPO innovation in the PRC. The new policy emphasises that the authority has the determination to promote the process of marketization in the IPO market even though there is still some indirect control and discretion from the regulators. In the latest reform, new rules are aimed at reducing speculations in the stock market and protecting investors by limiting speculation on new shares. Some items are specified in the new rules, such as, the registration system transition period, repurchased stocks, strengthening credibility, severe punishments for improper behaviour, such as market manipulation, and perfecting the new trading mechanism. Moreover, the new rules encourage major shareholders of IPO firms to release old shares in order to meet the excessive demands for new stocks. Although the aim of this policy is to mitigate the oversubscription problem for new shares and reduce the level of underpricing, it also motivates issuers to manage earnings and maximize their benefits from old share transferring.

With the evolution of the revised IPO approval system the role of underwriters has also changed. In the early period, the IPO approval process was highly controlled by the central government and underwriters had little influence on IPO applications.

[12] Verification system for IPOs refers to a system under which all listings must be approved by the CSRC, with rounds of review that sometimes last for several years ("CSRC chairman reveals," 2015, para.4).

[13] Compared with current verification system under which new listing aspirants must endure a notorious application process, the registration system is more market based and IPO firms and investors have more rights to decide the scale, valuation and timing of new issues ("Reforms could put," 2013, para.5).

Since 2001, underwriters have been accepted as an important role and have exerted their influence on IPO applications. From 2001 to 2004, the underwriters were only given authority to propose IPO candidates and the eventual approval rights still remained with the CSRC. Since 2004, the importance of underwriters has increased since the sponsor system was adopted by the CSRC. The sponsor system requires investment banks to employ a sponsor to take responsibility for listing recommendations and guidance and to provide assistance for the issuers to establish a strict information disclosure system and risk precaution practices. Underwriters now play the important dual role of underwriter and sponsor's representative, taking responsibility for the truthfulness of disclosure and post-issue financial performance (C. Chen et al., 2013).

Although the importance of underwriters is rising with the evolution of IPO approval system, there is still a lack of an authoritative ranking system regarding the reputation of underwriters in the PRC (Su & Bangassa, 2011a). As noted by Su and Bangassa (2011a), among 57 investment banks managed or co-managed at least one A-share IPO, top-ten underwriters[14] were identified as holding 80.62% percent of the market share of all IPOs during 2001 to 2008. They also found (Su & Bangassa, 2011a) high quality underwriters were helpful to screen out firms with good performance in the long term.

Despite the gradual improvement in the enforcement of IPO rules in recent years there have been criticisms (Chen et al., 2011). For instance, Yang (2013) has claimed the rules guiding the IPO selection process contain large amounts of soft, qualitative and ambiguous criteria, resulting in CSRC officials having great discretion in making decisions. Accordingly, firms seeking IPOs find it is difficult to predict the outcomes of their applications. In addition, the standard enforcement mechanisms during the IPO approval process are often unable to function effectively (Chen et al., 2011; Kao et al., 2009). For instance, to satisfy profitability requirements in the IPO approval system, firms may be forced to manipulate earnings in financial results (Chen, 2003). However, the CSRC is not investigating frauds in the IPO application process, even

[14] Top-ten underwriters: Citic Securities, China International Capital Corporation, BOCI Securities, Guotai Junan Securities, UBS China, China Galaxy Securities Company Limited, Haitong Securities and, GF Securities, Guosen Securities and Cinda Securities Co., Ltd (Su & Bangassa, 2011a).

when doubts about the information in the prospectus occur. Consequently, it is alleged many IPOs that looked good on paper, but lacked potential future viability, were accepted for listing whereas those IPOs of greater promise that did not 'look as good on paper' were often rejected (Caijing Net, 2009). Some PRC listed firms have been found to have engaged in severe violations of the law soon after an IPO. Such incidences have undermined the healthy development of the PRC IPO market (Want China Times, 2011).

2.4.2 IPO pricing system

During 1990 to 1995, the fixed-price system was adopted and the IPO price was set in reference to book value (Gao, 2010). From 1996 to the first half of 1999, the fixed-price system was replaced by a controlled price-earnings (P/E) range system and the offer price was set as the product of net earnings per share and P/E ratio using a pricing formula prescribed by the CSRC (Tian, 2011). Under the P/E range system, the value of P/E ratio was usually confined to a narrow margin around 15% (Kao et al., 2009). There are two major apparent deficiencies in the controlled P/E range system (Cheung et al., 2009). Firstly, the mandated multiple of the P/E ratio overlooks the individual characteristics of different firms. Secondly, the pre-set IPO P/E ratio may differ considerably from the actual P/E ratio. Those drawbacks have a negative impact on the appropriate pricing of the IPOs.

In 1999, the PRC took an experimental pilot reform approach in pricing domestic IPOs by introducing an auction system. Under this system, only consultation on the offer price was opened to the market, whereas the issue size remained under control of the quota system. The intention of this pilot reform was to set up the market-oriented price setting process, while ignoring the underdeveloped capital market and inexperienced investors (Cheung et al., 2009). Consequently, IPOs were overheated due to speculation leading to high levels of underpricing, resulting in a deviation from authorities' previous purpose (Gao, 2010). From July 2002 to 2004, regulators returned to the controlled P/E system by setting a cap on the P/E ratio (lower than 20%) to 'cool down' overheated IPOs. However, this approach has the same deficiencies as the original controlled P/E system, with the risk of distorting the market (Cheung et al., 2009).

With the increasing influence power of institutional investors in the PRC capital market, the central government on 1 January 2005 abolished the controlled P/E mechanism and adopted the popular 'book building' system in the IPO pricing system. The book building system represents the resolution of the PRC government to integrate the IPO pricing system into international practices and reduce the information asymmetry between issuers and investors (Lin & Tian, 2012). Under the book building system, the IPO price is first set by the institutional investors, and then individual investors can apply for shares at that price (Gao, 2010). Issuers and investors have more autonomy in the IPO price setting procedure and market transparency is improved. It was also anticipated that the IPO price would better reflect market conditions under the book building system. However, the efficiency of the book building system in the PRC is still questionable due to institutional features such as a poor legislation system and the prevalence of naive investors[15]. As argued by Li (2009), the book building system may result in a higher level of underpricing, because this system offers the issuers and institutional investors greater discretion in the IPO pricing process due to the poor legislation system.

In 2009, the CSRC revised the rules of the IPO pricing mechanism again and some new measures were introduced to impose restrictions on internet subscription. On 23 May 2012, the CSRC released the revised '*The Administration of Securities Issuance and Underwriters*'. In the revision it is clearly defined that besides the book building system, the IPO offer price can be determined by other legal and feasible methods, such as consultations between issuers and underwriters. This indicates deregulation of the CSRC in the IPO pricing system, with the aim of preventing speculative behavior of investors on new issues.

2.5 SME board

As mentioned above, the SME board was set up by the SZSE in 2004 as a platform to provide a direct financing channel for mature SMEs with successful operating history. It was designed to readdress the institutional deficiency caused by the main boards dedicated to serving SOE reform, and created a market platform for private

[15] The investors who have no useful information about individual stocks' future risks and returns are referred as naïve investors (Wit, 1998).

and high-tech firms (Xinhua, 2014). With the establishment of the SME board, the SHSE and SZSE took on relatively explicit function positioning for the first time. SHSE offered opportunities for firms from key industries to raise capital as well as improve operation mechanism, while SZSE provided full support to development of SMEs and implementation of the national strategy of independent innovation (Viviana, 2011). The launch of the SME board also catalyzed the introduction of institutional innovation measures and severed as a transitional step for creating a multi-tier capital market system in the PRC ("Shenzhen exchange launches," 2004, para. 4).

According to a survey conducted by the Asian Development Bank (2000), the most significant barrier to the development of SMEs is the lack of credit financing. The reason is SMEs are usually riskier than large businesses. For example, after investigating a large set of SMEs in France and Germany, Dietsch and Petey (2004) concluded that SMEs had higher credit risks and lower asset mortgage than larger firms. Fagan and Zhao (2009) concluded that there were three reasons to account for SMEs' lack of credibility: limited reporting transparency, lack of fixed asset collateral, and lack of formality. Thus, SMEs always face financial constraints during a period of expansion because banks and financial institutions are less likely to provide credit support for SMEs.

Equity financing can resolve SMEs' financial constraints with low cost, but only those firms meeting the financial and administrative listing requirements have the chance to go public. The SME board provides a channel for raising funds to SMEs, and ignites hope for the vast number of ambitious SMEs. After several years of successful operation, the SME board has proved to be effective in the capital market by providing funds for emerging firms. For instance, of 152 PRC IPOs in 2012, around 40% of them were SMEs listing on the SZSE SME board, raising more than 34 billion RMB in the PRC capital market (Forward Net, 2013).

The PRC SME board is unique in the world capital market with its own rules and regulations (Shenzhen Stock Exchange, 2004). As an integrated part of the SZSE, the SME board is governed by the same regulatory rules as the PRC's main boards. The

laws, regulations and the ministerial rules issued by the CSRC and other relevant departments of the State Council applied to the SME board remain unchanged from those governing the main boards (Javvin Press, 2008). In addition, some basic requirements in the main board firms also apply to SMEs, such as information disclosure, financial indicators, and the ratio of public shares. Moreover, due to the intrinsic risk associated with SMEs, some tailor-made regulations are also put into practice on the SME board to maintain an orderly market[16].

The listing requirements and procedures for firms listing on the SME board are also the same as those for the SZSE main board (Keung & Mak, 2004)[17]. The first requirement is firm age and corporate governance. Firms engaging in IPO must be established under the PRC law for more than three years of continuing operation, with a clear integral business structure, board composition and independence. Second, there are some minimum requirements on balance sheet items. For instance, net assets must exceed RMB 20 million and intangible assets shall not exceed 20% of net assets at the end of the latest year. The minimum required share capital before or after issuance is RMB 30 million, and firms should be free from any risks of debt service or significant contingent event. The final and most important requirement for listing is profitability and cash flows. The profits for the prior three years before listing must be no less than the aggregate amount of RMB 30 million and cumulative cash flows from operations in the last three years must exceed RMB 50 million in aggregate, or cumulative operating income for the last three years should be more than RMB 300 million. In addition, there are some other requirements for sustainable profitability of IPO firms. For example, revenue or profits in most recent years cannot heavily rely on a related party or investment returns. In conclusion, the number and quality of earnings are vital for IPO firms and listing requirements are rigorous and of high standard. As a result, firms succeeding in gaining access to the capital market in the PRC are usually relatively large and profitable, even for firms

[16] Separate tailor-made regulations for the SME board include *Special Regulations on Suspending and Terminating the Listing of Stocks on SME Board*, *Agreement on Listing on the SME Board*, *Special Provisions on Trading on the SME Board of SZSE*, *SSE Guideline on Good Faith for SME Board Companies*, *SSE Guidelines on Conduct of Corporate Directors of SME Board Listed Companies*, *SSE Guidelines on Sponsorship for Companies Listed on the SME Board and Guidelines on Protection of Investor Rights and Interests for SME Board* (Shenzhen Stock Exchange, 2013b)

[17] Given the multiple time points pertinent to this thesis, please refer to the diagrammatical depiction in the figure presented in Appendix A for clarity.

listing as SMEs (Tian, 2011). Due to the stringent specifications, SMEs generally face challenges in raising equity capital through the SME board because of the difficulty in meeting those listing requirements (Guariglia et al., 2011).

Even though the SME board is treated as a constituent part of the SZSE and share with it the identical regulatory and listing system, the SME board has virtual autonomy and operates independently from the main board. For instance, the SME board has a separate trading and regulatory system with independent stock coding and stock price indices (Shenzhen Stock Exchange, 2013a). Compared with the trading rules governing the main boards, the SME board has three differences in its rules (Javvin Press, 2008). Firstly, the SME board implements open auction in the pre-opening session, while the main boards implement the closed auction. Secondly, the SME board determines the closing price through auction, whereas the closing price of the main boards is calculated by the weighted average within a set period. Finally, to safeguard investors, the SME's disclosure system and delisting rules are stricter than those governing the main boards[18].

Although with the rapid growth, the PRC's capital market is still an emerging market in the transitional economy (Pistor & Xu, 2005). The innovation of the SME board is an exploration of the capital market in the PRC in its emerging and transitional stage (Shenzhen Stock Exchange, 2013b). Currently, the SME board could not be regarded as a whole and integrated second board (Li, 2005). The goal of the development of the SME board is to improve and perfect its operating system, and eventually split from the main board to form a new market when conditions are mature (Javvin Press, 2008).

2.6 Summary

In this chapter an overview of the capital market in the PRC has been provided. The development progress and regulatory environment of the capital market were

[18] The disclosure requirements of trading information for the SME board have improved, such as introduction of monitoring parameters about deviation ratios of price changes, turnover, etc (Javvin Press, 2008). Compared with delisting rules for firms listed on the main boards, two additional delisting conditions have been applied for firms listed on the SME board: (a) firm's net assets in the prior fiscal year are shown as negative in the auditors' report; (b) a certified public accountant has issued an adverse opinion or a disclaimer of opinion in a firm's annual report for the prior fiscal year and this is deemed serious by the exchange (Cumming, 2012)

introduced. Then the approval and pricing system of the IPO market was explained. Finally, the characteristics of the SME board were described, such as listing requirements and specific rules.

In the next chapter theories and literature of IPO anomalies are reviewed and hypotheses are developed.

Chapter 3: Literature review and hypothesis development

3.1 Introduction

In this chapter theories and explanations of IPO anomalies are reviewed and from these a theoretical framework is developed for this research. Also studies and empirical findings related to earnings management and IPO stock performance are summarized. Hypotheses are proposed for this research from the literature review and theoretical framework.

3.2 Theories and explanations for IPO anomalies

The general tendency of IPOs being underpriced in the short term and underperforming in the long term has attracted considerable academic and practical interest. A wide variety of theories and explanations have been proposed for those anomalies, which are outlined below.

3.2.1 Theories and explanations for underpricing

Recent taxonomies (Ljungqvist & Wilhelm, 2005; Ritter & Welch, 2002) indicate several alternative theoretical perspectives of IPO underpricing. Ritter and Welch (2002) divide the theories based on whether the information is asymmetric or symmetric. Ljungqvist (2008) classifies the theories and explanations into four categories: asymmetric information, behavioral explanations, institutional explanations and ownership and control. These theories are not mutually exclusive, but the most appropriate theory may be based on the circumstances of particular IPOs (Kennedy et al., 2006). Main streams of theories cited for IPO underpricing are reviewed in the following subsections.

3.2.1.1 Asymmetric information

Asymmetric information theory assumes that one party in a transaction has relevant information and the others do not. This information problem is dated from ‘the market for a lemon’ in the automobiles market and is cited by Akerlof (1970). He

claims that the 'the market for a lemon' problem arises from information differences between sellers and buyers, leading to quality uncertainty. The information gap causes an imbalance of power in the transaction and leads to the market inefficiency to some extent.

Nowadays, asymmetric information theory is adopted extensively in the accounting and financing area owing to the information uncertainty in those fields. The IPO process is publicly known as comprehensive and opaque, with an imbalance of power in transactions. This imbalance of power may affect stock prices in the aftermarket. Since the late 1980s, therefore, asymmetric information has been applied to explain IPO phenomena. Jog and Riding (1987), for instance, found that the issuer with pure investment aims had a high level of underpricing in Canadian IPO due to the information asymmetry between the firm and potential investors. Consistent with Jog and Riding (1987), Ljungqvist (2008) noted that the more uncertainty to price the firm, the greater the asymmetric information gap, and the higher level of underpricing. Ritter and Welch (2002) concluded that underpricing was positively related to the degree of asymmetric information in the US.

It is general knowledge that there are three main parties participating in the IPO pricing process: the issuer, the underwriter, and the investors. Asymmetric information gap is assumed to arise when the information related to the IPO firm is not shared among those parties. Based on which party has superior information about the firm, theoretical perspectives of underpricing are usually divided into four main streams: signaling theory, the winner's curse, information revelation, and the principal-agency[19].

Signaling theory

This theory originates from the assumption that the issuer has better information about the value or risk of IPO firms than investors do. Signaling theory is regarded as the most popular theory to explain underpricing (Allen & Faulhaber, 1989). Due to their limited information, investors need some signals to identify high quality firms

[19] The principal-agency problem is a conflict of interest in the relationship where one party is expected to act in another party's best interests. The agent is naturally motivated by self-interest which may differ from the principal's best interests.

so as to avoid picking up a 'lemon' in the capital market. As a result, the issuer attempts to underprice new shares in order to signal their high-quality and thereby distinguish itself from low-quality issuers. There are two kinds of signals issuers intend to send out to uninformed investors by underpricing.

Firstly, issuers have the intention to underprice IPOs to show their best prospects and distinguish them from others as well as provide a signal to inform shareholders investing their own money (Vong & Trigueiros, 2010). Apparently not all firms are willing to 'leave money on the table'[20]. Allen and Faulhaber (1989) found empirical evidence that only firms with the most favorable private information about future prospects choose to underprice their initial issue of shares. Many follow-up studies (Garfinkel, 1993; Grinblatt & Hwang, 1989; Welch, 1989) support this perspective. Conversely, Ritter and Welch (2002) found that firms with worse-than-average quality were happy to sell stocks at an average price rather than underpricing.

Secondly, issuers in firms with seasoned equity issue plans are more willing to indicate their quality by leaving money on the table, because they are likely to be compensated by conducting future equity issuance (Welch, 1989). On the other hand, firms are reluctant to offer an underpricing signal if they do not expect to sell new equity following the IPO (Allen & Faulhaber, 1989). It has been found that the level of underpricing is positively related to the probability and volume of subsequent seasoned equity offerings (Jegadeesh et al., 1993). Espenlaub and Tonks (1998) also found underpricing was significantly related to the volumes of proceeds raised through further share issues. Thus, underpricing is usually used by IPO firms to advertise for the subsequent equity issues (Welch, 1989).

Scholars agree that the signaling does matter in IPO underpricing, especially for firms in the segmented market, due to high information asymmetry and restricted access to the external capital markets (Francis et al., 2010). It seems that the signaling theory is a popular explanation of IPO underpricing in the developed markets (Brämisch et al., 2011; Allen & Faulhaber, 1989). However, the recent literature in the PRC testing the explanatory power of signalling theory on IPO

[20] 'Leave money on the table' is defined as the number of shares sold times the difference between the first-day closing market price and the offer price, that is underpricing (Loughran & Ritter, 2002).

underpricing is controversial. For example, Su and Fleisher (1999) assert that underpricing has been a strategy for firms to signal their values to investors by studying the PRC IPOs from 1987 to 1995. On the contrary, many recent studies in the PRC reject that hypothesis. Wang (2005), for instance, split the PRC IPOs into two groups based on the median level of underpricing and failed to find any significant relationship between the level of underpricing and future operating performance. Yu and Tse (2006) also found the signaling theory was inappropriate to explain the IPO underpricing problem in the PRC.

The winner's curse

Rock (1986) was the first scholar to put forward the winner's curse theory by assuming that a group of investors sometimes has superior information of the shares on offer than other parties (including investors in general, the issuer and the underwriter). As a result, the informed investors are prone to subscribe to attractively priced IPOs, whereas uninformed investors bid indiscriminately. Lee et al. (1999) found evidence that large investors tend to be better informed than small investors and make substantial profits from underpriced issues. Consequently, uninformed investors are confined to a 'winner's curse' (Ljungqvist, 2008). Uninformed investors are restricted in attractive offerings and receive most of their shares in overpriced IPOs, resulting in likely average returns being negative. To avoid privileged investors crowing uninformed investors out of IPO subscription with their expected value, the issuer must underprice shares to guarantee a sufficient number of uninformed investors participate in the process. Meanwhile, uninformed investors fear only receiving overpriced IPOs (Ritter & Welch, 2002), hence they prefer to submit purchase orders only when the offer price is underpriced. Therefore, all IPOs must be underpriced to ensure the uninformed investors no longer make losses on average, even adjusted for rationing (Ljungqvist, 2008).

Even if the market produces favorable public information (e.g. high market returns), which reduces the winner's curse problem, IPOs are still underpriced because issuers fail to fully adjust IPO prices for publicly available information (Leite, 2007). Yu and Tse (2006) endorse the winner's curse explanation to underpricing in the PRC

market in their finding that break even after adjusting for rationing uninformed investors.

Information revelation

Under the information revelation theory, general investors are assumed to have greater insights into market demand for an IPO stock than the issuer and the underwriter. In particular, general investors know their potential needs and the price they are willing to pay for new issues. When setting the offer price, underwriters use investors' demands as the basis for pricing an IPO. Although Spatt and Srivastava (1991) argued that the book building method in the IPO pricing setting process helped the underwriter to acquire information from informed investors. It is reasonable to speculate that potential investors are reluctant to show an 'indication of interest' in hot issues, because their interests may incur a higher offer price and lower profit. Instead, investors have a strong incentive to actively misrepresent positive information to mislead the underwriter to set a lower offer price (Ljungqvist, 2008). To induce investors to reveal their high personal demands for shares, the underwriter must offer more IPO allocations and underprice new issues. Accordingly, investors who bid aggressively and reveal favorable information are rewarded with disproportionately large allocations of shares and compensated by partial adjustment of offer prices (Goergen et al., 2009; Ljungqvist, 2008).

Ritter and Welch (2002) demonstrated that the underpricing was positively related to the price revision during the book building process with information revelation. As concluded by Ljungqvist (2008), the more positive the information, the more money had to be left on the table. Even when IPOs are underpriced, the issuer is still better off as a result of an increased offer price pushed up by high demand and positive information. In conclusion, underpricing in information revelation theory is regarded as compensation for investors revealing their demand to purchase.

Principal-agent

Under special circumstances, the underwriter has superior information than the issuer and investors. As the delegate of the issuer, the underwriter has discretionary power in the allocation and price-setting process under the book building system. However,

such an institutional arrangement can induce agency problems between the underwriter and the issuer. Baron (1982) found it was less costly for the underwriter to market an underpriced IPO. In addition, Loughran and Ritter (2002) suggest that underwriters receive quid pro quos from buy-side[21] clients in return for allocating underpriced IPOs to them, indicating that underwriters have incentives and scope to underprice new issues.

Meanwhile, the issuer cares more about whether the wealth increases or not rather than the underpricing problem. Therefore, the underwriter can deliberately underprice the new issues and allocate those underpriced stocks to competitive investors or a firm's executives to gain side-payments or win future investment banking business (Loughran & Ritter, 2004). Loughran and Ritter (2004) found that although underwriting fees were determined by the IPO proceeds, underwriters were still apt to underprice IPOs because the private benefits of underpricing greatly exceeded their implied loss of underwriting fees. The underpricing caused by the principal-agent problems is also detected by testing the relationship between underwriters and issuers. Schenone (2004) found that the IPO firm with a pre-IPO banking relationship underwriter had lower underpricing than the firm without such underwriter owing to reduced agency costs. Arikawa and Imad'eddine (2010) also attribute IPO underpricing to agency problems between underwriters and issuers caused by information asymmetry.

Biais et al. (2002) combine the principal-agent theory with information revelation theory and infer that the underwriter may collude with the informed investors to underprice IPOs, to the detriment of the issuer. Under such circumstance, institutional investors with positive signals receive more allocation than uninformed retail investors.

In summary, asymmetric information theory is adopted extensively in IPO literature and viewed as the root of underpricing. However, the four main subtheories under the asymmetric information theory, as mentioned above, only provide popular conjectures on information distributions rather than a thorough analysis under all

[21] Buy-side refers to advising institutions concerned with buying investment services in investment banking.

circumstances. For instance, under the asymmetric information assumption, the most general situation is that outside investors tend to face information uncertainty about the IPO firm's valuation rather than the issuer or the underwriter (C. Chen et al., 2013). The expected underpricing of the IPO is found to be positively related to the uncertainty of investors with regard to its value (Clarkson, 1994; Beatty & Ritter, 1986). Although signaling theory assumes that investors have a lack of superior information about the pricing of IPOs, it emphasizes on the issuer leaving money on the table to indicate its high quality, which is more applicable in an efficient market. In an emerging market, with poor regulations, the issuer is more likely to take advantage of the superior information to manipulate earnings and induce investors to overvalue the IPO. Based on the PRC IPO market, therefore, it seems that the main concern of asymmetric information lies between the issuer and investors. The asymmetric information gap provides scope for the issuer to engage in opportunistic behavior (e.g. earnings management), resulting in investors overpricing the IPO.

3.2.1.2 Behavioral explanation

Behavioral explanation is also a very popular theory for interpreting underpricing and is normally classified into two categories: investors' behavior and issuers' behavioral biases (Ljungqvist, 2008).

The dominant behavioral explanation lies in investors' behavior. Barberis et al. (1998) assert that investors overreact to short-term good earnings announcements due to their overoptimism. Consistent with Barberis et al. (1998), Ljungqvist et al. (2006) developed a model in a hot market and found that when regular institutional investors resold IPO stocks to sentimental investors, who held optimistic beliefs about the IPO firm, the stock was underpriced to compensate regulars for the risk of holding the IPO stock in inventory. Even though the IPO stock was underpriced, the issuer still benefited from the IPO, because the offer price capitalized part of the expected trading gain (Ljungqvist et al., 2006). As a result, the offer price exceeded the fundamental value, leading to subsequent underperformance (Purnanandam & Swaminathan, 2004). The investors' behavior explanation seems to be applicable in the PRC. For instance, Geng et al. (2010) found that the high level of underpricing in the PRC was induced by investors' overreaction to accounting information. Shen et

al. (2014) also noted that investors' over optimism further increased the stock price in the secondary market and led to the overvaluation of IPO stocks in the short term in the PRC.

Based on behavioral explanation from the perspective of the issuer, Loughran and Ritter (2002) used prospect theory to explain the behavioral biases among the decision-makers of the IPO firm in a hot market. Prospect theory argues that in most cases in the IPO market, wealth gained on the retained shares from a price jump is larger than the wealth loss from underpricing for pre-issue shareholders who only care about the change in wealth rather than the level of wealth. Thus, underpricing is considered an indication of satisfaction and indirect compensation by the issuer to underwriters in this theory. Ljungqvist and Wilhelm (2005) tested the prospect theory and found IPO firms with higher levels of underpricing were less likely to switch underwriters in the subsequent seasoned offerings, indicating they were satisfied with the IPO underwriters' performance. Therefore, underpricing was considered as compensation by the issuer to express satisfaction for the underwriters' performance.

In conclusion, both the behavioral explanations from investors and the issuer perspective are more applicable in a hot market.

3.2.1.3 Other explanations

Besides the dominant asymmetric information and behavioral theories, there are other explanations for underpricing, such as institutional explanations, underwriters' incentive, and ownership and control.

Institutional explanations

There are two main institutional explanations for deliberate underpricing to achieve various means. The first explanation is issuers deliberately underprice IPOs to avoid legal liability. Hughes and Thakor (1992) contend that issuers are prone to underprice IPOs to reduce their litigation risks. However, this explanation is somewhat US-centric rather than worldwide (Ljungqvist, 2008). The second institutional explanation of IPO underpricing is from the tax point of view. Rydqvist

(1997) suggests that the issuers allocate new issues to employees and underprice IPOs to evade high income taxes. The reason is the capital gains tax rates of stock options held by the employees are considerably lower than income tax rates (Taranto, 2003).

Underwriters' incentive

Underpricing is sometimes caused by underwriters who intend to increase the share price to avoid undersubscription. Ruud (1993) constructed a diagram of the distributions of IPO initial returns in the US and suggests that the stock price was raised significantly under the influence of the underwriter until the issues were fully sold. Boehmer and Fishe (2004) also found empirical evidence that underwriters encouraged IPO underpricing to develop aftermarket liquidity by using global new issues database. Fairly priced or underpriced stocks provided the underwriter a guaranteed payment from their issuances compared with overpriced stocks facing a risk of being undersubscribed (Gordon & Jin, 1993). In addition, underpricing can bring underwriters several benefits, as concluded by Cliff and Denis (2004). First, underwriters might gain future business opportunities by allocating more underpriced IPOs to favoured clients or large investors. Second, underwriters might gain interest (e.g. trading and inventory profit) from underpricing by high aftermarket trading volume as the primary market makers.

Ownership and control

When going public, this may lead to the separation of ownership and control, inducing agency cost. As a result, if the separation of ownership and control is incomplete, there is an agency problem between non-managing and managing shareholders (Jensen & Meckling, 1976). Managers may have incentives to use their control benefits at the expense of outside shareholders' interest. Hence, ownership is dispersed to safeguard managers' control power by underpricing. Two models within the agency cost context are used to explain the underpricing phenomenon (Ljungqvist, 2008). Firstly, managers in the IPO firms may have the intention to underprice IPOs to gain less supervision by leaving money on the table, because underpricing leads to a more dispersed ownership and reduced monitoring of current management (Boulton et al., 2010; Pham et al., 2003; Brennan & Franks, 1997).

Secondly, underpricing is considered as the compensation for ownership dispersed to minority investors due to their increased risk exposure, leading to agency cost increase (Chen et al., 2004; Stoughton & Zechner, 1998).

In conclusion of section 3.2.1, the theories and explanations of underpricing are not isolated or mutually exclusive and some may be more or less relevant than others depending on the circumstances of particular IPOs (Kennedy et al., 2006). The asymmetric information theory is applied widely in various circumstances (Goergen et al., 2009; Yu & Tse, 2006), whereas behavioral explanations are usually adopted only in the hot market (Ljungqvist et al., 2006; Loughran & Ritter, 2002), and other explanations are not generalized applicable (Ljungqvist, 2008). A asymmetric information theory is particularly useful in explaining underpricing phenomenon within emerging markets with a poor regulatory system and deficient disclosure mechanism (Lin & Tian, 2012). Uncertainty tends to be induced under such circumstance, when investors' pricing of IPO stocks lead to a high level of underpricing.

3.2.2 Explanations for post-issue stock performance

In contrast to underpricing, theoretical explanations for negative post-issue stock returns have been less available. One popular set of explanations is rooted in asymmetric information (S. S. Chen et al., 2013; Roosenboom et al., 2003; Teoh, Welch et al., 1998a). Another set of post-issue stock performance theoretical explanations focuses on behavioral and expectations-based reasons (Brav & Gompers, 2003; Bradley et al., 2001; Miller, 1977). Proponents of the last explanation completely ignore any theoretical foundation by arguing negative post-issue stock performance arises due to researcher mismeasurement, such as: (i) failure to control adequately for risks; (ii) measurement problems related to returns across a long-time horizon; or (iii) inappropriate benchmark selection (e.g. Brav et al., 2000; Eckbo et al., 2000; Fama, 1998; Kothari & Warner, 1997; Sefcik & Thompson, 1986).

3.2.2.1 Asymmetric information

The asymmetric information is found to be related to future equity returns (Jiang & Lee, 2012). As mentioned in the previous section, information tends to be distributed unevenly among the issuer, underwriter and investors. When issuers have more information than investors, they are likely to take advantage of the information gap to improve the outward appearance of the stocks. If the unsophisticated investors have no access to interior information, they may be overoptimistic about the IPO firm's future prospect when pricing the new issues. However, with the information disclosed gradually to the public, optimistic investors convert to the mean market valuations, inducing stock price drops in the long term.

Two reasons are always cited to explain IPO long-term underperformance based on the asymmetric information explanation. The first is earnings management. Teoh, Welch et al. (1998a) found that issuers with unusual higher accruals in the IPO year experienced poorer three-year stock performance thereafter. They (Teoh, Welch et al., 1998a) believe that the level of discretionary accruals was a proxy of earnings management and investors were fooled by the boosted earnings due to the asymmetric information. However, the manipulated earnings were not sustainable and the stock price eventually fell once investors perceived the manipulate (X. Chang et al. 2010; Roosenboom et al. 2003). S. S. Chen et al. (2013) also noted that post-IPO long-term stock performance was negatively associated with earnings management in firms with high information uncertainty.

Another explanation for long-term underperformance based on information asymmetry is market timing. Issuers are able to forecast the IPO firm's future prospects better than outside investors, hence they are likely to use the information advantage to make an equity issue decision (Jiang & Lee, 2012). Lucas and McDonald (1990) developed an asymmetric information model and documented that issuers tended to take advantage of the superior information to go public when the IPO was overvalued, resulting in a decreased stock price after issuance. This model also helps to explain why equity issuance always follows general market increase or the bull market.

All in all, asymmetric information has a profound influence on IPO stock performance over short and long horizons.

3.2.2.2 Behavioral and expectation-based explanation

Another popular explanation of underperformance relates to investors' behavioral and expectation adjustments. There are two hypotheses under the behavioral and expectation-based approach: investors' behavior hypothesis and opinion divergence hypothesis.

The first hypothsis was put forward by Ritter (1991) who attributes the reason for long-term underperformance to investors' over optimism about firms' prospects. The negative relationship between annual volume of new issues and aftermarket performance indicates that firms engage in IPOs when overoptimistic investors are willing to pay high multiples (Ritter, 1991). Investors' over optimism is triggered by various parties (Zhang & Liu, 2013). For instance, investment banks may advertise and package the IPOs to promote sales of new issues. Issuers always choose to go public when the industry is hot or their earnings are at a peak point. When investors disappointingly realize the unsustainable development of the IPO firm and adjust their expectation, share price decreases, leading to negative aftermarket performance. Ljungqvist et al. (2006) studied the relationship between investors' behavior and IPO pricing in hot markets. They set up a model that relied on investors' behavior and found that naive exuberant investors led to post-issue underperformance due to the over valuation of IPOs. The general tendency of long-term underperformance indicates that investors' overoptimistic sentiment eventually fades away and IPO overpricing is corrected over time (Jiang & Li, 2013). The investors' behavior explanation is very popular in explaining the post-issue stock performance in the PRC. Scholars generally found that the post-issue underperformance of PRC IPOs was induced by investors' optimism and overreaction to manipulated earnings (Shen et al., 2014; Tian, 2011; Yi et al., 2008).

The second hypothesis was raised by Miller (1977) who documented that the uncertainty associated with returns of new issues led to investors' divergence of opinion, resulting in IPOs underperforming in the long term. Based on Miller's

hypothesis, Gao et al. (2006) found empirical evidence that early-market return volatility, a proxy for the divergence of opinion, was negatively related to the subsequent IPO long-term abnormal returns. In addition, some scholars have found that the share price dropped at the end of the lockup period[22] due to investors' divergence. For instance, Bradley et al. (2001) and Brav and Gompers (2003) examined stock performance in the period surrounding the lockup expiration and found that lockup expiration was associated with significant and negative abnormal returns. Field and Hanka (2001) also got similar results and concluded that high trading volume was associated with abnormal negative returns caused by downward-sloping demand curves. Those studies showed that the diversity of opinion occurred due to more shares made available to the public, resulting in poorer aftermarket performance. Another explanation from venture capital (VC) investors' perspective also builds on the divergence hypothesis. Bradley et al. (2001) found post-issue stock underperformance was much more pronounced for VC backed IPOs because VCs distributed shares after the lockup expiration date, resulting in exceptionally high trading volume and investors' divergence of opinions. Moreover, Krishnan et al. (2011) provided the evidence that reputable VCs were associated with better post-issue stock performance owing to the continued post-IPO support.

In summary, investors' behavior and opinion divergence have significant influences on post-issue stock performance.

3.2.2.3 Mismeasurement explanation

As noted by Fama (1998), post-issue stock performance could be sensitive to the model selection. Consequently, the value of long-term IPO returns is sensitive to measurement techniques. There have been various measures of post-issue stock performance and the calculation process found to be influenced by four factors: risk controls, observation periods, evaluation methods, and benchmark selection. Each of these is described below.

[22] IPO lock up period refers to agreements which prohibit company insiders-including employees, their friends and family, and venture capitalists-from selling their shares for a set period of time, and most IPO firms' lock up period is 180 days in the US (U.S. Securities and Exchange Commission, 2011). The lock up period for listed firms in the PRC is 12-month, and nontradable shareholders are only allowed to sell, at most, 5% of the shares outstanding within 12 months after the lock up (Liao et al., 2011). Since 2012, all institutional and individual pre-IPO shareholders have been allowed to sell their shares in an IPO without waiting for the lock up period has expired (CSRC, 2012).

The first possible mismeasurement of IPO post-issue stock performance is the failure to control risk factors. Brav et al. (2009) argued that the poor long-term IPO returns were commensurate with the issuers' risk characteristics, such as size and book-to-market ratio. Therefore, sometimes the IPO abnormally long-term performances are interpreted by controlling risk factors incompletely (Fama & French, 1996).

Second, Ritter and Welch (2002) claim that results of post-issue stock performance are sensitive to the observation periods, which attribute disparity performance for the same sample. Consequently, it is possible to obtain underperformance during a specific period, while over-performance or a different magnitude of underperformance is detected in other periods. For example, Drobetz et al. (2005) found that the three-year and five-year buy-and-hold abnormal returns of Swiss IPOs were -26.17% and -173.46% respectively.

Third, post-issue stock performance is also sensitive to the evaluation method selection. The computation process is totally different among various measurement of long-term stock returns, hence the results are not unanimous and sometimes show significant diversity. For instance, Chorruk and Worthington (2010) found IPO firms underperformed in the long term in Thailand, but the degrees of underperformance were from -0.3% to -468% when using different ways to evaluate post-issue stock returns.

Fourth, it is crucial to choose an appropriate benchmark to adjust for expected returns. Different benchmarks yield different post-issue stock performance. Sapusek (2000), for instance, analyzed the long-term stock performance of German IPOs using various benchmarks and his result exhibited neutral, over-performance and underperformance tied to different benchmarks used.

Although many studies have revealed that post-issue stock returns were sensitive to various factors, scholars generally found consistent post-issue stock performance regardless of measurement (Chen et al., 2010; Gregory et al., 2010; Jaskiewicz et al., 2005; Chan et al., 2004). For instance, Ritter (1991) used two measurements to test post-issue stock performance of US IPOs and consistently found underperformance

in the long term. Therefore, the mismeasurement explanation for post-issue stock performance seems groundless in practice.

In conclusion of section 3.2.2, among all explanations of IPO post-issue stock performance, asymmetric information and behavioral explanation seem to be the most applicable to interpret long-term performance (Shen et al., 2014; S. S. Chen et al., 2013; Chahine et al., 2012; Su et al., 2011). Since there is little pre-listing information about IPO firms available to investors (Rao, 1993), investors have to rely heavily on released financial statements and prospectuses. This unusually high dependence on accounting information creates scope for the issuer to engage in earnings management (Aharony et al., 1993). Then unsophisticated investors are likely to be misled by manipulated earnings and overvalue IPOs. If financial information is disclosed after going public, investors detect pre-IPO earnings manipulation and correct their overoptimism, leading stock prices to decline in the long term.

3.2.3 Theoretical framework in this thesis

As mentioned above, factors causing IPO anomalies are diverse and all parties involved in the IPO price setting process exert their influences on final price. Therefore, studies on the explanations of IPO anomalies may be more or less relevant, depending upon conditions and circumstances of IPOs (Kennedy et al., 2006). In this thesis, the research focus is SMEs in the PRC, which are accompanied by severe information asymmetry problems (Deng et al., 2013). In view of the above point, the most well established and supported theoretical perspectives for SME IPO anomalies rely on asymmetric information.

Krinsky and Rotenberg (1989) found that there was an information gap between the issuer and outsider investors in Canada. In general, the issuer was familiar with the IPO firm's operation and had private information about the firm's prospects (e.g. potential earning ability, debt constrains, employee and customers' loyalty), whereas outside investors only had access to published financial statements and prospectuses which may have been deliberately manipulated. It is noteworthy that when

asymmetric information arises, there is greater uncertainty about the firm thereby making a valuation very difficult for investors.

The level of underpricing is found to be negatively associated with the strength of legal framework all around the world, suggesting that legal protection mitigates ex ante uncertainty regarding property rights protection and thereby reducing underpricing (Liu et al., 2014b; Hopp & Dreher, 2013). In particular, asymmetric information has been considered as a primary issue in emerging markets, which were characterized by deficient formal institutions, inefficient market mechanism and political volatility, leading to inadequate and unreliable information (Payne et al., 2013). Operating in an emerging economy, the PRC capital market is governed by a poor regulatory framework that provides shareholders little protection (La Porta et al., 1998), and market transparency is viewed as a major barrier to PRC investors (Carpenter et al., 2014). Consequently, asymmetric information theory is more applicable for the PRC IPOs.

In prior literature, asymmetric information was adopted widely as a major theory to interpret IPO underpricing in the PRC. For instance, Yu and Tse (2006) advocate information asymmetry theory and support the winner's curse hypothesis. Su (2004) also noted that underpricing was related to information asymmetry in the PRC because it was positively associated with pre-IPO leverage as a proxy for ex ant information asymmetry. Furthermore, Lin and Tian (2012) found accounting conservatism was an important factor in IPO underpricing by reducing asymmetric information. They also found that IPO underpricing and its relationship with accounting conservatism was more pronounced when the information asymmetry was critical.

Research findings indicate that asymmetric information theory is useful for explaining underpricing and post-issue stock returns. Long-term stock performance has been found to be poor when IPO investors were overoptimistic about the market value initially due to favorable public information in pre-IPO periods (Kutsuna et al., 2009). Overoptimistic investors turned to a more rational outlook when unfavorable

information was disclosed gradually in the aftermarket, leading to poor long-term stock performance following issuance.

Besides asymmetric information theory, investors' behavioral explanation is pertinent for explaining post-issue stock performance in the PRC (Shen et al., 2014; Aharony et al., 2010; Kao et al., 2009). Arguably, this explanation is particularly feasible in the PRC capital market due to the inequality between supply and demand of IPOs as well as the high proportion of uninformed individual investors. It has been found that large individual investors' demands have led to higher IPO prices and poorer long-term stock performance (Derrien, 2005). Shen et al. (2014) and Tian (2011) all claim that the inequality of supply and demand of new issues partly account for the enthusiasm of investors bidding for IPO stocks and long-term underperformance in the PRC. In addition, investors have extrapolated the growing trends in earnings depending on financial figures, leading to overvaluation of the stock price at the initial stage (Barberis et al., 1998). However, according to Loughran and Ritter (1995), in the long term IPO stocks tend to underperform the market due to managers' opportunism in taking advantage of investors' sentiments to issue overpriced securities. Thus, based on the information available in the aftermarket, investors correct their overoptimistic expectation and discount the stock price. Purnanandam and Swaminathan (2004) found evidence that overpriced IPOs exhibited the largest initial returns and the poorest long-term stock performance. Consequently, the post-issue stock performance was found to be positively related to the extent of information production and negatively associated with pre-issue investors' optimism (Yi et al., 2013; Yi et al., 2008).

Based on the well documented literature concerning the pervasive asymmetric information gap and the poor regulatory system in the PRC, it is reasonable to predict earnings management in the IPO process. As the initial purpose of PRC's inauguration of the capital market was to provide a platform for SOEs reform, the listing priorities were usually given to large firms, leaving SMEs competing for a limited funding pool. Moreover, SMEs always faced challenges in raising equity capital to get listed on the SME board due to the rigid specification of listing requirements (Guariglia et al., 2011). In addition, the supervisory mechanism and

information disclosure system in the PRC IPO market have been far from perfect. All those conditions in the PRC IPO market have provided SMEs incentives and scope to manipulate earning to increase the possibility of obtaining external equity funds. Consequently, the issuer has tended to manipulate earnings by using the information gap and misleading investors' expectation about IPO firms' future prospects. Empirical evidence shows that earnings management was positively associated with information asymmetry, resulting in informational ambiguity (Bartov & Mohanram, 2004). In the PRC capital market with its 'speculative bubble', investors have been less than rational and have not fully understood managed accruals. Therefore, the issuer has had a chance to take advantage of superior information to manipulate financial statements and lead naive investors to overprice the IPO, resulting in underpricing in the aftermarket. However, earnings could only be 'borrowed' from future periods, so they have been inflated at the expense of subsequent earnings deflation (Ball & Shivakumar, 2008). After issuance, stock returns have tended to decrease if the IPO firm failed to exhibit persistent earnings and the manipulation was detected by the investors, leading to poor long-term stock performance.

Given that the sample firms in this research are from the SME board in the PRC and the IPO anomalies are to be explained from the earnings management perspective, asymmetric information is adopted in this thesis as the main theoretical framework to explain IPO stock performance over short and long horizons. Investors' behavioral explanation will be combined with asymmetric information theory to interpret post-issue stock performance in this thesis.

3.3 Earnings management in the IPO

The available literature about earnings management is relatively recent, becoming a major financial and accounting issue during the past several decades. Nonetheless, the topics and issues examined in respect to earnings management are extensive and detailed. Healy and Wahlen (1999) argued that earnings management "will use judgement in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying performance of the firm or to influence contractual outcomes that depend on released accounting numbers." (p.368). Earnings are particularly important during the IPO process due to

the afore-mentioned information gap between the issuer and investors (Chen et al., 2005). Earnings form a significant aspect in the formation of expectations about a firm's future potential, thereby influencing stock valuations. Accordingly, earnings management behavior has been examined by many scholars (e.g. Roosenboom et al., 2003; Teoh, Welch et al., 1998a).

3.3.1 Earnings management in the IPO literature

3.3.1.1 Opportunities and incentives for earnings management

The IPO is a particularly susceptible environment for earnings management, offering the issuer both opportunities and incentives to manipulate earnings (Teoh, Welch et al., 1998a).

Due to the rare media coverage of new issues prior to the IPO (Rao, 1993), an information gap has emerged between insiders and potential investors. Roosenboom et al. (2002) concluded that "Inside information concerning future cash flows, investment opportunities, managerial skills, and the ability to control future agency costs, among other things, are privy to management. Consequently, an information asymmetry manifests itself a fortiori." (p.2). In other words, the issuer has access to extensive information about the internal operation of the IPO firms, whereas potential investors only have access to relatively limited knowledge regarding the IPO (Cohen & Zarowin, 2010). Brown and Hillegeist (2007) found that the quality of the annual report was negatively associated with information asymmetry, suggesting that information asymmetry was a detriment to the quality of financial information. When information asymmetry is high, investors have insufficient resources, incentives, or access to relevant information to monitor manager's actions, providing opportunity for earnings management (Warfield et al., 1995). Empirical studies also suggest there is a significant positive relationship between the magnitude of information asymmetry and the scope of earnings management (Richardson, 2000). Therefore, generally speaking, asymmetric information intensifies the possibility of earnings management within the IPO setting.

Besides asymmetric information, low market monitoring and less investor sophistication increase the opportunity for earnings management in the PRC

(Aharony et al., 2000). Securities regulatory authorities play an important role in monitoring the opportunistic behaviors and detecting frauds. IPO firms have been found to have more opportunities to manage earnings in a market where regulations and policing mechanisms are new and poor (Aharony et al., 2000). As a result, earnings management is more pronounced in the developing markets, such as Malaysia and the PRC (C. Chen et al., 2013; Ahmad-Zaluki et al., 2011). In addition, investors' behavior has contributed to earnings management. When investors have had little information about IPO firms, they were unable to fully understand the earnings, which are the combined results of operating performance and deliberate accounting method choice within accounting standards (DeFond & Jiambalvo, 1994). Consequently, higher reported earnings would be translated directly into a higher valuing of the new issue.

Research in various countries has shown that the incentives for earnings management are determined by the long-term development strategy of the IPO firm. For example, if the issuer views the IPO as a vehicle for 'cashing in', then the earnings are inflated to maximize the price of the stock (Ronen & Yaari, 2008). Given the IPO process is a major event (if not the most important) within the entity's life cycle of raising capital, there are enormous incentives for issuers to raise as much as possible by taking advantage of the asymmetric information gap. Most of the empirical studies support this view by providing evidence that IPO firms have engaged in income-increasing earnings management in the US and Europe (e.g. DuCharme et al., 2004; Roosenboom et al., 2003; Teoh, Welch et al, 1998a).

The incentive for income-increasing earnings management can be divided into two categories based on the issuers' direct and indirect targets. Some issuers have direct economic incentives to manipulate earnings upward because greater earnings may be reflected in a higher offer price and greater proceeds (Chen et al., 2005). It has been found that there was a significant positive relationship between financial numbers and the IPO offer price, which had a direct and immediate impact on the wealth of the issuer (DuCharme et al., 2000; Kim & Ritter, 1999). As a consequence, to maximize proceeds from the IPO, the issuer has a direct incentive to temporarily deceive investors by inflating earnings opportunistically through pre-IPO accruals

management to capture as much gain as possible (Ljungqvist et al., 2006; DuCharme et al., 2000). For example, issuers have been found to manage earnings upwards to increase the value of new issues and cash receipts from the partial disposition of existing shares (Friedlan, 1994; Aharony et al., 1993). Even when there was no direct economic incentive, some issuers in IPO firms still had indirect incentives to engage in income-increasing earnings management to increase the listing possibility. Those incentives include higher prestige and other non-pecuniary benefits accompanied by listing status. For instance, although SOE managers in the PRC owned no shares of the firm and had no stock options, they still had indirect incentives to inflate earnings to increase the possibility of their firms qualifying for listing with increased autonomy and decreased government interference (Aharony et al., 2000).

However, if the issuer views the IPO as the first step in raising capital externally and aims at future development, the aggressive reporting at the IPO stage is undesirable and the income-decreasing earnings management is likely to be adopted to allow the firm to meet future expectations (Ronen & Yaari, 2008). To ensure a smooth series of earnings after going public, the issuer tends to choose a prudent and conservative policy to reserve income rather than robbing future earnings. Gramlich and Sørensen (2004) found Danish managers exercised income-decreasing discretionary accruals to reach targets and mitigate errors in earnings forecast when the actual earnings were greater than expected between 1984 and 1996. Managers in Malaysia also preferred income-decreasing discretionary accruals to reduce earnings forecast deviation to meet future earnings targets between 2000 and 2002 (Cormier & Martinez, 2006).

In summary, the IPO setting provides issuers considerable opportunities and incentives to engage in earnings management.

3.3.1.2 IPO studies on earnings management

Prior literature in the US concerning the existence of earnings management during the IPO year is rather mixed. Earnings management behavior was generally detected in prior US IPO literature (e.g. S. C. Chang et al., 2010; Ducharme et al., 2000; Teoh, Welch et al., 1998a) with some exceptions. For instance, Chaney and Lewis (1998)

found evidence that discretionary accruals were used by firms to smooth income prior to the IPO between 1975 and 1984. Friedlan (1994) found IPO firms made income-increasing accruals in the most current statements included in the prospectus between 1981 and 1984, while other researchers found IPO firms manipulated earnings in the first year as a public firm rather than in the years before the IPO for the 1980 to 1984 period (Teoh, Welch et al., 1998a). Aharony et al. (1993) found little, if any, earnings management in the period preceding the IPO between 1985 and 1987, and concluded that earnings management was more likely to take place among small firms or firms with large financial leverage. However, there have been some different findings in US studies. For instance, Armstrong et al. (2008) reject the existence of earnings manipulation of IPOs in the US between 1987 and 2005, and argued that discretionary accruals documented in prior IPO studies were an artifact of biases in common test and the accruals were not systematically opportunistic.

Besides the US, earnings management behavior has also been detected during the IPO year in other regions. For instance, Roosenboom et al. (2003) found that managers engaged in earnings management in the first year as a public firm by using Dutch IPOs between 1984 and 1994. By examining a sample of 58 Danish IPO firms between 1984 and 1996, Gramlich and Sørensen (2004) found that managers exercised discretionary accruals to reach their voluntary earnings forecast targets in Danmark. Ahmad-Zaluki et al. (2011) also found that the issuers of Malaysian IPOs during the period 1990 to 2000 adopted income-increasing earnings management, particularly during periods of severe economic stress.

Earnings management has also been detected in the PRC IPOs (C. Chen et al., 2013; Aharony et al., 2010; Geng et al., 2010). For instance, Shen et al. (2014) claim that issuers tend to increase discretionary accruals at the end of the first post-IPO year by studying the PRC IPOs issued over the 1998 to 2003 period. C. Chen et al. (2013) also found the empirical evidence of pre-IPO earnings management in the PRC from 2002 to 2008, and that non-SOE issuers were associated with more aggressive earnings management than SOE issuers. Kao et al. (2009) concluded that IPO pricing regulations based on accounting earnings induced IPO firms to inflate their pricing-period earnings to attain more favorable IPO prices. Liu et al. (2014a) found that IPO

firms in the PRC manipulated earnings less after the introduction of the book building system to price IPOs during the period 1999 to 2009.

In summary, earnings management behavior has been detected by scholars for the IPO year in various countries.

3.3.2 Effect of earnings management on stock price

The major consequence of earnings management for listing firms is a change in stock performance (Bernard & Skinner, 1996) because the level of accruals is a negative cross-sectional predictor of abnormal stock returns (Sloan, 1996). Research has shown that investors are likely to fixate on earning numbers and neglect cash flows. Thus investors make decisions heavily relying on the disclosed financial information, thereby mispricing the new issues. As a result of the initial mispricing, the influence of earnings management lasts over short and long horizons.

Table 3.1 provides a summary of IPO studies about the effects of earnings management on the stock price. There are three major effects of earnings management on IPO stock price, as shown in Table 3.1. First, the offer price is occasionally influenced by manipulated earnings, but the directions are contentious as indicated in Panel A. Second, the short-term stock price is also affected by earnings management with great disparity, as shown in Panel B. Third, in the long term, the stock price tends to be generally depressed by the earnings management as suggested in Panel C.

As shown in Table 3.1, Panel A, DuCharme et al. (2000) found evidence that pre-IPO abnormal accruals had a positive impact on the initial firm value. The researchers (DuCharme et al., 2000) used data from manufacturing firms in the US. By contrast, Nagata and Hachiya (2007) found IPO firms in Japan with conservative pre-IPO earnings management tended to have higher offer prices, whereas IPO firms with aggressive earnings management tended to be discounted if they fail to show consecutive earnings increase. It might be explained that underwriters or investors detected earnings manipulation and discounted the offer prices as a result. Contrary

to most of the prior literature, Armstrong et al. (2008) reject the relationship between discretionary accruals and offer price in the US.

Table 3.1 IPO studies on earnings management and stock price

Study	Event period	Impact on share price
Panel A: Effect on offer price		
DuCharme et al. (2000)	one year prior to the IPO	Increase offer price Decrease long-term stock returns
Nagata and Hachiya (2007)	pre-IPO period	Decrease offer price
Armstrong et al. (2008)	in the IPO year	No impact on offer price or stock price
Panel B: Effect on short-term stock price		
Kao et al. (2009)	in the IPO year	Decrease initial returns Decrease long-term stock returns
Boulton et al. (2011)	around the IPO year	Increase initial returns
Chahine et al. (2012)	around the IPO year	Increase initial returns Decrease long-term stock returns
Francis et al. (2012)	around the IPO year	Decrease initial returns
Shen et al. (2014)	in the IPO year	Increase initial returns Decrease long-term stock returns
Panel C: Effect on long-term stock price		
Teoh, Welch et al. (1998a)	in the IPO year	Decrease long-term stock returns
Roosenboom et al. (2003)	in the IPO year	Decrease long-term stock returns
Ahmad-Zaluki et al. (2011)	in the IPO year	Decrease long-term stock returns
Shu et al. (2012)	around the IPO year	Decrease long-term stock returns

Table 3.1, Panel B provides IPO studies on earnings management and short-term stock price. Compared with sophisticated underwriters, retail investors are unable to understand earnings management (Teoh, Welch et al., 1998a). As a result, investors are likely to be fooled by masked financial figures and overestimate firm value initially. As indicated in Panel B, Shen et al. (2014) found that abnormal high initial returns of IPOs in the PRC were induced by investors' incorrect beliefs about the fundamental value in the IPO year. Besides Shen et al. (2014), the positive relationship between earnings management and short-term stock price is reported in various regions, such as the US and UK (Chahine et al., 2012; Boulton et al., 2011). However, Kao et al. (2009) got a contrary finding that firms reporting better pricing-period accounting performance in the IPO year had lower short-term returns due to inflated offer prices in the PRC. Consistent with Kao et al. (2009), Francis et al. (2012) assert that conservative earnings management leads to higher short-term stock returns in the US.

Compared with the debates on the influence of earnings management on offer price and short-term stock performance, there is general agreement about the negative effect on long-term stock performance as described in Table 3.1, Panel C. Accrual-based earnings management is undertaken with the precondition that total accruals will be zero over the long term, because the sum of earnings should be equal to the sum of cash flows. Therefore, managers can only use accruals to increase short-term earnings and those abnormal accruals must be offset by lower accruals in the long term. In other words, inflated earnings cannot persist in subsequent periods because managers have to reverse accruals, especially for those poorly performing firms without stable growing cash flows. A number of empirical studies have found the empirical evidence of the negative relationship between long-term stock performance and earnings management in different regions, such as the US (DuCharme et al., 2000; Teoh, Welch et al., 1998a), Netherlands (Roosenboom et al., 2003), Malaysia (Ahmad-Zaluki et al., 2011), Taiwan (Shu et al., 2012) and the PRC (Shen et al., 2014; Kao et al., 2009). The only exception is Armstrong et al. (2008) who argued that earnings management had no effect on the IPO stock price in the US in the short or long term.

To sum up, earnings management has generally been found to have had a profound effect on IPO prices over short and long horizons. If investors are less sophisticated and do not take accruals into consideration when valuing IPO firms, stock prices are likely to be boosted in the short term, but drop in the long term.

3.4 IPO underpricing

3.4.1 Underpricing phenomenon

IPO underpricing, sometimes termed abnormal initial returns, is normally defined as the difference between the first trading day closing price and the offer price of the IPO (Ritter & Welch, 2002). This phenomenon was first observed by Ibbotson (1975) who found the first month initial returns of 11.4% in the US IPOs during the period of 1960s, but the result was not precise in terms of the calculation of the first trading day returns. Other pioneers of IPO underpricing are McDonald and Fisher (1972) who obtained an IPO returns for the first trading week of 28.5%, but they only used

sample firms listing in one year. Over the past decades, many studies have found that the phenomenon of IPO underpricing was not just a casual case.

3.4.1.1 Underpricing in the global markets

The underpricing phenomenon was been investigated by many scholars globally and cited as one of the IPO anomalies (Ritter, 2011). Table 3.2 shows recent studies on underpricing in the global markets (other than the PRC), which are classified into two panels: developed (Panel A) and developing (Panel B) markets[23].

As shown in Table 3.2, researchers in different nations and at different points in time have found that new shares of IPO firms were, on average, offered to investors at prices that were considerably lower than the first trading day's closing price (e.g. Cheung et al., 2009; Dimovski & Brooks, 2004). Whereas the phenomenon of positive first trading day's abnormal returns are virtually universally accepted, magnitudes vary across nations.

In Table 3.2, Panel A, the highest level of underpricing (57.56%) in the developed markets was detected in Korea, while the lowest level of underpricing (3.74%) was found in Scandinavia. Chen et al. (2004) noted that the average underpricing level in countries with long established capital markets was around 10%, and the level expanding to 20-50% in emerging economies. Most of the studies in the developed markets in Panel A report the levels of underpricing are below 30%, such as Australia (Dimovski & Brooks, 2004), Canada (Aintablian & Mouradian, 2007), UK (Coakley et al., 2009), France (Goergen et al., 2009), Scandinavia (Bartholdy & Jorgensen, 2010), Hong Kong (Vong & Trigueiros, 2010) and the US (Hahn et al., 2013; Ritter, 2011). Studies of the US IPOs have been the focus of the vast bulk of IPO research, with first trading-day returns ranging from 22.80% to 27.80% during the last three decades (Hahn et al., 2013; Ritter, 2011).

[23] The definitions of developed and developing markets in this thesis are based on the 2014 Human Development Report (Malik et al., 2014).

Table 3.2 Studies on IPO underpricing in the global markets (other than the PRC)

Study	Region	Period	Sample size	Initial returns	Industry with highest underpricing
Panel A: Developed markets					
Kim et al. (1995)	Korea	1980-1991	169	57.56%	N/A
Dimovski and Brooks (2004)	Australia	1994-1999	358	25.60%	Gold
Drobetz et al. (2005)	Switzerland	1983-2000	109	34.97%	N/A
Aintablian and Mouradian (2007)	Canada	1993-2001	199	5.28%	Oil and gas
Coakley et al. (2009)	UK	1985-2003	591	10.50%	High technology
Goergen et al. (2009)	France	1997-2000	158	21.00%	Transport and public
Goergen et al. (2009)	Germany	1996-2000	325	53.00%	Business service
Arikawa and Imad'eddine (2010)	Japan	1999-2004	474	38.00%	N/A
Bartholdy and Jorgensen (2010)	Scandinavia	1997-2006	195	3.74%	N/A
Vong and Trigueiros (2010)	Hong Kong	1994-2005	483	7.00%	N/A
Ritter (2011)	US	2000-2011	1,522	22.80%	N/A
Hahn et al. (2013)	US	1988-2009	2,693	27.80%	N/A
Panel B: Developing markets					
Krishnamurti and Kumar (2002)	India	1992-1994	386	77.94%	N/A
How et al. (2007)	Malaysia	1998-2000	322	102.00%	Construction
Islam et al. (2010)	Bangladesh	1995-2005	117	15.37%	Food and allied product
Samarakoon (2010)	Sri Lankan	1987-2008	105	34.00%	Footwear and textiles
Adjasi et al. (2011)	Nigeria	1990-2006	80	43.28%	Oil and mining
Agathee et al. (2012)	Mauritius	1989-2005	44	14.00%	Investment and transport
Ekkayokkaya and Pengniti (2012)	Thailand	1990-2007	468	30.00%	N/A
Darmadi and Gunawan (2013)	Indonesian	2003-2011	101	22.20%	N/A

In the developing markets, as indicated in Panel B of Table 3.2, the level of underpricing was found to be generally high. For instance, How et al. (2007) found Malaysian IPOs gained 102% initial returns on average during the period 1998 to 2000. The levels of underpricing were found to be beyond 10% in the developing

markets. Compared with findings in other developing markets, the underpricing levels were relatively lower in Bangladesh and Nigeria of less than 20% (Agathee et al., 2012; Islam et al., 2010). Studies of nations like India (Krishnamurti & Kumar, 2002), Sri Lankan (Samarakoon, 2010), Nigeria (Adjasi et al., 2011) and Thailand (Ekkayokkaya & Pengniti, 2012) found average initial returns were generally above 30%. Thus this level of underpricing was much higher than those reported in the US and other major developed markets, such as Australia, Canada, UK, Hong Kong and various European countries.

The last column of Table 3.2 suggests that the extent of underpricing also varies across industries. In some countries (e.g. Australia, Canada and Nigeria), IPO firms from resource sectors had the highest levels of underpricing, whereas in France and Mauritius, the levels of underpricing were highest in firms from the transport sector.

In summary, as indicated in Table 3.2, all studies in the global markets find evidence of IPO underpricing and the level of underpricing ranges from 3.74% to 102.00%. The level of underpricing is generally higher in the developing markets than that in the developed markets. In addition, the level of underpricing also varies across different industries.

3.4.1.2 Underpricing in the PRC

Researchers have found (consistent with other nations) that underpricing is prevalent amongst PRC IPOs (e.g. Yu & Tse, 2006; Su & Fleisher, 1999). In addition, the level of underpricing of PRC IPOs is significantly higher than that in other nations. In the PRC, the average level of underpricing is usually in excess of 100% (e.g. Shen et al., 2014; Liu et al., 2013; Shen et al., 2013; Chen & Strange, 2012; Lin & Tian, 2012). The abnormal high initial returns are cited by scholars as one of the '3-high'[24] problems in the PRC capital market.

Table 3.3 summarizes recent studies on the IPO underpricing in the PRC. All studies in Table 3.3 are categorized into three panels based on the observation period. The

[24] IPO anomalies after the reform of IPO book building mechanism in the PRC are called '3-high' problems, which include high issuing price, high P/E ratio and high funding (Yu, 2013).

cutting point is the listing year before or after 2000, around when the quota system was replaced by the verification system. Tian (2011) found that the quota system itself did not lead to underpricing, but the control of supplies was a key determinant of market distortion. Therefore, studies concerning IPO firms listed prior to 2000 are classified in Panel A. Studies on IPO firms listed across 2000 and after 2000 are classified into Panels B and C respectively.

Table 3.3 Studies on IPO underpricing in the PRC

Study	Listing board	Period	Sample size	Underpricing
Panel A: IPO firms listed prior to 2000				
Mok and Hui (1998)	SHSE	1990-1993	87 A-shares 22 B-shares	289.20% 26.00%
Su and Fleisher (1999)	SHSE/SZSE	1987-1995	308 A-shares	948.59%
Chen et al. (2000)	SHSE/SZSE	1992-1995	277 A-shares 65 B-shares	350.47% 38.55%
Chan et al. (2004)	SHSE/SZSE	1993-1998	570 A-shares 39 B-shares	178.00% 11.60%
Chen et al. (2004)	SHSE/SZSE	1991-1997	701 A-shares 117 B-shares	145.00% 10.00%
Su (2004)	SHSE/SZSE	1994-1999	248 A-shares	124.20%
Chi and Padgett (2005a)	SHSE/SZSE	1996-2000	668 A-shares	118.66%
Yu and Tse (2006)	SHSE/SZSE	1995-1998	343 A-shares	123.59%
Kao et al. (2009)	SHSE/SZSE	1996-1999	366 A-shares	134.00%
Shen et al. (2013)	SHSE/SZSE	1996-2000	411 A-share	243.46%
Panel B: IPO firms listed across 2000				
Kimbro (2005)	SHSE/SZSE	1990-2002	1,209 A-shares	120.32%
Chang et al. (2008)	SHSE/SZSE	1996-2004	891 A-shares	125.44%
Cheung et al. (2009)	SHSE/SZSE	1992-2006	1,446 A-shares	133.60%
Zhou and Zhou (2010)	SHSE/SZSE	1991-2005	1,380 A-shares	238.00%
Tian (2011)	SHSE/SZSE	1992-2004	1,377	247.00%
Chen and Strange (2012)	SHSE/SZSE	1992-2011	906 SOEs	131.71%
Liu et al. (2014b)	SHSE/SZSE	1997-2009	963 A-share	123.02%
Shen et al. (2014)	SHSE/SZSE	1998-2003	506 A-share	129.23%
Panel C: IPO firms listed after 2000				
Deng and Dorfleitner (2007)	SHSE/SZSE	2002-2004	237 A-shares	88.67%
Gannon and Zhou (2008)	SHSE/SZSE	2003	47 A-shares	76.14%
Guo and Brooks (2008)	SHSE/SZSE	2001-2005	286 A-shares	93.49%
Gao (2010)	SHSE/SZSE	2006-2008	217 A-shares	157.00%
Geng et al. (2010)	SZSE	2007	94	198.14%
Lin and Tian (2012)	SHSE/SZSE	2001-2009	674 A-share	110.90%
Song et al. (2014)	SHSE/SZSE	2006-2011	948 A-share	66.30%

It is shown in Table 3.3, Panel A that the underpricing level of A-shares listed prior to 2000 was extremely high with the offer price more than double. During the observation period from 1987 to 1995, the initial returns incredibly achieved 948.59% at the beginning of the inauguration of the capital market in the PRC (Su & Fleisher, 1999). Scholars generally found extremely high levels of underpricing in the early 1990s (e.g. Chen et al., 2000; Mok & Hui, 1998). Even in the late 1990s, when the hot market started to fade, the average levels of underpricing of A-shares listed from 1996 to 2000 still stayed at 118.66% and 243.46% respectively with different sample pools (Shen et al., 2013; Chi & Padgett, 2005a). Table 3.3, Panel B also shows that A-shares listed across 2000 demonstrated a high level of underpricing by no less than 100%. Some studies even reported the average level of underpricing exceeded 200% by testing A-shares listed from the beginning of 1990s to the middle of 2000s (Tian, 2011; Zhou & Zhou, 2010). All studies in Panels A and B found the levels of underpricing of PRC A-shares were beyond 100%. The extremely abnormal returns for IPO A-shares listed prior to 2000 were primarily explained by the inequality of supply and demand caused by the quota system (Chi & Padgett, 2005a).

For firms listed after 2000, the underpricing level decreased as indicated in Table 3.3, Panel C. For example, the average level of underpricing of A-shares listed from 2000 to 2005 was found to be below 100% (Gannon & Zhou, 2008; Guo & Brooks, 2008; Deng & Dorfleitner, 2007). This may be explained by the revolution of the IPO approval system. After 2000, the IPO quota system was replaced by a verification system, inhibiting underpricing to some extent (Liu, 2003). However, some studies after 2000 still found extremely high levels of underpricing. For instance, Geng et al. (2010) found that IPOs listed in 2007 had abnormal initial returns of 198.14% on average. Recently, the level of underpricing has decreased. The lowest level of underpricing (66.30%) for A-shares detected by Song et al. (2014) in IPO firms listed from 2006 to 2011. This decline may indicate the effectiveness of the recent reforms carried out by the PRC authorities on the IPO approval and pricing systems.

Compared with A-shares' high underpricing level (from 66.30% to 948.59%), B-shares only exhibited moderate underpricing (from 10% to 38.55%). Studies in Table 3.3 found significant differences between the levels of underpricing for A-shares and

B-shares (Chan et al., 2004; Chen et al., 2004; Chen et al., 2000; Mok & Hui, 1998). Chen et al. (2000) documented that the pricing systems of A- and B- shares were different, with large discounts of more than 50% for B-shares, inducing disparate stock performance in the aftermarket[25].

Although the underpricing issue has been documented extensively in the PRC, prior studies have overwhelmingly focused on large firms and SOEs listing on the SZSE and SHSE main boards (e.g. Shen et al., 2014; Chen & Strange, 2012; Cheung et al., 2009; Gannon & Zhou, 2008; Chi & Padgett, 2005a; Chen et al., 2004). However, empirical research focusing on PRC SMEs is rare, particularly in respect to IPO issues. Recently, some conference papers have analyzed the SME IPOs, but these papers are generally anecdotal studies, with a lack of comprehensive empirical evidence. For example, some scholars have paid attention to the underpricing phenomenon on firms listing on the SZSE ChiNext (Anderson et al., 2013; Zhou & Lao, 2012) and the SME board (Wang & Li, 2013; Cao, 2010). The levels of underpricing of SMEs range from 33.50% to 77.89% as reported in those studies. These findings suggest that the PRC SMEs have not been exempt from a high level of underpricing (Cao, 2010).

3.4.2 Earnings management and underpricing

Due to the specific disclosure mechanism in the IPO process system, an information gap has been found to exist between the issuer and investors in various countries (Boulton et al., 2011). It was found by Richardson (2000) that outside shareholders of IPO firms with high levels of information asymmetry did not have sufficient resources, incentives, or access to relevant information to monitor manager's actions, providing scope for issuers to manage earnings. In addition, IPO underpricing has been found to be negatively related to earnings quality (Boulton et al., 2011). In the absence of high quality information, investors forecast firm's future earnings based on the disclosed financial statements or prospectus, resulting in them being fooled by

[25] B-shares are traded in foreign currencies mainly by foreign investors. Given that foreign investors have less information on China stock than domestic investors, the prospectus of B-shares usually contains more information than that appearing in the A-shares, and B-shares are underwritten and audited by major international financial institutions. As a result, B-share investors are much better informed than A-share investors, leading to less IPO underpricing due to decreased information asymmetry and ex-ante uncertainty (Mok & Hui, 1998).

manipulated earnings and overvaluing IPOs. Based on the asymmetric information theory, therefore, earnings management is a major determinant of underpricing.

3.4.2.1 Studies on earnings management and underpricing

Table 3.4 presents recent studies on the relationship between earnings management and IPO underpricing. Panels A and B summarise studies in the global markets (other than the PRC) and the PRC market respectively.

Table 3.4 Studies on earnings management and underpricing

Study	Data	Findings	Relationship
Panel A: Global markets (other than the PRC)			
Nagata and Hachiya (2007)	775 Japan IPOs From 1989 to 2000	Aggressive earnings management induces discounted offer prices and underpricing	Positive
Armstrong et al. (2008)	4,169 US IPOs From 1987 to 2005	The accruals of IPO firms have no impact on stock returns	No
Ahmad-Zaluki et al. (2011)	250 Malaysian IPOs From 1990 to 2000	Earnings management is not related to underpricing	No
Boulton et al. (2011)	10,783 IPOs from 37 countries From 1998 to 2008	Low quality earnings lead to underpricing	Positive
Chahine et al. (2012)	274 US & UK IPOs From 1996 to 2006	Aggressive earnings management leads to higher underpricing	Positive
Francis et al. (2012)	3,844 US IPOs From 1986 to 2004	Conservative earnings management increase underpricing	Negative
Nagata (2013)	1,476 Japan IPOs From 1982 to 2005	Aggressive earnings management leads to higher underpricing	Positive
Panel B: PRC market			
Kimbro (2005)	691 PRC IPOs From 1995 to 2002	Aggressive earnings management induces discounted offer prices and underpricing	Positive
Kao et al. (2009)	366 PRC IPOs From 1996 to1999	Aggressive earnings management leads to lower initial returns	Negative
Geng et al. (2010)	101 PRC IPOs Listing in 2007	Aggressive earnings management leads to higher underpricing	Positive
Shen et al. (2014)	506 PRC IPOs From 1998 to 2003	Aggressive earnings management leads to higher underpricing	Positive

As shown in Table 3.4, Panel A, the significant association between earnings management and IPO underpricing has generally been detected in the global capital markets (other than the PRC) with controversial relationships. For example, Nagata and Hachiya (2007) found that IPO firms in Japan with aggressive earnings management tended to be discounted when they failed to exhibit smooth earnings growth, leading to high levels of underpricing. Nagata (2013) further noted that earnings management was positively related to the level of underpricing as compensation to investors' uncertain valuation resulting from asymmetric information. In line with Nagata (2013), Boulton et al. (2011) also support the asymmetric information explanation, finding a positive relationship between earnings management and underpricing by testing 10,783 IPOs from 37 countries. Unlike the consistent relationship reported in Japan, scholars in the US found mixed relationships between earnings management and underpricing. Chahine et al. (2012) explained the IPO anomalies from the venture capital diversity angle and found higher earnings management led to a higher level of underpricing in the US and UK. In contrast to the positive relationship generally found in prior studies, Francis et al. (2012) argued that technology firms in the US tended to adopt conservative earnings management to decrease their offer price to reduce litigation risks, resulting in higher levels of underpricing. Unlike most prior studies, Armstrong et al. (2008) reject the association between earnings management and underpricing. They (Armstrong et al., 2008) failed to find the opportunistic manipulation of earnings around IPO years in the US and argued that any association between discretionary accruals and issue price or future returns was an artifact of cash-flow mispricing. Ahmad-Zaluki et al. (2011) were also unable to find any significant relationship between earnings management and initial returns in Malaysian IPOs.

PRC results are consistent with those from the extensive research on earnings management and underpricing in global markets. As illustrated in Table 3.4, Panel B, some scholars found a significant and positive relationship between earnings management and IPO underpricing (Shen et al., 2014; Geng et al., 2010; Kimbro, 2005), whereas others argued that IPO firms with better pre-IPO accounting performance tended to have lower first trading day returns (Kao et al., 2009). Kimbro (2005) found that IPO firms in the PRC tended to employ negative discretionary

accruals to decrease earnings to reduce offer price of the IPO, resulting in a high level of underpricing. Geng et al. (2010) contend that underpricing is the consequence of earnings management combined with overreaction of speculative investors. Consistent with Geng et al. (2010), Shen et al. (2014) support investors' overreaction explanation, finding a positive relationship between discretionary accruals and underpricing. In contrast, Kao et al. (2009) claim that the issuers of IPO firms overstate the pricing-period earnings, leading to more favorable offer price and lower first trading day returns.

As indicated in Table 4.3, there are various associations between earnings management and IPO underpricing both in developed and developing markets. In developed markets, scholars consistently found a positive association in Japan (Nagata, 2013; Nagata & Hachiya, 2007) and a mixed relationship in the US: positive (Chahine et al., 2012), negative (Francis et al., 2012) and no associations (Armstrong et al., 2008). In the developing markets, scholars failed to find any statistical evidence to support the relationship between earnings management and underpricing in Malaysian IPOs (Ahmad-Zaluki et al., 2011). However, most of studies in the PRC reported a positive relationship (Shen et al., 2014; Geng et al., 2010; Kimbro, 2005), except Kao et al. (2009) who found a negative relationship.

In conclusion, the relationship between earnings management and IPO underpricing is contentious, but a majority of studies support the positive relationship. Until now, however, little attention has been paid to underpricing in SMEs from the angle of earnings management.

3.4.2.2 Hypothesis development

Under the informational perspective, earnings are important signals for investors to evaluate share price. It was found that IPOs were less underpriced in countries where public firms produced higher quality earnings information (Boulton et al., 2011). However, earnings quality was discounted if the issuer had private information, which could be used to distort accounting decisions (Schipper, 1989). In theory, manipulated earnings should be detected by sophisticated auditors and investors. Nevertheless, the detection failure occurs due to inadequate information in the

market (Hirst & Hopkins, 1998). Based on the fact that earnings influence the investors' estimation of stock price, particularly in the IPO process, managers tend to manipulate earnings to maximize their firm's valuation when investors are asymmetrically informed (Chaney & Lewis, 1995).

Heightened information asymmetry prior to the IPO provides an issuer with a 'window of opportunity' to induce overoptimistic expectations amongst investors through 'window dressing' (Teoh, Welch et al., 1998a; Mikkelson et al., 1997; Jain & Kini, 1994). Because many details about the IPO firm are heavily internalized in the pre-listing period (given the entity is private), an issuer tends to extract greater wealth from investors by adopting aggressive accounting policies and disclosure strategies that project a highly optimistic image of the IPO's future potential. Accordingly, valuation uncertainty increases the extent of the adverse selection[26] problem faced by uninformed investors due to asymmetric information (Nagata, 2013). Investors pay more for firms with higher reported earnings regardless of earnings quality, driving the share price beyond realistic valuation. Ritter (1991) claims that investors are overoptimistic concerning earnings potentials of emerging firms, hence the first day aftermarket price is pushed higher than the normal offer price.

The PRC capital market is of particular importance within the context of earnings management in the pre-IPO period due to its unique institutional features (e.g. poor regulatory system, naive investors). Given the research focus of this thesis is SMEs in the PRC, earnings management is viewed as the most appropriate explanation for PRC IPO anomalies for several reasons.

The first reason is that asymmetric information seems extremely acute in SMEs. Information available to investors prior to the IPO is limited, especially in the PRC (Yu & Tse, 2006). Tian (2011) asserts that the larger firms are usually better known than smaller ones, consequently smaller firms suffer more from the asymmetric information. Most SMEs are privately owned prior to going public and little information is disclosed about them before the IPO. Therefore, private

[26] Adverse selection was originally in insurance industry, and refers to a market process in which undesired results occur when buyers and sellers have asymmetric information.

information is more important for infrequently traded stocks and information asymmetry has more influence on smaller and younger firms (Easley et al., 1996). As summarized by Carpentier et al. (2012), there is greater asymmetric information associated with SMEs, so managers have an incentive to exploit this asymmetry and sell overvalued equity. The impact of earnings management is particularly relevant and valuable to the SME IPO stock performance because of the likelihood of asymmetric information.

The second reason is earnings management is more pronounced among SMEs (Aharony et al., 1993). Given the inherent high risk and information asymmetry, researchers have found that SMEs suffer financial constraints set by financial institutions, such as banks and informal lenders (e.g. Lin & Sun, 2006). An IPO is a direct channel to reduce SMEs' financial stress and provide support for future expansion. Going public also brings the IPO firm higher prestige and other non-pecuniary benefits (Kao et al., 2009). Aharony et al. (2000) found that managers in the PRC firms engaging in earnings management were motivated more by increased listing opportunity than by maximizing proceeds, owing to rigid listing requirements. As stated in the previous paragraph, the listing rules for SMEs are exactly the same as for large enterprises. Consequently, the requirements on profits prior to listing years are extremely critical for SMEs. Financial statements are the most important certificates of a firms' performance and crucial to investors' decision making. Consequently, given the rigid listing requirements and promising prospects after listing, the motivation for SME issuers to manipulate earnings under the scope of accounting standards is anticipated.

Thirdly, the poor regulatory framework in the PRC provides opportunity for SMEs to manage earnings. Kao et al. (2009) found that the IPO firms were less likely to make extremely optimistic forecasts if the severe penalty regulations were introduced. Although the IPO approval system is consistently improving, the laws and regulations are still criticized for lagging behind the market development (Chen et al., 2011). In addition, as an official department, the CSRC has not been active in investigating frauds in the IPO application process, even when doubts about the prospectus information arose. Moreover, earnings management was found to be a

joint effort of local government and firm managers in some former SOEs (X. Chen et al., 2008). Those regulatory flaws in the PRC capital market increase the scope for the SME issuers to engage in earnings management.

Finally, the special composition of the PRC capital market facilitates the influence of earnings management on the IPO stock price. The capital market in the PRC is comprised of more than 90% naive individual investors who lack professional knowledge and experience in investing (Chi & Padgett, 2005a). Accordingly, there are short-term profit-seeking investors and excessive speculation in the secondary market in the PRC (Geng et al., 2010). In addition, due to the unique institutional setting, the PRC capital market is controlled by the government which restricts the quantity of IPO shares supplied to an extraordinarily hungry set of retail investors[27] (Tian, 2011). It is acknowledged that individual investors are unable to correctly assess the true value of the stocks issued by the SMEs (Carpentier et al., 2012). Meanwhile, it is even difficult for investors to make appropriate judgment of IPO firm accruals as indicators of future performance (Teoh, Wong et al., 1998). As a result, the hungry and unsophisticated retail investors are more likely to be guided by manipulated financial information and to overvalue the initial prices, leading to a high level of underpricing.

In general, by taking advantage of asymmetric information and a poor regulatory framework, the SME issuer tends to engage in earnings management to increase the listing opportunities and maximize proceeds from IPOs. Uninformed investors are unable to identify the inflated earnings, so they are temporarily deceived by earnings manipulation and overvalue the new issues, resulting in a high level of underpricing. A collection of studies have found that earnings management was positively associated with the magnitude of IPO underpricing in the PRC (Shen et al., 2014; Geng et al., 2010; Kimbro, 2005). However, existing literature generally focuses on large firms listing on the main boards, with little attention paid to SMEs'

[27] Compared with the secondary market, the average risk in the primary (IPO) market is much lower. In addition, the average returns in the primary market are higher than the deposit returns and there are not too many alternative investment instruments for retail investors in the PRC. Therefore, the relatively higher returns and lower risks in the primary market lead to a huge demand for IPOs in the PRC (Tian, 2011).

underpricing phenomenon from the perspective of earnings management, despite the fact that earnings manipulation is more pronounced in SMEs (Aharony et al., 1993).

Among all the accounting techniques employed to improve earnings, discretionary accruals are regarded as the most frequently used tools. Prior literature provides evidence that the issuer tends to maximize proceeds and enhance listing opportunity by adopting discretionary accruals during the IPO year (e.g. Shen et al., 2014 Roosenboom et al., 2003; Teoh, Welch et al., 1998a; Aharony et al., 1993). In line with prior literature, discretionary accruals are used to detect earnings management in this thesis. In principle, an aggregate accruals model divides total accruals into discretionary (also termed 'abnormal') and non-discretionary (also termed 'normal') accruals. By definition, discretionary accruals are the component potentially subject to manipulation due to discretionary powers appointed to corporate management. The total discretionary accruals can be further divided into two parts: current discretionary accruals and long-term discretionary accruals. Most of the prior researchers have depended on the total or current discretionary accruals to detect earnings management (e.g. Roosenboom et al., 2003; Teoh, Welch et al., 1998a).

On the basis of asymmetric information theory and the characteristics of SMEs in the PRC, it is expected that issuers of SME IPOs in the PRC adopting more aggressive discretionary accruals (total, current and long-term) are associated with higher levels of underpricing. There is still controversy in using current or total discretionary accruals to measure earnings management. Thus, the proposed hypotheses below reflect all the possible use of total, current and long-term discretionary accruals by an issuer to manage earnings. The first three hypotheses in this thesis are:

H_1: The total discretionary accruals and level of underpricing of SME IPOs in the PRC are positively associated.

H_{1a}: The current discretionary accruals and level of underpricing of SME IPOs in the PRC are positively associated.

H_{1b}: The long-term discretionary accruals and level of underpricing of SME IPOs in the PRC are positively associated.

3.5 IPO post-issue stock performance

3.5.1 Post-issue stock performance

Relative to the underpricing research, Ritter (2003) argued there had been limited academic research focusing on post-issue stock performance, despite the importance of the phenomenon. There is, however, growing attention on the topic.

3.5.1.1 Post-issue stock performance in the global markets

Table 3.5 shows IPO post-issue stock performance across various countries (other than the PRC) and time horizons. Studies finding underperformance are summarized in Panel A, whereas studies with neutral and over-performance results are categorized in Panels B and C respectively.

Table 3.5 Studies on IPO post-issue stock performance in the global markets (other than the PRC)

Study	Region	Sample period	Sample size	Period	Stock returns
Panel A: Underperformance					
Ritter (1991)	US	1975-1984	1,526	3 years	-8.96% to -42.21%
Page and Reyneke (1997)	South Africa	1980-1991	118	4 years	-18.40%
Stehle et al. (2000)	Germany	1960-1995	222	3 years	-6.00%
Chahine (2004)	France	1996-1998	168	3 years	-9.94%
Dimovski and Brooks (2004)	Australia	1994-1999	358	1 year	-4.00%
Drobetz et al. (2005)	Switzerland	1983-2000	109	5 years 10 years	-26.17% -173.46%
Jaskiewicz et al. (2005)	Germany Spain	1990-2001	493 61	3 years	-32.8% -36.7%
Aintablian and Mouradian (2007)	Canada	1993-2001	199	3 years	-19.81%
Agarwal et al. (2008)	Hong Kong	1993-1997	256	2 years 3 years	-27.68% -48.03%
Chorruk and Worthington (2010)	Thailand	1997-2008	136	3 years	-25.39%
Gregory et al. (2010)	UK	1975-2004	2,499	3 years 5 years	-12.60% -31.60%
Ahmad-Zaluki et al. (2011)	Malaysia	1990-2000	250	3 years	-26.87%

(Continued on next page)

Table 3.5 Studies on IPO post-issue stock performance in the global markets (other than the PRC) (continued)

Study	Region	Sample period	Sample size	Period	Stock returns
Jewartowski and Lizińska (2012)	Polish	1998-2008	194	3 years	-22.62%
Wen and Cao (2013)	Taiwan	2005-2007	121	1 year 3 years 5 years	-6.30% -34.04% -55.12%
Panel B: Neutral performance					
Brav et al. (2000)	US	1975-1992	4622	5 years	Similar to non-issuing firm returns
Panel C: Over-performance					
Dawson (1987)	Malaysia	1978-1984	21	1 year	18.2%
Loughran et al. (1994)	Sweden	1980-1990	162	3 years	1.20%
Kim et al. (1995)	Korea	1985-1989	169	2 years	59.01%
Allen et al.(1999)	Thailand	1985-1992	151	3 years	27.54%
Naceur (2000)	Tunisian	1992-1997	12	250 days	11.04%
Corhay et al. (2002)	Malaysia	1992-1996	258	3 years	41.70%
Durukan (2002)	Istanbul	1990-1997	173	1 year 2 years 3 years	5.82% 34.05% 29.66%
Chen et al. (2010)	Taiwan	1991-2002	261	5 years	6.62%

As illustrated in Table 3.5, prior studies found the IPOs exhibited underperformance, neutral performance and over-performance following issuance in assorted regions and time periods. The majority of IPO studies reported long-term underperformance as shown in Table 3.5, Panel A. Using a sample of 1,526 US IPOs between 1975 and 1984, Ritter (1991) found the average degree of negative post-issue stock returns over three-year observation window ranged from -8.96% to -42.21% by using different benchmarks. Negative post-issue stock performance was also observed in other settings. In the UK, Gregory et al. (2010) found the post-issue stock performance over a three-year and five-year observation window declined by 12.6% and 31.6% respectively compared with the value-weighted size-decile control portfolios. The literature shows prevalent long-term underperformance of IPOs in other developed markets, such as Germany (Stehle et al., 2000), France (Chahine,

2004), Switzerland (Drobetz et al., 2005), Australia (Dimovski & Brooks, 2004) and Canada (Aintablian & Mouradian, 2007). There is also some evidence of long-term underperformance in the developing markets, such as Thailand (Chorruk & Worthington, 2010) and Malaysia (Ahmad-Zaluki et al., 2011). The magnitude of negative post-issue returns ranged from -173.46% in Switzerland to -6.00% in Germany (Drobetz et al., 2005; Stehle et al., 2000).

However, a negative post-issue stock performance has not been universally observed. As shown in Table 3.5, Panel B, Brav et al. (2000) argued that the US IPO long-term returns were part of the systematic price movement. They (Brav et al., 2000) found that IPO post-issue performance was similar to size and book-to-market matched firms that had not issued equities.

Some scholars have found IPOs sometimes gained positive returns in the long term, as indicated in Table 3.5, Panel C. The long-term over-performance was found in both developed and developing markets with different levels. Loughran et al. (1994), for example, found small over-performance (1.20%) by Swedish IPOs, Kim et al. (1995) found a high positive post-issue stock performance (59.01%) in a sample of Korean IPOs, and Chen et al. (2010) found a five-year positive average returns (6.62%) in the Taiwan capital market. Compared with the mild over-performances in the developed markets (e.g. Sweden, Taiwan), the positive long-term stock returns were higher in the developing markets. For instance, Durukan (2002) found IPOs listing on the Istanbul capital market maintained an increasing trend across a 36-month observation period and gained 29.66% by the end of the third year after going public. Naceur (2000) also found Tunisian IPOs had a significant positive aftermarket returns (11.04%) following their listing. On the other hand, Allen et al. (1999) found that Thai IPOs showed underpricing in the early aftermarket, but demonstrated an increasing trend in the long term and gained 27.54% average returns at the end of the third year. Scholars also found an average high positive long-term stock returns (41.7%) in Malaysian IPOs during 1992 to 1996 (Corhay et al., 2002). The magnitude of positive returns ranged from 1.2% in Sweden to 59.01% in Korea (Kim et al., 1995; Loughran et al., 1994).

The trend of IPO long-term stock performance varied across countries. For example, Drobetz et al. (2005) conducted an empirical study using different measurement techniques to test Swiss IPOs up to 120 months after going public, finding the underperformance tended to be significant only after four years of trading in the secondary market. Consistent with Drobetz et al. (2005), Chorruk and Worthington (2010) found that Thai IPOs generally over-performed the market benchmark up to 24 months, but underperformed thereafter. By contrast, Dimovski and Brooks (2004) found that the stock performance of Australian IPOs deteriorated following their listing.

Data from Table 3.5 also provides evidence that the long-term performance of IPOs is sensitive to observation period and benchmark selection. Ritter (1991), for instance, found different levels of underperformance during the same observation period using different benchmarks. Meanwhile, some researchers showed disparate long-term performance during different observation periods. For instance, IPOs in Thailand, Malaysia and Taiwan were found to experience long-term underperformance and over-performance during different observation periods (Wen & Cao, 2013; Ahmad-Zaluki et al., 2011; Chen et al., 2010; Chorruk & Worthington, 2010; Corhay et al., 2002; Allen et al., 1999). In addition, studies of developed markets generally found long-term underperformance, except in Korea (Kim et al., 1995), Sweden (Loughran et al., 1994) and Taiwan (Chen et al., 2010). And in the developing markets, a number of scholars reported positive long-term stock returns or mixed returns during different observation periods (e.g. Ahmad-Zaluki et al., 2011; Chen et al., 2010; Corhay et al., 2002; Durukan, 2002; Allen et al., 1999; Dawson, 1987).

3.5.1.2 Post-issue stock performance in the PRC

Although the history of the PRC capital market is rather short, the post-issue stock performance of IPOs has still prompted enormous interest among domestic and international scholars. Table 3.6 provides studies on IPO post-issue stock performance in the PRC, including firms listing on the main boards. The studies in the PRC IPO market are also divided into Panels A, B and C based according to the results of underperformance, mixed performance and over-performance respectively. As outlined in Table 3.6, the results of IPO long-term stock returns in the PRC are

rather mixed. Some researchers report a negative post-issue stock performance (e.g. Shen et al., 2014; Chan et al., 2004; Chen et al., 2000), whereas others found positive long-term stock performance (e.g. Song et al., 2014; Xia & Wang, 2003; Mok & Hui, 1998). There are also some scholars reporting mixed post-issue stock performance (Su et al., 2011; Li et al., 2008).

Table 3.6 Studies on IPO post-issue stock performance in the PRC

Study	Listing board	Period	Sample size	Period	Stock returns
Panel A: Underperformance					
Chen et al. (2000)	SHSE/ SZSE	1992-1995	277 A-shares 65 B-shares	3 years	-21.20% -44.28%
Chan et al. (2004)	SHSE/ SZSE	1993-1998 1995-1998	570 A-shares 39 B-shares	3 years	-3.56% to-19.77% 25.06 to 30.04%
Fan et al. (2007)	SHSE/ SZSE	1993-2001	790 A-shares	3 years	-17.00%
Cai et al. (2008)	SHSE	1997-2001	335 A-shares	3 years	-24.97% to -29.57%
Kao et al. (2009)	SHSE/ SZSE	1996-1999	366 A-shares	3 years	-25.00%
X. Chang et al. (2010)	SHSE/ SZSE	From 1993	1194 A-shares	3 years	-2.70% to -7.80%
Su and Bangassa (2011b)	SHSE/ SZSE	2001-2006	391 A-shares	3 years	-16.30% to -18.16%
Shen et al. (2014)	SHSE/ SZSE	1998-2003	506 A-shares	3 years	-3.87%
Panel B: Mixed performance					
Li et al. (2008)	SHSE/ SZSE	1993-2003	769 A-shares	3 years	-10.7% to 1.4%
Su et al. (2011)	SHSE/ SZSE	1996-2005	936 A-shares	3 years	-4.40% to 9.50%
Panel C: Over-performance					
Mok and Hui (1998)	SHSE	1990-1993	87 A-shares 22 B-shares	350 days	5.00% to 32.00% 3%
Xia and Wang (2003)	SHSE/ SZSE	1997-1998	146 A-shares	3 years	25.91%
Bai and Zhang (2004)	SHSE/ SZSE	1998-2000	341 A-shares	150 weeks	0.13%
Chi and Padgett (2005b)	SHSE/ SZSE	1996-1997	409 A-shares	3 years	10.30% to 10.70%
Chi et al. (2010)	SHSE/ SZSE	1996-2004	897 shares	3 years	9.60% to 16.60%
Song et al. (2014)	SHSE/ SZSE	2006-2011	994 shares	3 years	4.10%

Table 3.6, Panel A shows studies reporting long-term underperformance of A-shares in the PRC. Chen et al. (2000), for instance, found the mean level of market-adjusted three-year buy-and-hold returns were -21.20% for 277 A-share IPOs listed over the period 1992 to 1995. The highest negative returns in the PRC IPOs was observed by Cai et al. (2008) who found the three-year buy-and-hold abnormal returns (*BHARs*) and cumulative average adjusted returns of A-shares (*CARs*) were -29.57% and -24.97% respectively. A significant underperformance of A-shares in the PRC was also detected by other scholars (e.g. Kao et al., 2009; Cai et al., 2008; Fan et al., 2007; Chan et al., 2004). However, some findings suggest the negative post-issue stock returns were not as extensive as that in the developed markets (Shen et al., 2014). Chan et al. (2004), for example, found the post-issue underperformance of A-share IPOs in the PRC was relatively moderate compared with US IPOs. X. Chang et al. (2010) also found the average three-year post-issue returns of A-shares were moderate, ranging from -2.7% to -7.8% by using different benchmarks.

As shown in Table 3.6, Panel B, some scholars reported mixed post-issue stock performance. For example, Li et al. (2008) documented that the three-year post-issue stock returns of A-share IPOs listing from 1993 to 2003 ranged from -10.7% to 1.4% based on whether the CEO or chairman had political connections or not. Su et al. (2011) by using different measurements, such as event-time and calendar-time approaches, also found a mixed stock performance of A-shares from -4.4% to 9.5%.

In addition, some scholars in the PRC found long-term over-performance as indicated in Table 3.6, Panel C. For instance, Mok and Hui (1998) found the cumulative average excess market returns of A-shares listing on SHSE over 350 days were 5% and 32% in overpriced and underpriced IPOs groups respectively. Xia and Wang (2003) noted three-year cumulative adjusted returns of 25.91% in their empirical study on the long-term performance of PRC A-share IPOs listing from 1997 to 1998. Some scholars found small over-performance (0.13%) of PRC A-share IPOs (e.g. Bai & Zhang, 2004), while other scholars noted an increasing trend of IPOs long-term stock performance (e.g. Song et al., 2014; Chi & Padgett, 2005b). For instance, as reported in a recent study by Song et al. (2014), IPOs presented an increasing trend from -14.4% to 4.1% across one to three years' observation periods

after going public. Chi and Padgett (2005b) also found the upward curve of long-term returns of A-shares and reported that the three-year buy-and-hold abnormal returns and cumulative adjusted returns were 10.7% and 10.3% respectively.

Compared with extensive studies of A-shares' post-issue stock performance, the literature about long-term stock performance of B-shares was rather limited. Due to its small market size and lack of liquidity in comparison with A-share, B-share has rarely been treated as a sole research sample in previous PRC IPO studies and sometimes been excluded from the sample data (X. Chang et al., 2010; Li et al., 2008). Only a few studies reported post-issue stock performance of A-shares and B-shares separately. For instance, Chen et al. (2000) showed that B-share IPOs listed from 1992 to 1995 significantly underperformed both A-share IPOs and the market index for the three-year period after listing, while Chan et al. (2004) found an opposite trend of B-shares listed during the period from1995 to 1998. Mok and Hui (1998) noted both A-shares and B-shares listed during the period from 1990 to 1993 over-performed the market as a whole.

Due to the short history of listing SMEs in the PRC, there is little empirical research on the long-term stock performance of SME IPOs. Only a few informal studies, without long-term empirical evidence, address the post-issue problems. For example, Qiang (2011) focused on firms listing on the ChiNext board and found that most IPOs had fallen below the issue prices without specification of the observation period. In line with Qiang (2011), Guo et al. (2013) also found a decreasing trend of IPO post-issue stock performance based on 281 firms listing on the ChiNext during the period from 2009 to 2011, but the observation period was too short (only six months). Another investigation was conducted by Anderson et al. (2013) who found that one-year buy-and-hold returns of IPOs on the ChiNext board were lower than firms listing on SME board and main boards. None of those studies contained empirical evidence on long-term stock performance of SME IPOs.

In summary, the post-issue stock performance has been controversial in the PRC across various time periods. Although prior research has made contributions to the IPO anomalies literature, most studies have been limited to the large firms listing on

the main boards (e.g. Shen et al., 2014; Su et al., 2011; Chi et al. 2010). Therefore, more attention needs to be paid to the long-term stock performance of SME IPOs.

3.5.2 Earnings management and post-issue stock performance

As stated in previous sections, post-issue stock performance has been rather mixed. Among all the interpretations, earnings management is a major influential factor in the long-term stock returns (Roosenboom et al., 2003; Teoh, Welch et al., 1998a). Based on the asymmetric information theory, managers in the IPO firms have incentives and scope to manage earnings to get listed or maximize proceeds. If this manipulation is overlooked by investors, share prices are overvalued at the initial stage of the IPO.

However, in the long term, inflated earnings do not persist due to the reverse of discretionary accruals. With more and more information disclosed to the public by the media, the adverse news diminishes initial optimism and prompts investors to discount the value of IPO firm more heavily. Thus the detection of earnings management triggers investors' pessimistic emotion and leads to poor post-issue stock performance in the long term. As a result, earnings management only can inflate earnings opportunistically in the short term, whereas in the long term the stock price decreases and investors' interest is impaired eventually. DuCharme et al. (2000) found empirical evidence that pre-IPO earnings management increased IPO proceeds at the expense of subsequent returns to investors.

3.5.2.1 Studies on earnings management and post-issue stock performance

In Table 3.7, recent studies on earnings management and post-issue stock performance are summarized. Based on the region of IPO firms, the studies are split into two panels: Panel A shows studies in the global markets (other than the PRC) and Panel B lists PRC studies.

Table 3.7 Studies on earnings management and post-issue stock performance

Study	Data	Findings	Relationship
Panel A: Global markets (other than the PRC)			
Teoh, Welch et al. (1998a)	1,649 US IPOs From 1980 to 1992	Aggressive issuers have three-year aftermarket stock returns of 20% less than conservative issuers	Negative
DuCharme et al. (2000)	171 US IPOs From 1982 to 1987	Earnings management is negatively related to subsequent performance	Negative
Balatbat and Lim (2003)	326 carve-outs From 1982 to 1997	Carve-out firms with high level of discretionary accruals consistently perform poorly 1-3 years after the offering	Negative
Roosenboom et al. (2003)	64 Dutch IPOs From 1984 to 1994	Earnings management negatively related to 3-year post-issue performance	Negative
Rahman and Abdullah (2005)	187 Malaysia IPOs From 1989 to1998	No significant relationship between earnings management and subsequent stock performance	No
S. C. Chang et al. (2010)	2,053 US IPOs From 1989 to 2003	Negative relationship between earnings management and post-issue stock performance only in IPO firms employing less-prestigious underwriters	Negative
Ahmad-Zaluki et al. (2011)	250 Malaysian IPOs From 1990 to 2000	IPOs with aggressive earnings management perform worse than conservative counterparts during the Asian crisis period	Negative
Chahine et al. (2012)	274 US U.K.IPOs From 1996 to 2006	Aggressive earnings management lead to poor post-issue stock performance	Negative
Shu et al. (2012)	287 Taiwan IPOs From 2004 to 2008	Earnings management is positively related with long-run underperformance	Negative
S. S. Chen et al. (2013)	1,593 US IPOs From 1990 to 2005	Earnings management is negatively related to long-term stock performance for high-information-uncertainty issuers	Negative
Panel B: PRC market			
Chaney and Lewis (1998)	489 PRC IPOs From 1975 to 1984	Earnings management negatively related to subsequent performance	Negative

(Continued on next page)

Table 3.7 Studies on earnings management and post-issue stock performance (continued)

Study	Data	Findings	Relationship
Kao et al. (2009)	366 PRC IPOs From 1996 to 1999	Negative relationship between earnings management and post-issue stock performance	Negative
Aharony et al. (2010)	185 PRC IPOs From 1999 to 2001	Negative relationship between related party sales of goods and services and post-issue stock performance	Negative
Shen et al. (2014)	506 PRC IPOs From 1998 to 2003	Negative relationship between earnings management and post-issue stock performance	Negative

Table 3.7, Panel A contains empirical evidence on earnings management and post-issue stock performance in the global markets (other than the PRC). A negative relationship between earnings management and subsequent long-term stock performance was observed in most studies. Teoh, Welch et al. (1998a) were pioneers in finding evidence that issuers with aggressive earnings management had three-year aftermarket stock returns of approximately 20% less than their conservative counterparts. Before long, DuCharme et al. (2000) also achieved similar results, noting that opportunistically manipulated earnings by issuers to increase IPO proceeds can only deceive investors temporarily and firm value declines when information is disclosed. Based on prior literature, two other studies were carried out in the US IPO market: S. C. Chang et al. (2010) found that the negative impact of earnings management on post-issue stock performance only existed in IPO firms employing less-prestigious underwriters; and S. S. Chen et al. (2013) found that the negative relationship was influenced by information uncertainty. Only issuers with high information uncertainty engaged in earnings management for opportunistic purposes and experienced poor long-term stock performance (S. S. Chen et al., 2013).

In addition to abundant research based in the US, scholars from other regions have tried to find the relationship between earnings management and post-issue stock performance. In Europe, Roosenboom et al. (2003) found when testing 64 Dutch IPOs a negative relationship between the magnitude of current discretionary accruals in the first year of IPO year and post-issue stock performance over the next three years. Chahine et al. (2012) documented that US and UK IPO firms with higher

earnings management and venture capital diversity led to lower aftermarket performance. Shu et al. (2012) found that earnings management was positively related with initial overreaction, leading to long-term underperformance. By contrast to these findings in the above-mentioned markets, Ahmad-Zaluki et al. (2011) found that in Malaysia only IPO firms listing during the economic crisis period with aggressive earnings management experienced poor market-based performance, whereas Rahman and Abdullah (2005) failed to find the relationship between earnings management and long-term underperformance in Malaysia. Without specifying countries, Balatbat and Lim (2003) found carve-out IPOs with a high level of discretionary accruals consistently performed poorly from one to three years after the offering.

Table 3.7, Panel B shows that unlike the discrepant consequence of earnings management in global markets, in the PRC the negative effect of earnings management on long-term stock returns was consistent. Scholars (e.g. Shen et al., 2014; Aharony et al., 2010; Kao et al., 2009; Chaney & Lewis, 1998) generally found PRC IPO firms using more aggressive earnings management were likely to experience poorer long-term stock performance. Kao et al. (2009), for example, documented that IPO firms with higher level of earnings management tended to have a larger decline in post-IPO profitability and worse post-IPO stock performance based on SOEs listing from 1996 to 1999. By testing IPO firms from two main boards in the PRC, Shen et al. (2014) reached the same conclusion: discretionary accruals led to post-issue underperformance due to overpricing correction.

In summary, Table 3.7 shows some common features on prior studies of earnings management and post-issue stock performance. First, a majority of studies in the global (except Malaysia and Taiwan) and the PRC markets found a negative relationship between earnings management and post-issue stock performance. Second, although extensive studies document the long-term performance of IPO firms, none of them focused on SMEs despite the growing importance of SMEs to the global economy.

3.5.2.2 Hypothesis development

Overwhelmingly the literature has shown that, as a consequence of earnings management, short-term earnings are followed by the sacrifice of long-term profits (Roosenboom et al., 2003). Any inflated accruals in one period are offset by lower accruals in the subsequent periods, thereby forcing issuers to reverse accruals after going public. To maintain post-issue stock price, analysts affiliated with the lead investment bank underwriting the offering tend to issue overly optimistic earnings forecasts (Dechow et al., 2000), and issuers are under pressure to meet those forecasts to avoid lawsuits by misled shareholders. High quality firms where with cash inflows genuinely increased are able to reverse discretionary accruals gradually without influencing reported earnings. Poor quality firms, however, may face the circumstance that cash flows are insufficient to mitigate the impact of reversing accruals, resulting in managers reporting slumped earnings. It has been found that low quality IPO firms forecasting good earnings news, no matter whether genuinely optimistic or tending to cheat, have high levels of underpricing in the short term, but suffer negative abnormal returns in the long term (Jog & McConomy, 2003).

Due to asymmetric information, investors are unaware of the inflated earnings by the generous use of accruals around the IPO year and thus pay too high a price to purchase IPO stocks, resulting in overvaluation of IPOs and a boosting of the initial stock price (Shen et al., 2014). In the long term, however, most IPO firms are unable to sustain their pre-issue performance levels even though they display high post-issue growth in sales and capital expenditure, because expectations are raised too high (Jain & Kini, 1994). When information is disclosed gradually by the media, analysts' reports and subsequent financial statements, investors may recognize that pre-IPO earnings cannot persist (Teoh, Welch et al., 1998a). Accordingly, a flow of bad news induces market disbelief and investors' overly optimistic expectations fade with disclosed information (Dechow et al., 2000). The pessimism expectation of speculators accelerates the 'burst of bubbles' in stock prices in the long term. As a result, firms making aggressive forecasts perform much worse when good results cannot be sustained (Kao et al., 2009; Dechow et al., 1996).

When all other conditions are equal, ultimate price correction is positively related to the level of earnings management at the time of offering (Teoh, Welch et al., 1998a). Issuers of IPO firms in more uncertain information environments have been found to be more likely to manipulate earnings for opportunistic purposes, leading to poorer stock performance in the long term (S. S. Chen et al., 2013). Those disparate stock performances in the short and long term can arguably be considered as 'overpriced' of IPOs in the aftermarket. Altogether, the relationship between earnings management and IPO anomalies implies that insiders take advantage of information asymmetry to make profit at the cost of investors' interest, which is impaired in the long term.

This thesis is dedicated to studying PRC SME IPOs. Within this setting, earnings management is predicted to significantly influence the post-issue stock performance for several reasons. Firstly, SMEs have been found in a worsened information asymmetry situation (Ou & Haynes, 2006; Berger & Udell, 1998). As a result of little information available prior listing of SMEs, investors value the price of IPO firms facing high information uncertainty. This asymmetric information gap provides an opportunity for IPO issuers to manipulate earnings and mislead investors. However, SMEs are required to disclose material information periodically to the investors after listing, leading to the reduction of the information gap in the aftermarket. With the assistance of released information and comments from financial analysts, potential investors and existing shareholders estimate the stock price more rationally than those in the pre-IPO period. In other words, the higher of the initial price inflated by naïve investors due to asymmetric information, the bigger of the long-term price adjusted by rational investors in the aftermarket. It is found that post-IPO long-term stock performance is negatively associated with earnings management for firms with high information uncertainty (Chen et al., 2013).

Secondly, the PRC IPOs are overvalued at the initial stage due to earnings management, indicating that in the long term the high returns are less viable. The initial returns for PRC IPOs are always beyond 100%, as reported in prior studies (e.g. Liu et al., 2014b; Lin & Tian, 2012). The extremely high level underpricing of PRC IPOs indicates new stocks are significantly overvalued. Purnanandam and

Swaminathan (2004) found that 'overvalued' IPOs are always accompanied by low long-term risk-adjusted returns. The reason is that the profitability of 'overvalued' IPO firms tends to decline below the pre-IPO levels, indicating the failure of projected high growth to materialise (Purnanandam & Swaminathan, 2004). Based on the asymmetric information theory, the overvaluation of PRC IPOs is likely to be induced by pre-IPO abnormal accruals, which mislead unsophisticated investors to interpret inflated earnings as future prosperity (Kimbro, 2005). Shen et al. (2014) also noted that earnings management in the PRC generated an interesting pattern where the initial IPO prices were overvalued but adjusted to their fundamental level in the long term. Thus long-term poor stock performance pays for the initial overvaluation induced by earnings management.

Thirdly, owing to inflated pre-IPO earnings, the post-issue stock performance is expected to deteriorate if subsequent earnings are unsustainable. Lin and Li (2012) documented that the operating performance of manufacturing SMEs listing in the PRC have declined subsequent to IPO due to earnings management. They (Lin & Li, 2012) also found that SMEs were unable to sustain their pre-issue performance levels or reverse earnings which were borrowed from the future. When the information about unfavorable earnings was released in the aftermarket, the short-term profit-seeking investors reversed their optimistic valuation, leading to depressed stock price in the long term. Overall, the characteristics of the PRC SME IPOs indicate that earnings management is particularly relevant to the post-issue stock performance.

As noted above, recent studies on earnings management and post-issue stock performance have been limited to SOEs and large firms (e.g. Shen et al., 2014; Aharony et al., 2010; Kao et al., 2009), with little focus given to SMEs and their earnings management (Aharony et al., 1993). Although small firms with high-tech features tend to perform better after going public compared with their larger counterparts (Chi et al., 2010; Chi & Padgett, 2005b), the influence of earnings management on the post-issue stock performance may still persist.

Therefore, based on asymmetric information theory and investors' behavior explanation, and in line with the negative relationship between earnings management

and post-issue stock performance detected in the extensive literature (e.g. Shen et al., 2014; S. S. Chen et al., 2013; Aharony et al., 2010), it is expected that for SMEs in the PRC, the level of their pre-IPO discretionary accruals (total, current and long-term) will be negatively related to post-issue stock performance. The following three hypotheses are thus proposed:

H_2: The total discretionary accruals and post-issue stock performance of SME IPOs in the PRC are negatively associated.

H_{2a}: The current discretionary accruals and post-issue stock performance of SME IPOs in the PRC are negatively associated.

H_{2b}: The long-term discretionary accruals and post-issue stock performance of SME IPOs in the PRC are negatively associated.

3.6 Summary

In this chapter related studies of IPO anomalies were reviewed and hypotheses were developed. The theories and explanations commonly used to interpret IPO anomalies have also been reviewed. The applicable theory to interpret IPO stock performance in the PRC SMEs is asymmetric information in this thesis. Then the studies of earnings management in the IPO process were analyzed.

Next, the recent studies concerning IPO underpricing were reviewed in the global markets and the PRC market respectively. In addition, the studies on the relationship between earnings management and underpricing were analyzed. Based on the asymmetric information theory, combined with SMEs' special characteristics in the PRC, three hypotheses concerning the relationship between earnings management and underpricing were then put forward.

In the last section studies on post-issue stock performance in the global and PRC markets were displayed. Then the studies on the association between earnings management and post-issue stock performance were reviewed. Based on the asymmetric information and investors' behavior, three hypotheses concerning the relationship between earnings management and post-issue stock performance were proposed.

In the next chapter the research methods in this thesis are presented, such as sample selection, measurement of variables and multiple regression models.

Chapter 4: Research methods

4.1 Introduction

In this chapter the research methods for this thesis are presented. First, the sample selection process and source documentation are described. Then, the measurement of dependent, independent and control variables used in this thesis are discussed. Finally, the multiple regression models employed to test six hypotheses are exhibited.

4.2 Research design

Two dependent variables (underpricing and post-issue stock performance) and three independent variables (total, current and long-term discretionary accruals) are used in this chapter to detect the relationship between earnings management and short and long-term stock performance of SME IPOs. To test six main hypothesis (H_1, H_{1a} , H_{1b}, H_2, H_{2a} and H_{2b} respectively) raised in Chapter 3, six cross-sectional regression models (*Models 1, 2, 3, 4, 5 and 6*) are defined. In the regression models, several control variables (e.g., issue size, leverage, auditors' and underwriters' reputation) that potentially influence the IPO stock performance are incorporated to minimize Type I errors.

Besides cross-sectional analysis in the main hypothesis, descriptive and univariate analysis are also presented in this thesis to explore the features of variables (dependent, independent and control variables). Correlation analysis is provided to avoid the multicollinearity problem affecting the cross-sectional as well. All analysis has extensive reliance on secondary data from database and website.

4.3 Sample selection and source document

This section contains the sample selection process and source document applied in this thesis. The focus of this thesis is SMEs. To facilitate data collection, firms listed on the SZSE SME board[28] in the PRC during 2006 to 2010 form the sample.

[28] It should be noted that only SZSE has an SME board.

The initial sample of this thesis comprised all firms officially listed[29] on the SZSE SME board as of 31 December 2010. The sample ended on 31 December 2010 in order to leave adequate time and sample firms to estimate the 36-month post-issue stock performance[30]. Because the composite market index of the SME board was unavailable for the first two years after the SME board was established[31], firms listing between 25 June 2004 and 31 December 2005 were removed from the sample. Consistent with prior IPO research, IPO firms in the finance industry were also excluded from the sample. This is because they were subject to different regulatory and reporting requirements, which may have unduly affected discretionary accruals and stock prices.

Table 4.1 outlines the sample selection process. The initial sample was comprised of 531 firms listed on the SME board as of 31 December 2010. Then 50 firms were removed due to the unavailability of SME board composite market index data, 2 firms were excluded from the finance industry and 15 firms were identified as outliers[32]. The final sample to test underpricing was 464 firms. To test post-issue stock performance, further firms needed to be removed from the sample. Due to unavailable share prices in the third year for firms listed in 2010 (197 firms) and the further removal of outliers (5 firms), the final sample for post-issue stock performance was reduced to 262 firms.

[29] Firms may initiate action to list but subsequently withdraw applications. For this thesis, only firms that formally applied and listed were included in the initial sample.

[30] The post-issue stock performance was analyzed over a 36-month observation window, commencing the fourth month after the first fiscal-year end post-IPO. The sample used to test post-issue stock performance was comprised of IPO firms listed from 31 December 2005 to 31 December 2009. Presuming the latest IPO listed on 31 December 2009 had a first year-end post-IPO financial report prior to 30 June 2010, the 36-month observation window (plus 3 months after first fiscal-year end post-IPO) concluded no later than 31 October 2013, they had sufficient time to be included in the overall analysis of this thesis. Because of applying the 36-month observation window, it is acknowledged IPO firms listed in year 2010 included in the final useable sample to test underpricing needed to be excluded from the post-issue stock performance analysis.

[31] The composite market index of the SME board became operative from 1 December 2005, since it is feasible to calculate market return using market index from the end of 2005.

[32] All outliers in this thesis were identified using the Mahalanobis distance scores. Outliers are defined by Hair et al. (2009) as observations with a unique combination of characteristics identifiable as distinctly different from the other observations. Outliters identified in this thesis have considerable impact on the regreassion solution, so they need to be deleted to reduce their influence.

Table 4.1 Sample selection process to test underpricing

Sample selection process	Number of sample firms
Initial sample	531
Step 1: Exclude firms without information on the market index	(50)
Step 2: Exclude firms from finance industries	(2)
Step 3: Exclude firms identified as outliers	(15)
Final sample	464

Financial data were collected from the Centre for Chinese Economic Research (CCER) database and the China Stock Market Accounting Research (CSMAR) database. Stock prices and composite market indices of the SME board and the SZSE main board were collected from the CSMAR and Yahoo finance website.

4.4 Measurement of dependent variables

Given the dual focus on underpricing and post-issue stock performance, there are two dependent variables (underpricing and post-issue stock performance) underpinning this thesis and different methods to measure those two variables are proposed in this section.

4.4.1 Measurement of underpricing

4.4.1.1 Common measures of underpricing

Some decisions had to be made for the measurement of underpricing, that is, the initial stock returns of IPOs. The first was: how many days should be included in initial returns? Some scholars have chosen the closing price on the 22nd trading day (roughly a calendar month) (Boulton et al., 2010), or the fifth trading day (one week) (Brennan & Franks, 1997). Boulton et al (2010) explained that their choice of later days other than the first trading day aimed to limit any bias induced by price stabilization, which have faded with underwriters' withdrawing their support from the market. However, such a long time period (one week or one month) has always been considered as aftermarket returns instead of initial returns by scholars (Su & Fleisher, 1999). Previous scholars have overwhelmingly chosen the closing price of the first trading day as the most relevant figure to evaluate underpricing (e.g. Shen et al., 2014; Hahn et al., 2013; Lin & Tian, 2012; Tian, 2011; Geng et al., 2010; Yu & Tse, 2006; Chan et al., 2004). Consistent with prior literature, therefore, the first trading day returns were used in this thesis to measure underpricing.

The second decision relates to benchmark selection. Two major measures of IPO initial returns have been adopted in recent literature. The first measure is the initial raw returns which are determined by the percentage of difference between the closing price of the first trading day and the offer price. In that case, the benchmark is zero and the calculation process is straightforward. The second method is adjusted initial returns, which is based on the initial raw returns, and then adjusted by some indices. How to choose the most suitable index to avoid misevaluation is the main question. Some indices are formed from the top largest firms on the stock exchange, while others are comprised of different exchanges in different countries. However, if sample firms are from the same exchange market, the market index is usually taken as the benchmark to adjust the initial returns (Chi & Padgett, 2005a; Chan et al., 2004; Chen et al., 2004; Carter et al., 1998).

Table 4.2 lists the popular measures of IPO underpricing for recent studies worldwide, as well as the research objectives and focuses. The initial raw returns and market-adjusted initial returns are two predominant methods adopted to measure the underpricing level. The difference between those two measures is the change in the market index, which is relatively small compared with the general high level of underpricing. Studies employing initial raw returns to measure the level of underpricing are classified into Panel A, while studies using market-adjusted returns to evaluate underpricing are categorized into Panel B.

Table 4.2 Common measures of underpricing in IPO studies

Research objective	Study	Focus
Panel A: Initial raw returns		
To test the relationship between underpricing and other factors	Habib (2001)	Underpricing and wealth loss
	Dimovski and Brooks (2004)	Underpricing and long-term performance
	Coakley et al. (2009)	Underpricing and venture capitalists
	Boulton et al. (2010)	Underpricing and international corporate governance
	Geng et al. (2010)	Underpricing and earnings management
	Boulton et al. (2011)	Underpricing and earnings quality
	Ekkayokkaya and Pengniti (2012)	Underpricing and governance reform
	Hahn et al. (2013)	Underpricing and liquidity

(Continued on next page)

Table 4.2 Common measures of underpricing in IPO studies (continued)

Research objective	Study	Focus
	Shen et al. (2014)	Underpricing and earnings management
To verify the underpricing phenomenon	Engelen and Essen (2010)	Underpricing: Firm, issue and country specific characteristics
	Vong and Trigueiros (2010)	Underpricing in Hong Kong
Panel B: Market-adjusted initial returns		
To test the relationship between underpricing and other factors	Elston and Yang (2010)	Underpricing and venture capital, ownership, accounting standards
	Lin and Tian (2012)	Underpricing and accounting conservatism
	Nagata (2013)	Underpricing and earnings management
To verify the underpricing phenomenon	Chen et al. (2004)	Underpricing in the PRC
	Guo and Brooks (2008)	Underpricing under the approval system
	Jain and Padmavathi (2009)	Underpricing in India
	Tian (2011)	Regulatory underpricing
	Agathee et al. (2012)	Underpricing in Mauritius

As shown in Table 4.2, both initial raw returns and market-adjusted returns were used widely by scholars in IPO studies. It suggests that those two measures were alternatives and both were highly accepted, with little difference between them. However, there are still some patterns of scholars' preferences for measuring underpricing. As indicated in Panel A scholars normally chose initial raw returns to test the relationship between underpricing and other factors such as wealth loss (Habib, 2001), long-term performance (Dimovski & Brooks, 2004), venture capitalist (Coakley et al., 2009), international corporate governance (Boulton et al., 2010), earnings management (Shen et al., 2014; Geng et al., 2010), earnings quality (Boulton et al., 2011), government reform (Ekkayokkaya & Pengniti, 2012) and liquidity (Hahn et al., 2013). For instance, to test the relationship between earnings management and underpricing, Shen et al. (2014) and Geng et al. (2010) chose initial raw returns to measure underpricing and found that earnings management was a significant determinant of IPO underpricing in the PRC. Boulton et al. (2011) examined the impact of country-level earnings quality on IPO underpricing by using initial raw returns to measure the level of underpricing and found that IPOs were underpriced less in countries with higher quality earnings information. Only a few

scholars chose initial raw returns to verify the underpricing phenomenon and determinants (e.g. Engelen & Essen, 2010; Vong & Trigueiros, 2010). For example, Engelen and Essen (2010) used the initial raw returns to test the country-level institutional characteristics of the IPO underpricing in 21 countries.

Table 4.2, Panel B shows that market-adjusted initial returns were generally used in studies to verify the phenomenon of IPO underpricing to avoid overvaluation by the initial raw returns (Agathee et al., 2012; Jain & Padmavathi, 2009; Chen et al., 2004). For instance, Chen et al. (2004) chose market-adjusted initial returns to investigate the pricing of IPOs of both A-shares and B-shares in the PRC. Guo and Brooks (2008) also used market-adjusted initial returns to measure the level of underpricing to analyze their trends and determinants since the new approval system had been adopted in the PRC. Occasionally, scholars adopted market-adjusted initial returns to test the relationship between underpricing and other factors, such as venture capital, accounting conservatism and earnings management (Nagata, 2013; Lin & Tian, 2012; Elston & Yang, 2010).

Scholars have held different opinions about those two methods. Guo and Brooks (2008) state that market-adjusted initial returns indicates the level of market sentiment of the total capital market in the duration period and measures underpricing more accurately. However, Engelen and Essen (2010) argued that in case of the first trading day returns, corrections for market movements had no significant impact since the average market returns were very small compared with the large initial raw returns. This point of view was expressed by Beatty and Ritter (1986) who found that the mean value of initial raw returns were 14.1%, whereas market returns during that period was less than 0.1% on average.

4.4.1.2 Measurement of underpricing in this thesis

Given that one of the main objectives of this thesis is to examine the relationship between earnings management and IPO underpricing, consistent with prior literature (e.g. Shen et al., 2014; Geng et al., 2010), initial raw returns is a more straightforward and applicable measurement of underpricing in SME IPOs. Therefore, initial raw returns of IPO firms (denoted UP_i) were used to measure

underpricing in the main regressions, while market-adjusted initial returns were applied in the robust test.

If UP_i is positive, then the IPO's stock is deemed to be underpriced. Specifically, UP_i of IPO firm *i* is measured as the first trading day closing price less the offer price divided by the offer price of the stock *i*. UP_i is then calculated as a percentage of the initial offer price. UP_i is expressed arithmetically as follows:

$$UP_i = (P_{i1} - P_{i0})/P_{i0} \quad [1]$$

Where:
UP_i = Initial raw returns on stock of IPO *i*;
P_{i1} = closing price of stock of IPO *i* at the end of the first trading day; and
P_{i0} = offer price of the stock of IPO *i*.

4.4.2 Measurement of post-issue stock performance

4.4.2.1 Common measures of post-issue stock performance

Unlike underpricing measures, there have been many disputes about the most appropriate metric to capture post-issue stock performance. Fama (1998), for example, argued quite forcefully that it had been infamously difficult to measure long-run abnormal returns because of empirical sensitivities associated with the methods used. Among all the metrics to test post-issue stock performance, some have both the direction and magnitude of post-issue stock returns, while others have only tested the direction of long-term stock returns. For instance, the Wealth Relative *(WR)* approach has only represented the ratio of average gross returns instead of average returns (Ritter, 1991). Therefore, the *WR* approach was not used exclusively and was always adopted as a supplementary method to other more direct ways to measure post-issue stock performance (e.g. Liu et al., 2012; Ritter, 1991).

Table 4.3 shows the popular approaches used for measuring post-issue stock performance worldwide. The research objectives and focus are also indicated for each approach. As shown in Table 4.3, there have been three usual ways to evaluate post-issue stock performance: buy-and-hold abnormal returns (*BHARs*), cumulative average adjusted returns (*CARs*) and the *Fama-French* model. IPO studies using these three methods are categorized into Panels A, B and C respectively. Each is elaborated below.

Table 4.3 Common measures of post-issue stock performance in IPO studies

Research objective	Study	Focuses
Panel A: *BHARs*		
To test investors' long-term experience	Roosenboom et al. (2003)	Long-term stock performance and earnings management
	Chi and Padgett (2005b)	Long-term stock performance of IPOs in the PRC
	Drobetz et al. (2005)	Long-term stock performance of IPOs in Switzerland
	Wen and Cao (2013)	Long-term stock performance of IPOs in Taiwan
	Shen et al. (2014)	Long-term stock performance and earnings management
Panel B: *CARs*		
To test whether IPO firms persistently earn abnormal returns in the long term	Lee et al. (1996)	Short- and long-term stock performance in Australia
	Corhay et al. (2002)	The growth/value effect exists in long-term stock performance of IPO in Malaysia
To test the influence of several factors on long-term stock performance	Kao et al. (2009)	The influence of regulations on earnings management and IPO long-term stock performance
Panel C: *Fama-French* model		
To test the influence of several factors on long-term stock performance	Chen et al. (2010)	Long-term stock performance of IPOs in Taiwan with a five-factor model
	S. C. Chang et al. (2010)	The relationship among underwriter reputation, earnings management and long-term stock performance of IPOs
	S. S. Chen et al. (2013)	The effect of information uncertainty surrounding IPO on earnings management and long-term stock performance

Buy-and-hold abnormal returns (BHARs)

The first measure of post-issue stock performance is *BHARs* as shown in Table 4.3, Panel A. Since Ritter (1991) first put forward the measurement of buy-and-hold returns to evaluate the post-issue performance of the IPO, it has been the most popular method in estimating long-term abnormal returns. *BHARs* measure the compounding rate of returns on shares purchased at the beginning of the event period and held until the end of the observation period, and then adjusted for the benchmark during that period. The benchmarks adopted widely in the *BHARs* approach are market index and size/book-to-market matched firm (Barber & Lyon, 1997). *BHAR*

of the stock of IPO *i* is calculated in accordance with the following arithmetic formula:

$$BHAR_{i,T} = \left[\prod_{t=1}^{T}(1+r_{i,t})-1\right]-\left[\prod_{t=1}^{T}(1+r_{m,t})-1\right] \quad [2]$$

Where:
$BHAR_{i,T}$ = Buy-and-hold abnormal returns on stock of IPO *i* listing for time period *T*;
$r_{i,t}$ = monthly returns on the stock of IPO *i* in the trading month *t*;
$r_{m,t}$ = monthly returns on the benchmark in the trading month *t*; and
T = length of time period for which the buy-and-hold abnormal returns is calculated.

It seems that *BHARs* are appropriate for measuring investors' long-term experience (Barber & Lyon, 1997) because scholars have used *BHARs* to examine the long-term stock performance in various countries, such as the Netherlands (Roosenboom et al., 2003), Switzerland (Drobetz et al., 2005), Taiwan (Wen & Cao, 2013) and the PRC (Shen et al., 2014; Chi & Padgett., 2005b). Shen et al. (2014) and Roosenboom et al. (2003) chose *BHARs* to test the investors' experience when holding IPOs for three years under the influence of earnings management.

BHARs have a distinct advantage for measuring investors' experience (Barber & Lyon, 1997) because they include the effect of monthly compounding and measures the underlying parameter of interest, which are the long-term stock performance relative to an appropriate comparison group (Barber & Lyon, 1997). Nevertheless, as noted by Fama (1998), systematic errors might arise with *BHARs* and those errors might lead to bad model problems, including new listing bias, skewness bias and rebalancing bias (Brav et al., 2000). For instance, the mean value of *BHARs* might be biased because of poor statistical properties of individual-firm *BHARs* (Lyon et al., 1999; Barber & Lyon, 1997; Kothari & Warner, 1997). However, it is assumed those biases can be alleviated by large samples (Mitchell & Stafford, 2000). On the whole, *BHARs* are still widely accepted as a standard measure of long-term abnormal returns (Mitchell & Stafford, 2000).

Cumulative average adjusted returns (CARs)

The second measure of post-issue stock performance is *CARs*. *CARs* are calculated as the summation of average adjusted returns during a certain period. Barber and Lyon (1997) concluded the difference between *BHARs* and *CARs* arose from the effect of

monthly compounding, and *CARs* were a biased predictor of *BHARs*. There are three steps to calculate *CARs*. The first step is to calculate the benchmark-adjusted returns in the trading month. In this step, the market index and size/book-to-market matched firm are commonly used as benchmarks (Barber & Lyon, 1997). The second step is to set up a portfolio comprised of *n* stocks to calculate an equally weighted arithmetic average of market-adjusted returns in the trading month. Finally, the average market-adjusted returns are summed up from the beginning of the month to the end of the month to get the cumulative average adjusted returns. Formulas for the three steps are illustrated as follows:

$$ar_{i,t}=r_{i,t}-r_{m,t} \quad [3]$$

$$AR_t=\frac{1}{n}\sum_{i=1}^{n} ar_{i,t} \quad [4]$$

$$CAR_{q,s}=\sum_{t=q}^{s} AR_t \quad [5]$$

Where:

$CAR_{q,s}$ = Cumulative average adjusted returns on stocks from event month *q* to event month *s*;
$ar_{i,t}$ = adjusted returns on stock of IPO *i* by market index in the *t*th trading month;
$r_{i,t}$ = monthly returns on the stock of IPO *i* in the trading month *t*;
$r_{m,t}$ = monthly returns on the benchmark in the trading month *t*; and
n = *n* stocks in the sample.

Lyon et al. (1999) found the *CARs* were particularly applicable for examining whether IPO firms persistently earned abnormal returns in the long term. Many scholars have used *CARs* to evaluate post-issue stock returns, as shown in Table 4.3, Panel B (e.g. Kao et al., 2009; Corhay et al., 2002; Lee et al., 1996). For example, Lee et al. (1996) adopted *CARs* to test whether the high initial returns of Australian IPOs persisted in the post-issue period. Corhay et al. (2002) also used *CARs* to investigate whether the growth/value effect existed over the four-year period by analyzing 258 Malaysia IPOs.

Fama (1998) asserts that *CARs* produce fewer spurious rejections of market efficiency than *BHARs*, hence the *CARs* are considered as an alternative method to value long-term stock performance. Some scholars have used both *BHARs* and *CARs* to assess post-issue stock performance (Teoh, Welch et al., 1998a). As one might expect, like other measures, *CARs* also have its disadvantages. Firstly, *CARs* neglect compounding effects compared with *BHARs*, hence *CARs* cannot reflect the investors' experience efficiently (Moshirian et al., 2010). Secondly, *CARs* overestimate the abnormal returns in the case of underperformance and is subject to new listing bias,

skewness bias and measurement bias (Barber & Lyon, 1997). Despite these defects, *CARs* have been popular in recent IPO studies to test post-issue stock performance.

Fama-French model

As shown in Table 4.3, Panel C, the third method adopted widely to measure post-issue stock performance has been the *Fama-French* model. During 1993 to 1996, Fama and French published a series of papers and developed a three-factor model that explained most of the cross-sectional variation in average returns. Fama and French (1993) found the three factors that influenced post-issue stock performance were overall market factors, firm size, and the book-to-market equity ratio. They concluded that market factors and firm size had positive relationships with earnings on assets, while the book-to-market equity ratio had a negative relationship. Based on those findings, the *Fama-French* model sets up mimicking portfolios for risk factors related to the market, firm size and the book-to-market equity ratio to capture strong variations in returns. The average monthly abnormal returns during the observation period is the intercept *a* of the time-series regression.

$$r_{pt} - r_{ft} = a + b(r_{mt} - r_{ft}) + s\mathrm{SMB}_t + h\mathrm{HML}_t + e_{pt} \quad [6]$$

Where:

r_{pt} =Monthly returns on the IPO portfolio;
r_{ft} =one month Treasure Bill rate*;*
r_{mt} =monthly returns on a value-weight market portfolio;
SMB_t =difference between the returns on portfolios of small and big stocks;
HML_t =difference between the returns on portfolios of high- and low- book-to-market value stocks; and
a =average monthly abnormal returns.

As shown in Table 4.3, Panel C, many scholars chose the *Fama-French* model to examine post-issue stock performance or to identify determinants of long-term stock returns (e.g. S. S. Chen et al., 2013; S. C. Chang et al., 2010; Chen et al., 2010). For example, to measure Taiwan IPOs' five-year performance, Chen et al. (2010) adopted the *Fama-French* model and incorporated leverage and liquidity into the factor model. S. C. Chang et al. (2010) also applied the *Fama-French* model to examine the relationship between underwriter's reputation, earnings management and post-issue stock performance of IPO firms.

The *Fama-French* model uses a calendar-time portfolio approach by accounting for cross-sectional dependence. Hence it is less susceptible to the misspecification

problem (Lyon et al., 1999). However, it has low explanatory power in detecting abnormal performance for events that are subject to behavioral timing consideration (Loughran & Ritter, 2000). In addition, the *Fama-French* model has systematic problems in explaining average returns on categories of small stocks (Fama & French, 1993). Fama (1998) found that the *Fama-French* model had systematic problems explaining the average returns on small firms, leading to mispricing.

As stated above, each method has its advantages and disadvantages for evaluating post-issue stock performance. But there appears to be no consensus on the preferred approach for testing long-term returns (Lyon et al., 1999; Fama, 1998; Barber & Lyon, 1997; Kothari & Warner, 1997). There is also no universally optimal methodology in terms of statistical properties in testing long-term stock performance (Brav et al., 2000). In conclusion, when evaluating the appropriateness of each measure, the research specific objectives need to be considered. Barber and Lyon (1997) favored the use of *BHARs* in tests designed to detect long-term abnormal stock returns and measure investors' long-term experience, whereas Lyon et al. (1999) recommended *CARs* be used if the objective of the study was to determine whether firms persistently earned abnormal (monthly, quarterly or annually) returns. However, to examine the influence of several factors on long-term stock performance, the *Fama-French* model was considered an appropriate choice (e.g. S. S. Chen et al., 2013; S. C. Chang et al., 2010; Chen et al., 2010).

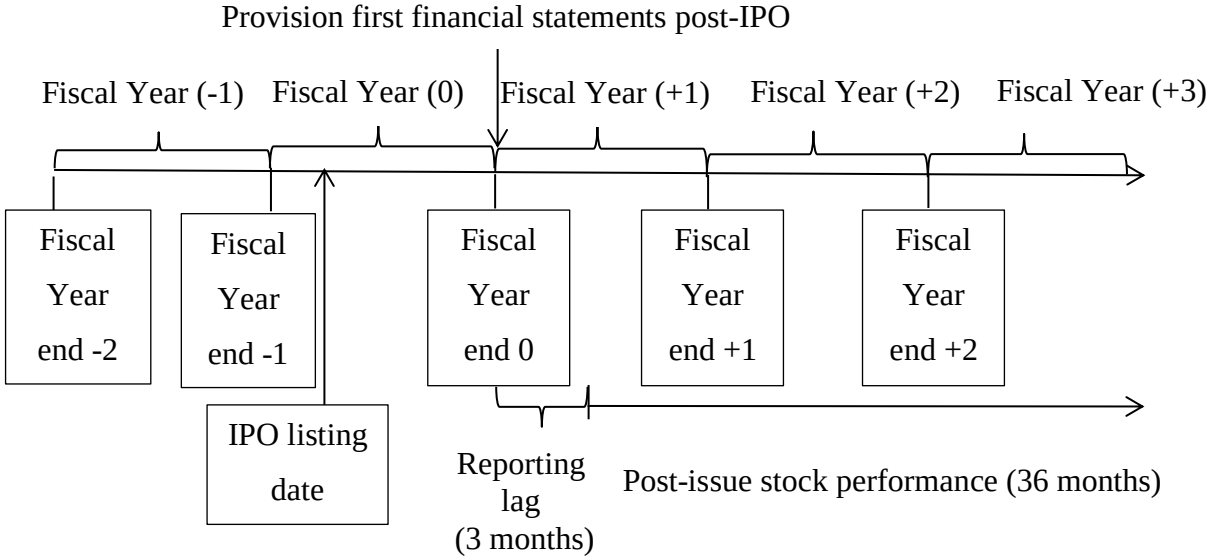
4.4.2.2 Measurement of post-issue stock performance in this thesis

Given that SMEs were the sample firms and one of the main objectives of this thesis was to test the relationship between earnings management and post-issue stock performance of IPOs, the *Fama-French* model was considered not to be best option in measuring post-issue stock performance of SMEs due to its deficiency in valuing small firms' long-term returns. Although *BHARs* and *CARs* have been found suitable measures for testing post-issue stock performance of SMEs, there have been varying preferences depending on the research questions of relevant studies. For example, Lyon et al. (1999) suggest that *BHARs* are the best measure if the research question is to determine whether or not investors earn abnormal stock returns for holding a stock across a particular time horizon. Jaskiewicz et al. (2005) also documented that

BHARs reflected compounding monthly returns that best measured the investors' experience, whereas *CARs* were normally recommended to test whether abnormal returns were persistently earned (Lyon et al., 1999). Given that the aim of this thesis was to test whether investors' realized long-term abnormal returns were influenced by earnings management, *BHARs* were deemed the most appropriate measure of post-issue stock performance of SME IPOs in this thesis. However, to ensure robustness of the results, *CARs* were employed in sensitivity testing.

Although according to the literature, *BHARs* were viewed as the most appropriate measure in testing post-issue stock performance in PRC SMEs, there was still a lack of consensus on the post-IPO optimal observation window in analyzing the impact of factors (e.g., pre-IPO earnings management) arising upon listing. The timeframe for examining long-term stock returns in several past studies usually ranged from 12 to 60 months (Song et al., 2014; Wen & Cao, 2013; Chen et al., 2010; Bai & Zhang, 2004). However, to examine the relationship between earnings management and post-issue stock performance, prior studies overwhelmingly adopted a 36-month observation period as the preference long-term window (e.g. Shen et al., 2014; S. S. Chen et al., 2013; Teoh, Welch et al., 1998a). In line with prior studies, in this thesis, the primary observation window for analyzing the relationship between post-issue stock performance of SME IPOs and earnings management comprises a 36 months period. Figure 4.1 illustrates the timeframe of post-issue stock performance in this thesis.

Figure 4.1 Timeframe for computation of post-issue stock performance



As demonstrated in Figure 4.1, the fiscal year in which the IPO firm listed is time period 0 (i.e., Year 0). The fiscal year -1 ends one year before the date of the IPO, whereas fiscal year +1 is the year following fiscal year 0. Post-issue stock performance is usually calculated from three to six months after the end of fiscal year 0 allowing for a reporting lag of the first financial statements (Teoh, Welch et al., 1998a). Therefore, in this thesis the 36-month observation window commenced from the fourth month after the end of the first fiscal year following each IPO.

As mentioned above, there are various metrics which can be used to calculate buy-and-hold abnormal returns. Since SME IPOs traded on the SME board, a natural appealing metric would be the SME board composite index, which has the advantage of closely matching the natural industry mix with the sample of IPOs (Ritter, 1991). The formulation of buy-and-hold abnormal return of IPO *i* (denoted $BHAR_i$) adopted in this thesis is described in *Formula 7*:

$$BHAR_i = \left[\prod_{t=1}^{T}(1+r_{i,t})-1\right]-\left[\prod_{t=1}^{T}(1+r_{m,t})-1\right] \quad [7]$$

Where:
$BHAR_i$ = Buy-and-hold abnormal return for stock of IPO *i* for 36-month holding period;
$r_{i,t}$ = monthly return on stock of IPO *i* in the event month[33] *t*;
$r_{m,t}$ = monthly return of the SME board composite market index in the event month *t*; and
T = 36 months.

4.5 Measurement of independent variables

Given that the aim of the study is to determine whether there is a relationship between earnings management and IPO stock performance, earnings management was the independent variable.

4.5.1 Earnings management measurement approaches

As required by the financial reporting system, earnings are calculated using the accrual basis of accounting. Earnings can be decomposed into cash flows from operating activities plus accruals. Under the accrual accounting system, managers have some scope in managing earnings without breaching any accounting rules in three broad classes: choice of accounting methods, revision of accounting estimates,

[33] Every event month has 21 successive trading days.

and acceleration or deferral of income and expenses (DuCharme et al., 2000). Despite this scope, a firm's financial reports and prospectus documents are thoroughly investigated by external auditors before listing. Therefore, in the preparation of financial statements, if managers strictly comply with general purpose accounting principles (GAAP) which include accounting standards, external auditors are more likely to attest that the firms' financial position is represented faithfully. Notwithstanding, managers do have considerable latitude within numerous accounting studies to select accounting policies and methods which have the ultimate effect of either increasing or decreasing earnings and still be in correspondence with GAAP. In effect this gives managers considerable discretion in determining earnings quality.

Earnings management can be detected in different ways. The first is the *aggregate accruals approach*, which typically uses regression models to calculate expected and unexpected accruals (e.g. Dechow et al., 1995; Jones, 1991). The second is the *specific accruals approach*, which focuses on accruals in specific sectors and examines direct transactions in detecting earnings management, such as the provision for bad debts, depreciation choices, opportunistic reductions of research and development (R&D) spending and related party transactions (Beneish et al., 2012; Aharony et al., 2010; Osma, 2008; Roychowdhury, 2006; Marquardt & Wiedman, 2004; McNichols, 2000; McNichols & Wilson, 1988). The third is the *frequency distribution approach*, which aims to identify behavior that influences earnings by comparing with specific benchmarks, such as zero or prior period earnings (Degeorge et al., 1999). Recent IPO studies have mainly adopted aggregate or *specific accruals approach*, whereas the *frequency distribution approach* has been rarely used in the IPO literature for detecting earning management. The reason given for the absence of the *frequency distribution approach* has been difficulty for the IPO firm to find an appropriate benchmark due to an often limited operating history (McNichols, 2000).

Table 4.4 is a summary of global IPO studies that have measured earnings management under various approaches and the proxy for earnings management. Table 4.4, Panel A shows IPO studies that adopted the *aggregate accruals approach*

to detect earnings management. Other studies that have employed the *specific accruals approach* to identify discretionary accruals are listed in Panel B.

Table 4.4 Earnings management measurement approaches in IPO studies

Study	Regions	Proxy of earnings management
Panel A: *Aggregate accruals approach*		
Teoh, Welch et al. (1998a)	US	Residuals from regression of current discretionary accruals
Roosenboom et al. (2003)	Netherlands	Residuals from regression of current discretionary accruals
Kimbro (2005)	PRC	Residuals from regression of current discretionary accruals
Rahman and Abdullah (2005)	Malaysia	Residuals from regression of current discretionary accruals
Cormier and Martinez (2006)	France	Residuals from regression of current discretionary accruals
Nagata and Hachiya (2007)	Japan	Residuals from regression of total discretionary accruals
Armstrong et al. (2008)	US	Residuals from regression of total discretionary accruals
S. C. Chang et al. (2010)	US	Residuals from regression of current discretionary accruals
Xiong et al. (2010)	US	Residuals from regression of total and current discretionary accruals
Ahmad-Zaluki et al. (2011)	Malaysia	Residuals from regression of current discretionary accruals
Chahine et al. (2012)	US and UK	Residuals from regression of current discretionary accruals
Shu et al. (2012)	Taiwan	Residuals from regression of total discretionary accruals
S. S. Chen et al. (2013)	PRC	Residuals from regression of current discretionary accruals
Shen et al. (2014)	PRC	Residuals from regression of total, current and long-term discretionary accruals
Panel B: *Specific accruals approach*		
Masako and Srinivasan (2005)	US	R&D expenditures
Kao et al. (2009)	PRC	After tax non-core earnings[34]
Aharony et al. (2010)	PRC	Related party sales

As indicated in Table 4.4, Panel A, a large proportion of literature preferred the *aggregate accruals approach* to identify discretionary accruals based on the relationship between accruals and hypothesized explanatory factors. For example, scholars relied on regression models extensively to test discretionary accruals in various regions, such as the US (S. C. Chang et al., 2010; Xiong et al., 2010;

[34] Non-core earnings refer to earnings other than those from operations, including income from short- and long-term investments, gains from asset sales, discontinued operations, extraordinary items and income from government subsidies (Kao et al., 2009).

Armstrong et al., 2008; Teoh, Welch et al., 1998a), Europe (Chahine et al., 2012; Cormier & Martinez, 2006; Roosenboom et al., 2003), Malaysia (Ahmad-Zaluki et al., 2011; Rahman & Abdullah, 2005), Taiwan (Shu et al., 2012), Japan (Nagata & Hachiya, 2007) and the PRC (Shen et al., 2014; S. S. Chen et al., 2013; Kimbro, 2005). In addition, residuals from the regression of total and current discretionary accruals were most frequently used to evaluate earnings management, as demonstrated in Panel A (e.g. S. S. Chen et al., 2013; Shu et al., 2012; Ahmad-Zaluki et al., 2011; Xiong et al., 2010). Some scholars used both total and current discretionary accruals as proxies of earnings management (e.g. Shen et al., 2014; Xiong et al., 2010). Despite its extensive use in past studies, the *aggregate accruals approach* was still subject to some criticism. For example, McNichols (2000) found that there was a potential for misspecification of earnings management behavior by ignoring long-term growth when using the aggregate accruals models.

Table 4.4, Panel B shows that a few studies examined specific accruals in an attempt to detect earnings management during the IPO process. For instance, as shown in Panel B, Masako and Srinivasan (2005) focused on the R&D expenditure in the US to identify whether insiders engaged in earnings management when selling new shares. Kao et al. (2009) relied on non-core earnings in detecting earnings management during the IPO process in the PRC, whereas Aharony et al. (2010) adopted related party transactions to test earnings management by using the return on assets (*ROA*) as a proxy. The *specific accruals approach* is based on intuition for key factors that influence the behavior of the accruals. McNichols (2000) documented that the *specific accruals approach* was applicable within industries where business practices caused accruals in question to be material. However, the studies of specific accruals tended to be confined to small or sector-specific samples and often required a costly investment in institutional knowledge (McNichols, 2000).

Given that the main aim of this thesis was to test the relationship between earnings management and IPO stock performance, without any specific concerns on accruals, the *aggregate accruals approach* is deemed to be more applicable.

4.5.2 Common measures of earnings management

Aggregate accruals are normally determined as the residuals from regression models. Several regression models have been used by researchers to calculate discretionary accruals under the *aggregate accruals approach*, but only a few models have been reliably tested and widely accepted. They include the Jones (1991) model, the modified Jones (1991) model (Dechow et al., 1995), the performance-matched model (Kothari & Warner, 1997), the Dechow and Dichev model (Dechow & Dichev, 2002), the modified Dechow and Dichev model (McNichols, 2002) and the Dechow, Hutton, Kim and Sloan ('DHKS') model (Dechow et al., 2012). Each of these is now described.

Jones (1991) model

The Jones (1991) model was initially created by Jones (1991) to test for earnings management during the import relief investigations in the US. Jones (1991) controlled for the effect of changes in a firm's economic activity in non-discretionary accruals and defined non-discretionary accruals as a function of revenue growth and depreciation. The discretionary accruals are the residuals subject to earnings management. The Jones (1991) model is as follows:

$$DTAcc_{i,t} = (TAcc_{i,t}/TA_{i,t-1}) - \left[\alpha_1\left(1/TA_{i,t-1}\right)+\beta_2\left(\Delta Rev_{i,t}/TA_{i,t-1}\right)+\gamma_3\left(PPE_{i,t}/TA_{i,t-1}\right)\right] \quad [8]$$

Where:

$DTAcc_{j,t}$ = Total discretionary accruals of firm *i* listing in time period *t*;
$TAcc_{i,t}$ = total accruals of firm *i* for time period *t*;
$TA_{i,t-1}$ = total assets of firm *i* at the end of time period *t-1*;
$\Delta Rev_{i,t}$ = change in net revenue of firm *i* for time period *t;*
$PPE_{i,t}$ = gross book value of the property, plant and equipment of firm *i* at the end of time period *t;*and
$\alpha_1,\beta_2,\gamma_3$= industry specific estimated coefficients.

The Jones (1991) model helps to control for unmanaged accruals associated with the depreciation charges and changes in economic activity (Peasnell et al., 2000). This model was successful in explaining around one quarter of the variations in total accruals (Dechow et al., 1995). The limitation of the Jones (1991) model was its implicit assumption that revenue is not managed. In reality however, managers have considerable discretionary power over revenue. For example, in accrual accounting revenue may be recognized before cash has been received, and in some cases even the possibility of receiving the cash in the future is highly questionable. Therefore,

the explanatory power of the Jones (1991) model has usually been low (Dechow et al., 2010).

Modified Jones (1991) model

The modified Jones (1991) model was regarded as a modified version of the original Jones (1991) model. It adopted discretionary power in preference to revenue recognition into consideration. The only adjustment made by the modified Jones (1991) model based on the original Jones (1991) model, was that the change in revenue was substituted by the change in revenue minus receivables in the event year. This model assumes that all credit sales change in the event year arise from earnings management because the discretionary power is easier to be exercised over the recognition of credit sales than cash sales (Dechow et al., 1995). In the modified Jones (1991) model, discretionary accruals are estimated as follows:

$$DTAcc_{i,t} = (TAcc_{i,t}/TA_{i,t}) - \left[\alpha_1\left(1/TA_{i,t-1}\right) + \beta_2\left(\Delta Rev_{i\,t} - \Delta Rec_{i\,t}\right)/TA_{i,t-1} + \gamma_3\left(PPE_{i,t}/TA_{i,t-1}\right)\right] \quad [9]$$

Where:

$DTAcc_{i,t}$ = Total discretionary accruals of firm *i* listing in time period *t*;
$TAcc_{i,t}$ = total accruals of firm *i* for time period *t;*
$TA_{i,t-1}$ = total assets of firm *i* at the end of time period *t-1*;
$\Delta Rev_{i,t}$ = change in net revenue of firm *i* for time period *t;*
$\Delta Rec_{i,t}$ = change in receivable of firm *i* for time period *t;*
$PPE_{i,t}$ = gross book value of the property, plant and equipment of firm *i* at the end of time period *t;* and
$\alpha_1, \beta_2, \gamma_3$ = industry specific estimated coefficients.

The modified Jones (1991) model has shown to be significantly better at detecting sales-based earnings management (Dechow et al., 1995). However, it is also noted that this model was poorly specified when financial performance was extreme, leading to Type I errors, for example when applied to firms with extreme cash flows (Peasnell et al., 2000). To improve the formulation of the standard Jones (1991) model, Teoh, Wong et al. (1998) distinguished accruals by terms (e.g. current and long-term) when detecting earnings management in IPO firms. Teoh, Wong et al. (1998) used the term-adjusted modified Jones (1991) model and found that IPO firms reported higher earnings at the time of IPO by using income-increasing abnormal accruals. The formulation of current portion of discretionary accruals was more appealing, because continuous earnings management via depreciation accruals was likely to have limited potential (Young, 1999; Beneish, 1998).

Performance-matched model

Concerned that the existing models failed to capture all non-discretionary accruals, Kothari et al. (2005) proposed a matching procedure that entailed subtracting estimates of discretionary accruals using the modified Jones (1991) model from matched firms. In their study Kothari et al. (2005) suggest the matched firm is selected by return on assets (*ROA*) in the same industry in either the current or the previous period. A matched firm is identified from the same industry with the closest *ROA*, and then the sample firm is matched to generate 'performance-matched' residuals. The calculation process of discretionary accruals under this model is similar to the modified Jones (1991) model, as demonstrated in *Formula 9*, except that it excludes matched firms' residuals.

The performance-matched model was useful in mitigating Type I errors when performance was important. However, it sometimes exaggerates model misspecification. As noted by Dechow et al. (2012), a performance-matched model only mitigated the errors when the appropriate omitted variables were identified and may have exaggerated misspecification in samples with extreme size and cash flows, thereby increasing the standard errors of the test statistics.

Dechow and Dichev (2002) model

The Dechow and Dichev (2002) model focused on working capital accruals and measures accruals from a cash flow aspect. Dechow and Dichev (2002) argued that accruals were used to shift future cash collections and reverse previously recognized cash. As a result, an empirical accrual based measure, using a function related to the past, present and future cash flows from operations, was developed by Dechow and Dichev (2002). The estimation error is defined as the difference between the amount accrued and the amount realized. The quality of accruals and earnings are determined by the magnitude of those errors. The current accruals are estimated as follows:

$$A_t = CF^{t}_{t-1} - \left(CF^{t+1}_{t} + CF^{t-1}_{t}\right) + CF^{t}_{t+1} + \varepsilon^{t}_{t+1} - \varepsilon^{t-1}_{t} \qquad [10]$$

Where:

A_t = Current accruals recognized in period *t*;

CF^{s}_{t} = cash from operations realized in period *t* and recognized in period *s*; and

ε^{s}_{t} = estimated error associated with accruals recognized in period *s* and cash flows realized in period *t*.

The Dechow and Dichev (2002) model had an important advantage: it set up a relationship between accruals and cash flows. It captured an important element of earnings quality by relating accruals to cash flows from the prior, contemporaneous and subsequent periods (McNichols, 2002). It also defined the notion of estimation errors, including both intentional and unintentional errors. However, this model provided little insight into the proper timing of the accruals with respect to cash flows (Dechow & Dichev, 2002). In addition, the estimation errors were assumed to be independent of each other and of the cash flow realization in the Dechow and Dichev (2002) model. Moreover, this model did not separately consider how total accruals might be affected by the behavior of discretionary accruals (McNichols, 2002). Therefore, this model was unsigned and could only predict current accruals, resulting in an important limitation.

Modified Dechow and Dichev (2002) model

McNichols (2002) modified and extended the Dechow and Dichev (2002) model by including revenue growth to reflect operating performance and property, plant and equipment (*PPE*) to include the depreciation factor. This model also decomposed the standard deviation of the residual into innate estimation errors and discretionary estimation errors. The modified Dechow and Dichev (2002) model was based on the cross-sectional Dechow and Dichev (2002) model, including change in revenue and *PPE* as fundamental variables from the Jones (1991) model. The formulation of modified Dechow and Dichev (2002) model is as follows:

$$TCA_{j,t}=\alpha+\beta_1 CFO_{t-1}+\beta_2 CFO_t+\beta_3 CFO_{t+1}+\beta_4 \Delta Rev_t+\beta_5 PPE_t+\varepsilon_t \quad [11]$$

Where:
$TCA_{j,t}$= Total current accruals in year *t*;
CFO_t =cash flows from operations in year *t*;
$\Delta\ Rev_t$= change of revenue in year *t*;
PPE_t = property, plant and equipment in year *t*.
α, β = estimated coefficients; and
ε = estimated errors.

The modified Dechow and Dichev (2002) model captured accruals better by regressing total accruals on changes in revenue and *PPE* (Francis et al., 2005). Hence it did not suffer from the limitation of the original Dechow and Dichev (2002) model and had increased explanatory power, thereby reducing measurement errors. However, similar to Dechow and Dichev (2002) model, this model also provided

estimates of discretionary accruals that were significantly associated with cash flows, which were likely to be substantially nondiscretionary (McNichols, 2002). Hence, further research was still needed to modify this model.

'DHKS' model

Dechow et al. (2012) provided a new approach termed the 'DHKS' model to test earnings management. This model was based on the notion that any accrual-based earnings management must be reserved in the future. Dummy variables were incorporated into the 'DHKS' model to indicate whether or not earnings management was engaged in the testing year. The following regression is used to estimate the discretionary accruals:

$$DA_{i,t} = a + bPART_{i,t} + cPARTR1_{i,t} + \varepsilon_{i,t} \quad [12]$$

Where:

$DA_{i,t}$ = Discretionary accruals of firm *i* in year *t*;

$PART_{i,t}$ =a dummy variable that is set to 1 in periods during which a hypothesized determinant of earnings management is present and 0 otherwise;

$PARTR1_{i,t}$= a dummy variable that is set to 1 in periods during which the earnings management is posited to reverse and 0 otherwise; and

ε =estimated errors.

In the 'DHKS' model, earnings management is identified by rejecting the null hypothesis that b-c=0. The alternative hypotheses for upward (downward) earnings management are b-c>(<)0. Dechow et al. (2012) found that their model incorporating reversals could increase test power by over 40% and mitigated misspecification arising from related omitted variables. However, it must be pointed out that incorporating reversals over two or more subsequent periods may induce an overcorrection problem (Dechow et al., 2012). In addition, the 'DHKS' model was typically only useful in sample firms with 'known' manipulation and where researchers knew the periods in which earnings management occurred and was reversed (Gerakos, 2012).

In summary, the Jones (1991) and the modified Jones (1991) models measured discretionary accruals as a residual from the regression of total accruals on change in sales (or change of sales minus change of account receivable) and property, plant and equipment. Although both the Jones (1991) and the modified Jones (1991) models were criticized for misspecification in firms with extreme development (Dechow et

al., 1995), they were useful and have been adopted widely to detect earnings management. In particular, the modified Jones (1991) model has been prevalent among the IPO studies up to the present time (e.g. Shen et al., 2014; Roosenboom et al., 2003; Teoh, Welch et al., 1998a). The performance-matched model was appropriate when performance was an issue and not generally applicable (Kothari et al., 2005). The Dechow and Dichev (2002) model could only predict current accruals, while the modified Dechow and Dichev (2002) model included a substantial nondiscretionary component (McNichols, 2002). The 'DHKS' model incorporated reversals into the estimation process, thereby significantly increasing explanatory power. However, the 'DHKS' model is only useful under the prediction that the earnings manipulation and corresponding periods are definite (Gerakos, 2012). Dechow et al. (2010) summarized that all those models were frequently adopted at the industry level that could assume constant coefficient estimates. However, the most appropriate method to detect discretionary accruals has been through selection of economic characteristics related to the hypothesized earnings management (Dechow et al., 2012).

In addition, there have been some disputes regards the directional or non-directional measures of earnings management (i.e. directional discretionary accruals and absolute value of discretionary accruals). For example, Larcker and Richardson (2004) found that if the research design focused on signed measures of earnings management, the directional discretionary accruals were usually employed. For example, IPOs typically created an incentive to engage in income-increasing earnings management, hence directional accruals were usually adopted to test earnings management in IPO studies. On the other hand, if there was less incentives to engage in both income-increasing and income-decreasing behavior, the absolute value of discretionary accruals was deemed appropriate (Othman & Zeghal, 2006). Sloan (1996) argued that the absolute value of accruals provided a simple and effective way to test the magnitude of the accrual component of earnings. However, the original and modified Jones (1991) models were found to generate low power for earnings management of economically plausible magnitudes when using absolute accruals (Peasnell et al., 2000).

Table 4.5 summarizes the common measures of earnings management in IPO studies. Panels A and B report studies employing the Jones (1991) and modified Jones (1991) models, whereas Panels C and D provide IPO studies using the performance-matched model and multiple models respectively. Other models (e.g. Dechow and Dichev [2002] model, modified Dechow and Dichev [2002] model and 'DHKS' model) have rarely been adopted in prior IPO studies due to their inherent deficiencies. The directional or absolute values of accruals that were adopted in each study are presented in the last column.

Table 4.5 Common measures of earnings management in IPO studies

Study	Data	Models of aggregate accruals	Directional/ Absolute value
Panel A: Jones (1991) model			
Chaney and Lewis (1998)	489 PRC IPOs From 1975 to 1984	Jones (1991) model	Absolute value
Panel B: Modified Jones (1991) model			
Teoh, Welch et al. (1998a)	1649 US IPOs From 1980 to 1992	Modified Jones (1991) model	Directional value
Roosenboom et al. (2003)	64 Dutch IPOs From 1984 to 1994	Modified Jones (1991) model	Directional value
Kimbro (2005)	691 PRC IPOs From 1995 to 2002	Modified Jones (1991) model	Directional value
Rahman and Abdullah (2005)	187 Malaysia IPOs From 1989 to1998	Modified Jones (1991) model	Directional value
Nagata and Hachiya (2007)	775 Japan IPOs From 1989 to 2000	Modified Jones (1991) model	Directional value
S. C. Chang et al. (2010)	2053 US IPOs From 1989 to 2003	Modified Jones (1991) model	Directional value
Geng et al. (2010)	101 PRC IPOs Listing in 2007	Modified Jones (1991) model with *CFO*	Directional value
Ahmad-Zaluki et al. (2011)	250 Malaysian IPOs From 1990 to 2000	Modified Jones (1991) model	Directional value
Chahine et al. (2012)	274 US/U.K. IPOs From 1996 to 2006	Modified Jones (1991) model	Directional value
Shu et al. (2012)	287 Taiwan IPOs From 2004 to 2008	Modified Jones (1991) model	Directional value
Shen et al.(2014)	506 PRC IPOs From 1998 to 2003	Modified Jones (1991) model	Directional value
Panel C: Performance-matched model			
Nagata (2013)	1476 Japan IPOs From 1982 to 2005	Performance-matched model	Both

(Continued on next page)

Table 4.5 Common measures of earnings management in IPO studies (continued)

Study	Data	Models of aggregate accruals	Directional/ Absolute value
Panel D: Multiple models			
DuCharme et al. (2000)	171 US IPOs From 1982 to 1987	Modified Jones (1991) model Modified Jones (1991) model with *CFO*	Directional value
Balatbat and Lim (2003)	326 carve-outs From 1982 to 1997	Modified Jones (1991) model Modified Jones (1991) model with *ROA* Performance-matched	Directional value
Armstrong et al. (2008)	4,169 US IPOs From 1987 to 2005	Modified Jones (1991) model Performance-matched model	Directional value
Francis et al. (2012)	3844 US IPOs From 1986 to 2004	Modified Jones (1991) model Performance-matched model	Directional value
S.S. Chen et al. (2013)	1593 US IPOs From 1990 to 2005	Modified Jones (1991) model Performance-matched model Modified Jones (1991) model with *CFO*	Directional value

As shown in Table 4.5, Panel A, due to the explicit limitation of excluding revenue from discretionary accruals in the original Jones (1991) model, scholars have been less likely to adopt it except in some early studies in the 1990s (e.g. Chaney & Lewis, 1998).

As indicated in Table 4.5, Panel B, the modified Jones (1991) model was the most popular model used among existing IPO studies. Scholars used the modified Jones (1991) model to test the earnings management behavior in various regions, such as the US (Chahine et al., 2012; S. C. Chang et al., 2010; Teoh, Welch et al., 1998a), UK (Chahine et al., 2012), Netherlands (Roosenboom et al., 2003), Taiwan (Shu et al., 2012), Malaysia (Ahmad-Zaluki et al., 2011; Rahman & Abdullah, 2005) and Japan (Nagata & Hachiya, 2007). The modified Jones (1991) model was also popular in the PRC IPO studies (e.g. Shen et al., 2014; Geng et al., 2010; Kimbro, 2005). Some scholars included some additional factors into the standard modified Jones (1991) model. For example, Geng et al. (2010) included cash flows from operations (*CFO*) in the modified Jones (1991) model which they defined as the cash flow-return model.

Table 4.5, Panel C, indicates that although some new models, such as the performance-matched model, were introduced in recent studies, their application scope was not extensive within the IPO setting. Following Kothari et al. (2005), Nagata (2013) used the performance-matched model to detect earnings management in IPO firms in Japan. Another stream of IPO studies adopted several models simultaneously to test discretionary accruals as indicated in Table 4.5, Panel D. Among those models, the modified Jones (1991) model was still employed as a basic measure, together with other models, such as performance-matched model and some deformed modified Jones (1991) models, including some extra variables (e.g. *ROA* or *CFO*) (S.S. Chen et al., 2013; Francis et al., 2012; Balatbat & Lim, 2003).

The last column of Table 4.5 shows that, compared with the absolute value, the directional value of discretionary accruals was more pronounced in IPO studies. Because an IPO creates incentives to issuers to engage in income-increasing earnings management, most IPO studies have adopted discretionary accruals with directional signs to test earnings management (e.g. Shen et al., 2014; S. S. Chen et al., 2013; Shu et al., 2012). Evidently only Chaney and Lewis (1998) used absolute accruals to test the relationship between income smoothing and underperformance in IPOs, whereas Nagata (2013) adopted both directional and absolute amounts of abnormal accruals to examine whether earnings management led to IPO underpricing.

4.5.3 Measurement of earnings management in this thesis

Consistent with prior IPO studies (e.g. Shen et al., 2014; Chahine et al., 2012; Kimbro, 2005; Roosenboom et al., 2003; Teoh, Welch et al., 1998a), this thesis has adopted the modified Jones (1991) model to detect earnings management in the main regression models and used other popular models (e.g. original Jones [1991] model and performance-matched model) in the sensitivity testing.

There is some division in prior earnings management literature about whether an analysis should focus on possible manipulation of earnings via total discretionary accruals (i.e. both current and long-term accruals) or current discretionary accruals only. The original seminal model developed by Jones (1991), for example, focused on total discretionary accruals. Some scholars (e.g. Roosenboom et al., 2003;

DuCharme et al., 2000) have argued that such a focus is biased, with computed discretionary accruals potentially undervalued. The reason for the bias is corporate management, due to short-time horizons, was more likely to use discretionary power to manage earnings via current accruals (DuCharme et al., 2004; DuCharme, 2000). Furthermore, managers have greater discretion over current than long-term accruals (Teoh, Welch et al., 1998a). Therefore, some scholars have used total discretionary accruals as well as the current and long-term components to calculate earnings management (e.g. Shen et al., 2014; Xiong et al., 2010).

Consistent with prior literature, this thesis uses a combination of *aggregate accruals approach* (total, current and long-term discretionary accruals) to conduct a comprehensive analysis of earnings management. Following Teoh, Welch et al. (1998a), accruals are decomposed into four components: (i) current discretionary accruals (*DCAcc*); (ii) current non-discretionary accruals (*NDCAcc*); (iii) long-term discretionary accruals (*DLAcc*); and (iv) long-term non-discretionary accruals (*NDLAcc*). Total discretionary accruals (*DTAcc*) are the sum of current and long-term discretionary accruals.

This thesis investigates the relationship between pre-IPO earnings management and stock performance, hence the levels of discretionary accruals one year prior to the IPO are the primary focus. Given that SME issuers in the PRC are predicted to have a strong incentive to inflate earnings in the pre-IPO period, the directional value of discretionary accruals is used as the proxy of earnings management in this thesis in line with prior IPO literature (e.g. Shen et al., 2014; Teoh, Welch et al., 1998a). Accordingly, the directional values of total discretionary accruals (denoted $DTAcc_i$), current discretionary accruals (denoted $DCAcc_i$) and long-term discretionary accruals (denoted $DLAcc_i$)[35] in the fiscal year prior to the IPO are applied in the main regression models to test the six hypotheses. The positive discretionary accrual values are viewed as income-increasing earnings management, whereas negative values indicate income-decreasing earnings management.

[35] An illustrated example of the calculation of total, current and long-term discretionary accruals appears in Appendix C.

To calculate total discretionary accruals (*DTAcc*), the first step is to determine total accruals (*TAcc*). By using the modified Jones (1991) model, *DTAcc* is obtained from the difference between *TAcc* and total non-discretionary accruals (*NDTAcc*). *NDTAcc* stands for accrual adjustment, which is necessary and essential in certain conditions due to timing and mismatching issues and increase of sales. Hence *NDTAcc* represents the 'un-managed' component. In contrast, *DTAcc* represents the 'managed' component of accruals.

Total accruals (denoted $TAcc_{i,t}$) can be calculated as the difference between net income and cash flows from operations (Shen et al., 2014; DuCharme et al., 2000; Teoh, Wong et al., 1998). The calculation process is defined in *Formula 13*:

$$TAcc_{i,t} = NI_{i,t} - CFO_{i,t} \quad [13]$$

Where:
$TAcc_{i,t}$ = Total accruals of IPO firm *i* for time period *t*;
$NI_{i,t}$ = net income of IPO firm *i* for time period *t*;
$CFO_{i,t}$ = cash flows from operations of IPO firm *i* for time period *t*; and
t = the IPO fiscal year *-1*.

To determine total discretionary accruals for an IPO firm *i* in time period *t*, the estimated coefficients are firstly computed in the estimation portfolio (Teoh, Welch et al., 1998a). Expected values for a portfolio of firms in the industry to which the IPO is classified in the same time period are computed as per *Formula 14*:

$$(TAcc_{j,t}/TA_{j,t-1}) = a_0(1/TA_{j,t-1}) + a_1(\Delta Rev_{j,t}/TA_{j,t-1}) + a_2(PPE_{j,t}/TA_{j,t-1}) + \varepsilon_{j,t} \quad [14]$$

Where:
$TAcc_{j,t}$ = Total accruals of firm *j* in the industry estimation portfolio for time period *t*;
$TA_{j,t-1}$ = total assets of firm *j* in the industry estimation portfolio at the end of time period *t-1*;
$\Delta Rev_{j,t}$ = change in net revenue of firm *j* in the industry estimation portfolio from the end of time period *t-1* to the end of time period *t*;
$PPE_{j,t}$ = gross book value of the property, plant and equipment of firm *j* in the industry estimation portfolio at the end of time period *t*;
$\varepsilon_{j,t}$ = error term [assuming cross-sectional uncorrelation and normally distributed with zero means];
a_0, a_1, a_2 = estimated coefficients; and
t = the IPO fiscal year *-1*.

Next, total non-discretionary accruals (denoted $NDTAcc_{i,t}$) for IPO *i* in time period *t* are calculated using *Formula 15*:

$$NDTAcc_{i,t} = \hat{a}_0(1/TA_{i,t-1}) + \hat{a}_1[(\Delta Rev_{i,t}/TA_{i,t-1}) - (\Delta Rec_{i,t}/TA_{i,t-1})] + \hat{a}_2(PPE_{i,t}/TA_{i,t-1}) \quad [15]$$

Where:
$NDTAcc_{i,t}$ = Total non-discretionary accruals of IPO firm *i* for time period *t*;
$TA_{i,t-1}$ = total assets of IPO firm *i* at the end of year *t-1*;

$\Delta Rev_{i,t}$ = change in net revenue of IPO firm *i* from the end of time period *t-1* to the end of time period *t;*
$\Delta Rec_{i,t}$ = change in receivable of IPO firm *i* from the end of time period *t-1* to the end of time period *t;*
$PPE_{i,t}$ = gross book value of the property, plant and equipment of IPO firm *i* at the end of time period *t* ;
$\hat{a}_0$, $\hat{a}_1$, $\hat{a}_2$ = fitted estimated coefficients; and
t = the IPO fiscal year *-1*.

Then, $DTAcc_i$ for IPO *i* in the fiscal year prior to the IPO is calculated using *Formula 16*:

$$DTAcc_i = (TAcc_{i,t}/TA_{i,t-1}) - NDTAcc_{i,t} \quad [16]$$

Where:
$DTAcc_i$ = Total discretionary accruals of IPO firm *i* in the fiscal year prior to the IPO;
$TAcc_{i,t}$ = total accruals of IPO firm *i* for time period *t*;
$NDTAcc_{i,t}$ = total non-discretionary accruals of IPO firm *i* for time period *t*;
$TA_{i,t-1}$ = total assets of IPO firm *i* at the end of year *t-1*; and
t = the IPO fiscal year *-1*.

As defined by Teoh, Welch et al. (1998a), total current accruals (denoted $CAcc_{i,t}$) are the difference between the change in current assets (exclude change of cash and cash equivalents) and the change in current liabilities (exclude change of current portion of long-term liabilities and income tax payable). The calculation process is illustrated in *Formula 17*:

$$CAcc_{i,t} = (\Delta CA_{i,t} - \Delta Cash_{i,t}) - (\Delta CL_{i,t} - \Delta LTD_{i,t} - \Delta ITP_{i,t}) \quad [17]$$

Where:
$CAcc_{i,t}$ = Total current accruals of IPO firm *i* for time period *t*;
$\Delta CA_{i,t}$ = change in current assets of IPO firm *i* from the end of time period *t-1* to the end of time period *t*;
$\Delta Cash_{i,t}$ = change in the cash balance of IPO firm *i* from the end of time period *t-1* to the end of time period *t*;
$\Delta CL_{i,t}$ = change in current liabilities of IPO firm *i* from the end of time period *t-1* to the end of time period *t*;
$\Delta LTD_{i,t}$ = change in long-term debt included in current liabilities of IPO firm *i* from the end of time period *t-1* to the end of time period *t*;
$\Delta ITP_{i,t}$ = change in income tax payable of IPO firm *i* from the end of time period *t-1* to the end of time period *t*; and
t = the IPO fiscal year *-1*.

Meanwhile, $DCAcc_i$ is calculated using the following set of formulas:

$$(CAcc_{j,t}/TA_{j,t-1}) = u_0(1/TA_{j,t-1}) + u_1(\Delta Rev_{j,t}/TA_{j,t-1}) + \varepsilon_{j,t} \quad [18]$$

$$NDCAcc_{i,t} = \hat{u}_0(1/TA_{i,t-1}) + \hat{u}_1[(\Delta Rev_{i,t}/TA_{i,t-1}) - (\Delta Rec_{i,t}/TA_{i,t-1})] \quad [19]$$

$$DCAcc_i = (CAcc_{i,t}/TA_{i,t-1}) - NDCAcc_{i,t} \quad [20]$$

Where:
$DCAcc_i$ = current discretionary accruals of IPO firm *i* in the fiscal year prior to the IPO;

$CAcc_{j,t}$ = Total current accruals of firm *j* in the industry estimation portfolio for time period *t*;
$TA_{j,t-1}$ = total assets of firm *j* in the industry estimation portfolio at the end of time period *t-1*;
$\Delta Rev_{j,t}$ = change in net revenue of firm *j* in the industry estimation portfolio for time period *t*;
$NDCAcc_{i,t}$ = current non-discretionary accruals of IPO firm *i* for time period *t*;
$TA_{i,t-1}$ = total assets of IPO firm *i* at the end of year *t-1*;
$\Delta Rev_{i,t}$ = change in net revenue of IPO firm *i* from the end of time period *t-1* to the end of time period *t;*
$\Delta Rec_{i,t}$ = change in receivable of IPO firm *i* from the end of time period *t-1* to the end of time period *t;*
$CAcc_{i,t}$ = total current accruals of IPO firm *i* for time period *t*;
u_0, u_1 = estimated coefficients;
$\hat{u}_0$, $\hat{u}_1$ = fitted estimated coefficients;
$\varepsilon_{j,t}$ = error term [assuming cross-sectional uncorrelation and normally distributed with zero means]; and
t = the IPO fiscal year *-1*.

Finally, $DLAcc_i$ for IPO *i* in the fiscal year prior to the IPO is calculated using *Formula 21*:

$$DLAcc_i = DTAcc_i - DCAcc_i \quad [21]$$

Where:
$DLAcc_i$ = long-term discretionary accruals of IPO firm *i* in the fiscal year prior to the IPO;
$DCAcc_i$ = current discretionary accruals of IPO firm *i* in the fiscal year prior to the IPO; and
$DTAcc_i$ = total discretionary accruals of IPO firm *i* in the fiscal year prior to the IPO.

To calculate the estimated coefficients of a_0, a_1, a_2, u_0 and u_1, an estimation portfolio *k* is set up. It comprises size-matched non-IPO firms with at least a two-year trading history from the SME board and main boards[36]. The CSRC classifies firms into twelve major industry groups[37] (excluding the finance industry[38]). Appendix B provides a full list of the twelve industries. Due to listing age and sample constraints, there are insufficient firms in certain industries when calculating discretionary accruals following the CSRC twelve industry classification. Therefore, when running the cross-sectional regression models to calculate accruals, the twelve major industry groups are combined into five industry sectors[39] referring to the Global Industry Classification Standard (GICS): (a) manufacturing; (b) consumer service: wholesale and retail, social services and media; (c) industries: construction, transportation and

[36] For the IPO firms listed in 2006 and 2007, there were no non-IPO benchmark firms on the SZSE SME board, because the SZSE SME board was set up on 25 June 2004 and the number of firms listed in the first two years was insufficient to construct the estimation portfolio. Hence size-matched (e.g. market capitalization) firms listed on the main boards in 2006 and 2007 were selected as the benchmark to form the estimation portfolio.
[37] In the main regression models, the CSRC industry classification is used and all sample firms are categorized into 12 industries.
[38] Consistent with prior IPO and earnings management literature, IPO firms from finance industry are excluded from the analysis.
[39] The five industry sectors are only adopted when calculating discretionary accruals. In the main regressions testing hypotheses, 12 industries are applied.

real estate; (d) information technology and (e) others: remaining industries. In order to measure industry-related factors, the research categorizes non-IPO benchmark firms into the five industry sectors.

4.6 Measurement of control variables

It is generally accepted that cross-sectional influences may have effects on the IPO stock performance. To minimize Type I errors (i.e. incorrect rejection of true null hypothesis), control variables are incorporated into the analysis (Bartov et al., 2000). Following prior literature, control variables that potentially influence IPO stock performance are included in IPO underpricing and post-issue stock performance regression models. The measurement of each control variable is illustrated in the following subsections.

4.6.1 Control variables for underpricing

Consistent with prior literature, a number of control variables are included in the underpricing regression models to test H_1, H_{1a} and H_{1b}. These control variables are classified into three categories: market characteristics, firm characteristics, and underwriters' and auditors' reputation.

4.6.1.1 Market characteristics

Market characteristics (e.g. market index, listing lag and market timing) are documented as factors affecting the level of underpricing (Shen et al., 2014; Chan et al., 2004; Teoh, Welch et al., 1998a). Dimovski and Brooks (2004) found that the mood of the capital market had a positive relationship with share price, thereby the abnormal initial stock returns could be partly explained by strong market sentiment. For example, if a firm engaged in an IPO in a bull market in which investors were overoptimistic on stock issuance, the IPO was more likely to be oversubscribed and the initial share price would be boosted considerably above the offer price. As a result, in this thesis, the return of the market index during the event period or 'market sentiment' (denoted $IMkt_i$) is taken into account when assessing underpricing (Chi & Padgett, 2005a; Dimovski & Brooks, 2004).

$$IMkt_i = (I_{i1} - I_{i0})/ I_{i0} \quad [22]$$

Where:

$IMkt_i$ = Return on the SME board composite market index during the period between offering and listing dates of IPO firm *i*;
I_{i1} = SME board composite market index at the end of first day of trading for IPO firm *i*; and
I_{i0} = SME board composite market index at the end of offer day for IPO firm *i*.

Further, the time lag between the IPO offering and listing is also a factor influencing underpricing in the PRC, because IPOs in the PRC normally spend months waiting for approval (Chan et al., 2004; Chen et al., 2004). The delay sometimes may amount to more than one year based on market conditions (Chen et al., 2004). In general, a long listing delay means higher risks in stock issuance, so the listing lag is frequently found to be positively related to the level of underpricing. In this thesis, the listing lag is controlled for in the underpricing regression models. The listing lag (denoted Lag_i) is usually defined as the number of days between the offering and listing date divided by 365.

$$Lag_i = n / 365 \quad [23]$$

Where:
Lag_i = Listing lag between the issue date and the listing date of IPO firm *i*; and
n = number of days between the offering and the listing date of IPO firm *i*.

Moreover, the timing of IPO affects initial returns as well (Shen et al., 2014). Therefore, the listing year denoted $Year_i$ is controlled for in the underpricing regression models. $Year_i$ is a dummy variable coded one [1] if the IPO firm *i* is conducted in a certain year; otherwise zero [0]. In addition, the sample includes firms listed during the global financial crisis (GFC) period when many stocks plunged and IPOs are no exceptions. Hence, the influence of the GFC is controlled for in the underpricing regression models (Claessens et al., 2010). The GFC (denoted $FinCrisis_i$) is constructed as a dummy variable coded one [1] if the IPO firm *i* is listed after 2007, otherwise it is coded zero [0].

4.6.1.2 Firm characteristics

In previous studies, firm characteristics were found to have an impact on the level of underpricing, such as leverage, issue size, age, industry and ownership structure.

Leverage

The pre-IPO leverage indicated an IPO firm's financial distress and internal financing ability. Su (2004) found evidence that pre-IPO leverage was negatively

related to the quality of IPO firm and positively associated with underpricing in the PRC IPO market. In contrast, Jain and Padmavathi (2009) argued that high pre-IPO leverage reduced underpricing in India. In this thesis, the pre-IPO leverage (denoted $PreLev_i$) is controlled for in the underpricing regression models and defined as the book value of total debts divided by book value of total assets at the beginning of the IPO year.

$$PreLev_i = PreLiabilities_i / PreAssets_i \quad [24]$$

Where:

$PreLev_i$ = Leverage of IPO firm *i* at the beginning of the IPO year;
$PreLiabilities_i$ = book value of total liabilities (including short- and long-term) of IPO firm *i* at the beginning of the IPO year; and
$PreAssets_i$ = book value of total assets (including short- and long-term) of IPO firm *i* at the beginning of the IPO year.

Size

Issue size was also been found to have an influence on the level of underpricing (e.g. Chang et al., 2008; Guo & Brooks, 2008). Scholars have generally found issue size was negatively related to IPO underpricing (Islam et al., 2010; Samarakoon, 2010; Cheung et al., 2009). This relationship might be explained as larger IPOs being less risky than the smaller ones and thus usually having lower levels of underpricing (Mok & Hui, 1998). Chen et al. (2004) and Lee et al. (1996) argued that when more shares were offered, there would be less information asymmetry and thus a lower level IPO underpricing. As a result, in this thesis, issue size (denoted $IssueSize_i$) is also controlled for in the underpricing regression models and defined as the natural logarithm of gross proceeds raised following prior literature (e.g. Aggarwal et al., 2002).

$$IssueSize_i = Log\ (Proceeds_i) \quad [25]$$

Where:

$IssueSize_i$ = Issue size of IPO firm *i*; and
$Proceeds_i$ = gross proceeds raised by IPO firm *i* in million RMB.

Age

In addition, IPO firm age has been found to be related to underpricing. Engelen and Essen (2010) found that older firms with a long history and more information available to the public reduced the ex-ante uncertainty about the IPO firm's valuation, thereby lower underpricing. Based on this assumption, a negative relationship

between the firm age and the level of underpricing has been found by some scholars (e.g. Loughran & Ritter, 2004; Su & Fleisher, 1999). In line with prior literature (Clarkson & Merkley, 1994), in this thesis firm age (denoted Age_i) is controlled for in the regression models for underpricing, as follows:

Age_i = *Log* (1+IPO firm *i*'s age at the time of offering) [26]

Where:

Age_i = Age of IPO firm *i*; and

IPO firm *i*'s age at the time of offering = number of years of operating history at the time of offering for IPO firm *i*.

Industry and ownership structure

Moreover, IPO firms' inherent characteristics also need to be controlled for. For instance, Aintablian and Mouradian (2007) pointed out that initial returns varied across industries, and the highest initial returns existed in the oil and gas industry in Canada. Consequently, according to the CSRC classification, 12 dummy variables are created in this thesis. Industry classification (denoted Ind_i) is constructed as a dummy variable and coded one [1] if IPO firm *i* belongs to an industry, otherwise it is coded zero [0]. In addition, ownership structure is a unique characteristic that influences IPO underpricing in the PRC. According to Chen et al. (2004), larger retained shares held by the government and legal entities lead to higher underpricing due to increasing agency costs and lower liquidity. Following Chen et al. (2004), Wang and Zhang (2006) also found a positive relationship between underpricing and State ownership in the stock market in the PRC. Therefore, in line with prior literature (Chan et al., 2004; Chen et al., 2004), ownership structure is included in the underpricing regression models in this study. Accordingly, ownership structure (denoted SOE_i) is controlled for as a dummy variable and coded one [1] if IPO firm *i* is controlled by the State, otherwise it is coded zero [0].

4.6.1.3 Underwriters' and auditors' reputation

The underwriters' reputation has often been found to be negatively related to the level of IPO underpricing (Agathee et al., 2012; Vong & Trigueiros, 2010; Coakley et al., 2009; Carter, 1990). Carter et al. (1998) found that firms choosing underwriters with higher prestige to handle their listing always showed less underpricing, and the long-term returns were less affected as well. The reason is the good quality underwriters with high reputation tended to price IPOs to maximize

future business rather than the current fees from the offering, while low quality underwriters set the offer price to maximize the total cash flows in the 'one off' IPOs (Chua, 2014). Contrary to prior literature, Su and Bangassa (2011a) found little influence of underwriters' reputation on the degree of IPO underpricing in the PRC. In line with prior studies (Su & Bangassa, 2011a), the top-ten underwriters[40] in the PRC are identified according to the percentage of market shares[41] in this thesis. A dummy variable denoted UW_i[42] is incorporated in the underpricing regression models. If the IPO firm *i* employs one of the top-ten underwriters, it is coded one [1] for UW_i, otherwise it is scored zero [0].

Besides underwriters, auditors also have had an important influence on the level of IPO underpricing (Chen et al., 2001; Beatty, 1989). As found by Firth and Liau-Tan (1998), an IPO signaled key information to market participants about the IPO's value by engaging an auditor of high reputation, thereby reducing ex ante uncertainty and underpricing. Albring et al. (2007) also found that auditor quality was an important factor that negatively influenced the IPO underpricing level. Top-ten[43] auditors are employed in this thesis to represent reputation and prestige of auditors in the PRC (CICPA, 2012). A dummy variable denoted AD_i[44] is constructed with AD_i coded one [1] if the IPO firm *i* is audited by one the top-ten auditors, or it is coded zero [0].

4.6.2 Control variables for post-issue stock performance

To control other factors that might influence the post-issue stock performance, some control variables are included in the regression models to test H_2, H_{2a} and H_{2b}. The control variables for post-issue stock performance are classified into three categories: market characteristics, firm characteristics and other factors.

[40] Top-ten underwriters: Citic Securities, China International Capital Corporation, BOCI Securities, Guotai Junan Securities, UBS China, China Galaxy Securities Company Limited, Haitong Securities and, GF Securities, Guosen Securities and Cinda Securities Co., Ltd (Su & Bangassa, 2011a).
[41] The market share is determined by the ratio of the total gross proceeds raised by the underwriter to the total gross proceeds raised in the market over the period 2001 to 2008.
[42] 464 IPO firms in the sample data were underwritten by 63 investment banks. Around 24% of 464 IPO firms were underwritten by top-ten underwriters as shown in descriptive analysis in Chapter 5.
[43] Top-ten auditors: PwC Zhongtian, Deloitte Huayong, EY Huaming, KPMG Huazhen, Lixin, Zhong Rui Yue Hua, Tianjian, Xin Yong Zhong He, Guo Fu Hao Hua and Da Hua. This list is mainly based on the annual audit revenue and was surveyed by the Chinese Institute of Certified Public Accountants (CICPA) in the PRC (CICPA, 2012).
[44] 464 IPO firms in the sample data were audited by 88 auditing firms. Around 27% of 464 IPO firms were underwritten by top-ten auditors as shown in descriptive analysis in Chapter 5.

4.6.2.1 Market characteristics

The first market factor affecting post-issue stock returns is the market index return. Shen et al. (2014) and Teoh, Welch et al. (1998a) found a positive relationship between three-year *BHARs* and contemporaneous three-year buy-and-hold market index return from the exchange that listed the IPO. Thus, following these studies (e.g. Shen et al., 2014; Teoh, Welch et al., 1998a), the contemporaneous 36-month value-weighted buy-and-hold market index return (denoted $MktRet_i$) is included as a control variable in the post-issue stock performance regression models to control for the market impact on the stock price.

$$MktRet_i = \prod_{t=1}^{T}\left(1+r_{m,\,t}\right) - 1 \qquad [27]$$

Where:
$MktRet_i$ = Contemporaneous 36-month value-weighted buy-and-hold market index return of the SME board;
$r_{m,t}$ = monthly return of the composite market index of the SME board in the event month *t*; and
T = 36 months.

In addition, it has been found in previous studies that an IPO firms' initial price also influenced the subsequent stock price in the long term. Shen et al. (2014) documented that underpricing had a significant and negative influence on post-issue stock performance in the PRC. This finding is consistent with prior studies (Chorruk & Worthington, 2010; Chi & Padgett, 2005b; Kim et al., 1995). Hence, in this study the initial raw returns or underpricing (denoted UP_i) are incorporated as a control variable in the regression models to test post-issue stock performance.

Moreover, the timing of the IPO has also had an impact on post-issue stock performance (Shen et al., 2014; Teoh, Welch et al., 1998a). Therefore, the listing year denoted $Year_i$ is controlled for in the post-issue stock performance regression models for this thesis. $Year_i$ is measured as a dummy variable coded one [1] if the IPO of firm *i* is conducted in a certain year; otherwise it is zero [0]. Moreover, in this study the influence of GFC denoted $FinCrisis_i$ is also controlled for in the post-issue stock performance regression models. $FinCrisis_i$ is coded as a dummy variable equal to one [1] if the IPO firm *i* is listed after 2007, otherwise it is equal to zero [0].

4.6.2.2 Firm characteristics

According to previous studies (e.g. X. Chang et al., 2010; Chen et al., 2010; Gompers & Lerner, 2003), firm characteristics such as liquidity, leverage, *B/M* ratio, issue size, *P/E* ratio, ownership structure, change of net income and industry, have also been found to affect post-issue stock performance.

Liquidity and leverage

Firstly, liquidity and post-IPO leverage have both shown influences on IPO long-term stock performance (Chen et al., 2010; Eckbo & Norli, 2005). IPO firms with low liquidity or high leverage ratio have indicated high risk exposure, which were frequently associated with long-term underperformance (Chen et al., 2010; Eckbo & Norli, 2005). Therefore, consistent with this literature, liquidity (denoted Liq_i) and post-IPO leverage ($PostLev_i$) are both controlled for in the post-issue stock performance regression models for this study. The two variables are measured as follows:

$$Liq_i = Vol_i / Number\ of\ shares \quad [28]$$

Where:
Liq_i = Liquidity of IPO firm *i* on the first trading day;
Vol_i = trade volume of IPO firm *i* on the first trading day; and
Number of shares = number of shares outstanding on the first trading day.

$$PostLev_i = PostLiabilities_i / PostAssets_i \quad [29]$$

Where:
$PostLev_i$ = Leverage of IPO firm *i* at the end of the IPO year;
$PostLiabilities_i$ = book value of total liabilities (including short- and long-term) of IPO firm *i* at the end of IPO year; and
$PostAssets_i$ = book value of total assets (including short- and long-term) of IPO firm *i* at the end of IPO year.

Book-to-market ratio

In addition, underperformance was found to primarily take place in firms with low book-to-market ratio (Gompers & Lerner, 2003; Brav et al., 2000; Teoh, Welch et al., 1998a). Hence book-to-market ratio (denoted B/M_i) at the end of the issue year is included in this thesis as a control variable in the post-issue stock performance regression models.

$$B/M_i = Book\ value_i / Market\ value_i \quad [30]$$

Where:
B/M_i = Book-to-market ratio of IPO firm *i* at the end of the IPO year;
$Book\ value_i$ = book value of IPO firm *i* at the end of the IPO year; and

Market value$_i$ = market value of IPO firm *i* at the end of the IPO year.

P/E ratio

Moreover, *P/E* ratio was also found to be negatively related to IPO post-issue stock returns. X. Chang et al. (2010) concluded that IPOs in the PRC were mispriced in the aftermarket and the misevaluation was corrected in the long term. The significant and negative relationship between *P/E* ratio and post-issue stock performance has also been supported by other scholars (e.g. Chan et al., 2004). Following Chan et al. (2004), *P/E* ratio is defined for this study as the market price per share divided by earnings per share at the time of the offering, and the natural logarithm of the *P/E* ratio (denoted *Ln(P/E)*$_i$) is controlled for in the post-issue stock performance regression models. The formula is expressed as follows:

$$Ln(P/E)_i = Ln(Market\ price\ per\ share_i / Earnings\ per\ share_i) \quad [31]$$

Where:
Ln(P/E)$_i$ = Natural logarithm of *P/E* ratio of IPO firm *i* at the time of offering;
Market price per share$_i$ = market price per share of the IPO firm *i* at the time of offering; and
Earnings per share$_i$ = earnings per share of the IPO firm *i* at the time of offering.

Size

Furthermore, some scholars found that smaller issuers were more likely to experience long-term underperformance than larger issuers (e.g. Gregory et al., 2010; Drobetz et al., 2005; Brav et al., 2000). This phenomenon may be interpreted as small stocks tending to be mispriced more than large stocks due to asymmetric information and inherent risks. However, Allen et al. (1999) argued that smaller issuers tended to perform better than larger issuers. To control for the impact of issue size in the post-issue stock performance, *IssueSize*$_i$ is used based on the prior literature (Su & Bangassa, 2011a; Allen et al., 1999) in this thesis. The method to measure *IssueSize*$_i$ is the same as that presented in *Formula 25*.

Operating performance

Apart from the influencing factors mentioned above, an IPO firm's stock performance has been found to be related to its operating performance. For example, asset-scaled changes in net income were found to be positively related to long-term stock performance (Shen et al., 2014). Therefore, in line with this finding, the operating performance is measured as the change of net income scaled by beginning

total assets (denoted ΔNI_i), and is included as a control variable in the post-issue stock performance regression models.

$$\Delta NI_i = \Delta\ Net\ Income_{i,t} / TA_{i,\ t-1} \quad [32]$$

Where:

ΔNI_i = Change of net income scaled by beginning total assets of IPO firm *i* in the IPO year;
Δ *Net Income*$_i$ = change of net income of the IPO firm *i* in the IPO year;
$TA_{i,t-1}$ = total assets of IPO firm *i* at the end of the IPO year *t-1*; and
t = the IPO fiscal year.

Ownership structure and industry

Another factor found to affect post-issue stock performance is firm's ownership structure. Liu et al. (2012) found that politically connected IPO firms in the PRC (e.g. SEOs) were likely to have better long-term stock performance by gaining support from the government. For instance, politically connected firms tended to receive preferential treatment and often operated as protected industries. Therefore, in this study the ownership structure (denoted SOE_i) of the IPO firm is taken into account when analyzing post-issue stock performance and controlled for as a dummy variable. It is coded one [1] if IPO firm *i* is controlled by the State, otherwise it is coded zero [0]. Meanwhile, industry has also been an important element influencing post-issue stock performance (Teoh, Welch et al., 1998a). Hence sample firms' industry classification (denoted Ind_i) is also controlled for in this thesis. The industry is classified into 12 sectors according to the CSRC classification. Therefore, 12 dummy variables are created, where an IPO firm is coded one [1] if IPO firm *i* belongs to an industry, otherwise it is coded zero [0].

4.6.2.3 Other factors

Moreover, underwriters' reputation has frequently been found to have a positive relationship with post-issue stock performance, because reputable underwriters mitigate information asymmetry in IPO pricing (Dong et al., 2011; Su & Bangassa, 2011a; S. C. Chang et al., 2010). Therefore, underwriters' reputation (denoted UW_i) is controlled for in this study as a dummy variable in the post-issue stock performance regression models. If the IPO firm *i* employs one of the top-ten underwriters, it is coded one [1] for UW_i, otherwise it is scored zero [0].

4.7 Summary of variables

In conclusion, the measurement of the dependent, independent and control variables are defined in Table 4.6 as follows. All control variables are categorized into two panels (Panel A and Panel B) based on the underpricing and the post-issue stock performance regression models.

Table 4.6 Summary of measures of all variables in the thesis

Variable title	Variable description	Prediction
Dependent variables		
UP_i	The difference between the closing price on the first day of trading and the initial offer price for IPO firm *i*, expressed as a percentage of the initial offer price	N/A
$BHAR_i$	36-month buy-and-hold abnormal return for IPO firm *i* commencing the fourth month after the fiscal-year end of the IPO year	N/A
Independent variables		
$DTAcc_i$	Total discretionary accruals of IPO firm *i* in the fiscal year prior to the IPO	+ in Panel A - in Panel B
$DCAcc_i$	Current discretionary accruals of IPO firm *i* in the fiscal year prior to the IPO	+ in Panel A - in Panel B
$DLAcc_i$	Long-term discretionary accruals of IPO firm *i* in the fiscal year prior to the IPO	+ in Panel A - in Panel B
Control variables		
Panel A: Underpricing		
AD_i	Dummy variable coded one [1] if an IPO firm *i* is audited by one of the top-ten auditors in the PRC; otherwise zero [0]	-
UW_i	Dummy variable coded one [1] if the IPO firm *i* is underwritten by one of the top-ten underwriters in the PRC; otherwise zero [0]	-
$IMkt_i$	Return on the SME board composite market index during the period between offering and listing date of IPO firm *i*	+
$PreLev_i$	The book value of total debts (including short- and long-term) of IPO firm *i* divided by the book value of total assets(including short- and long-term) at the beginning of the IPO year	?
Lag_i	The number of days between the issue date and the listing date of IPO firm *i* divided by 365	+
$IssueSize_i$	Natural logarithm of gross proceeds raised in IPO by firm *i* in million RMB	-
Age_i	Log (1+IPO firm *i*'s age at the time of offering)	-
Ind_i	Dummy variables coded one [1] if IPO firm *i* belongs to an industry; otherwise zero [0]	N/A
SOE_i	Dummy variable coded one [1] if IPO firm *i* is controlled by the State; otherwise zero [0]	+

(Continued on next page)

Table 4.6 Summary of measures of all variables (continued)

Variable title	Variable description	Prediction
$FinCrisis_i$	Dummy variable coded one [1] if the IPO firm *i* is listed after 2007, otherwise zero [0]	-
$Year_i$	Dummy variables coded one [1] if the IPO of firm *i* is conducted in a certain year; otherwise zero [0]	N/A
Panel B: Post-issue stock performance		
Liq_i	Volume traded by IPO firm *i* divided by number of shares outstanding on the first trading day	+
$PostLev_i$	The book value of total debts (including short- and long-term) of IPO firm *i* divided by the book value of total assets (including short- and long-term) at the end of the IPO year	-
B/M_i	Book value of IPO firm *i* divided by market value of IPO firm *i* at the end of the IPO year	+
$IssueSize_i$	Natural logarithm of gross proceeds raised in IPO by firm *i* in million RMB	?
UP_i	The difference between the closing price on the first day of trading and the initial offer price for IPO firm *i*, expressed as a percentage of the initial offer price	-
UW_i	Dummy variable coded one [1] if the IPO firm *i* is underwritten by one of the top-ten underwriters in the PRC; otherwise zero [0]	+
$Ln(P/E)_i$	Natural logarithm of market price per share divided by earnings per share of IPO firm *i* at the time of offering	-
SOE_i	Dummy variable coded one [1] if IPO firm *i* is controlled by the State; otherwise zero [0]	+
ΔNI_i	Change of net income divided by beginning total assets of IPO firm *i* in the IPO year	+
$MktRet_i$	Contemporaneous 36-month value-weighted buy-and-hold market index return of the SME board	+
$FinCrisis_i$	Dummy variable coded one [1] if the IPO of firm *i* is listed after 2007, otherwise zero [0]	-
Ind_i	Dummy variables coded one [1] if IPO firm *i* belongs to an industry; otherwise zero [0]	N/A
$Year_i$	Dummy variables coded one [1] if the IPO of firm *i* is conducted in a certain year; otherwise zero [0]	N/A

4.8 Multiple regression models

Three main regression models (*Models 1, 2* and *3*) are therefore defined to test H_1, H_{1a} and H_{1b} respectively, as follows:

Model 1: $$UP_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i$$
$$+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$$

Model 2: $UP_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i$
$+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 3: $UP_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i$
$+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Legend:
See Table 4.6 for full definitions and descriptions for each variable.

Another three main regression models (*Models 4, 5* and *6*) concerning the association between discretionary accruals and post-issue stock performance are defined to test H_2, H_{2a} and H_{2b} respectively, as follows:

Model 4: $BHAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i$
$+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} FinCrisis_i+\gamma_{12} Ind_i$
$+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 5: $BHAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i$
$+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} FinCrisis_i+\gamma_{12} Ind_i$
$+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 6: $BHAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i$
$+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} FinCrisis_i+\gamma_{12} Ind_i$
$+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Legend:
See Table 4.6 for full definitions and descriptions for each variable.

4.9 Summary

In this chapter the various research method descriptions were provided for this thesis, including research methods to measure variables and models for statistical analysis. The final useable sample for this thesis was 464 IPO firms listed on the SZSE SME board.

The two dependent variables are underpricing and post-issue stock performance. Underpricing is measured as the initial raw returns and post-issue stock performance

is assessed by 36-month *BHARs*. Total, current and long-term discretionary accruals are employed as measures of earning management by using a cross-sectional modified Jones (1991) model. In line with previous research, xxxxcontrol variables are included in the regression analysis to control for compounding influences of cross-sectional factors. Finally, the OLS multiple regression models testing six hypotheses were illustrated.

In the next chapter the empirical results on the hypotheses are presented.

Chapter 5: Empirical results

5.1 Introduction

In this chapter empirical evidence on the hypotheses presented in Chapter 3 are reported. The first section focuses on demographic characteristics of the sample firms. The second section depicts the descriptive analysis of variables (dependent, independent and control variables) in the regression models. The following two sections provide the correlations between variables and univariate analysis. In the fifth section the results of multivariate analyses are reported. And in the final section a range of robustness checks are conducted to test the main results.

5.2 IPO firms' demographic characteristics

Table 5.1 illustrates the sample distribution for IPO year, industry, and listing age.

Table 5.1 Distribution of the full sample on IPO year, industry and listing age

	Number	Percentage
Panel A: IPO year distribution		
2006	51	10.99%
2007	96	20.69%
2008	67	14.44%
2009	53	11.42%
2010	197	42.46%
Panel B: Industry distribution		
Agriculture	11	2.37%
Mining	4	0.86%
Manufacturing	352	75.86%
Utilities	2	0.43%
Construction	12	2.59%
Transportation	3	0.65%
Information Technology	46	9.91%
Wholesale and Retail	12	2.59%
Real Estate	6	1.29%
Social Services	12	2.59%
Media	2	0.43%
Conglomerate	2	0.43%
Panel C: Listing age distribution (Year)		
0-5 (including 5)	171	36.85%
5-10 (including 10)	210	45.26%
10-15 (including 15)	57	12.28%
15-20 (including 20)	25	5.39%
Above 20	1	0.22%
Total	**464**	**100%**

Table 5.1, Panel A shows the yearly distribution of the sample. The IPO firms were unevenly distributed across the sample period. Among the 464 firms that listed on the SME board over the period from 2006 to 2010, only 10.99% of sample firms (51 firms) conducted IPOs in 2006 due to a moratorium imposed by the PRC on IPOs in the first half year. The number of IPO firms increased from 2006 to 2007, with 96 firms engaged in IPOs in 2007, which represent 20.69% of the full sample. In 2008 and 2009, the number of IPO firms decreased to 67 and 53 respectively. Then 2010 was the highest volume year with 197 firms issuing new shares, representing 42.46% of sample firms. This distribution indicates that the PRC capital market started to recover from the global financial crisis (GFC) and an increase in the pace of the SME IPO approval process.

Table 5.1, Panel B presents the distribution of IPO firms across various industries. Of the 464 firms, it is hardly surprising that manufacturing firms dominated the SME board, followed by information technology firms (Asian Development Bank, 2014). Manufacturing firms accounted for around 75.86% of the full sample, with information technology representing 9.91% of sample firms, which was an emerging trend. In contrast, the lowest number of sample firms was from utilities, media, and conglomerate industries, accounting for only 0.43% of the full sample. Interestingly, the sample firms' industry constituent was similar to that on the main boards (Liu et al., 2014a; Shen et al., 2014).

Table 5.1, Panel C provides the listing age distribution of the full sample. IPO firms listing on the SME board were relatively young. More than 80% of sample firms had a short history of less than ten years and 36.85% of this sample was established for less than five years. Among all sample firms, only one firm had been trading for more than twenty years. The age distribution reflects the original intention of the SME board: to provide direct equity financing channels for young emerging firms with strong growth potentials.

As specified by the CSRC, most SMEs listing on the SME board are small terms of in the issuing volume and size (CSRC, 2013). To provide an overview of issuance of

SMEs, some issuing characteristics of sample firms, including issuing volume (Panel A) and gross proceeds (Panel B), are presented in Table 5.2.

Table 5.2 Distribution of the full sample on issuing volume and gross proceeds

	Number	Percentage
Panel A: Issuing volume (Millions shares)		
0-20 (including 20)	105	22.63%
20-40 (including 40)	229	49.35%
40-60 (including 60)	77	16.59%
60-80 (including 80)	40	8.62%
80-100 (including 100)	13	2.80%
Panel B: Gross proceeds (Million RMB)		
0-500 (including 500)	221	47.63%
500-1,000 (including 1000)	157	33.84%
1,000-1,500 (including 1500)	55	11.85%
1,500-2,000 (including 2000)	17	3.66%
Above 2,000	14	3.02%
Total	**464**	**100%**

Table 5.2, Panel A shows the distribution of sample firms based on the issuing volume. Around half of sample firms (229 firms) issued 20 to 40 million shares in their first attempt to raise funds from the capital market. Most of the sample firms (around 90%) issued less than 60 million new shares. Only 13 firms issued more than 80 million new shares, whereas none of sample firms issued over 100 million new shares. Small issuing volumes distinguishes SMEs from large firms listing on the main boards.

Panel B of Table 5.2 shows the distribution of IPOs based on the gross proceeds. The small-size firms with gross proceeds of less than RMB 500 million represented 47.63% of the sample (221 firms). Large-size firms with gross proceeds of more than RMB 2,000 million represented only 3.02% of the sample (14 firms). Most of the sample firms (around 80%) raised gross proceeds of less than RMB 1,000 million.

5.3 Descriptive statistics

This section is composed of four sub-sections. The first sub-section provides descriptive statistics for underpricing (UP_i). The second sub-section presents descriptive statistics for post-issue stock performance ($BHAR_i$). In the third sub-section, the time-series profile is provided which compares the changes of all accruals and operating performance of the sample from the IPO year -2 to +2. Then

the descriptive statistics of total, current and long-term discretionary accruals in the fiscal year prior to the IPO (independent variables) are analyzed. The fourth sub-section presents descriptive statistics for the main variables.

5.3.1 Underpricing

Table 5.3 presents descriptive statistics for underpricing for the full sample of 464 IPOs. Underpricing statistics are presented in Panel A by IPO year and in Panel B by industry types.

Table 5.3 Descriptive statistics of underpricing (464 IPOs)

	N	Mean	Min.	Med.	Max.	St. Dev.
Total	**464**	**96.71%**	**-7.55%**	**67.07%**	**538.12%**	**95.21%**
Panel A: IPO year distribution						
2006	51	91.92%	24.47%	86.38%	345.71%	49.99%
2007	96	207.15%	51.02%	184.40%	538.12%	112.06%
2008	67	120.20%	7.66%	85.01%	403.54%	92.45%
2009	53	65.28%	23.22%	54.38%	206.93%	35.64%
2010	197	44.60%	-7.55%	30.09%	275.33%	48.07%
Panel B: Industry distribution						
A Agriculture	11	90.20%	20.79%	72.20%	211.97%	62.13%
B Mining	4	171.62%	12.91%	122.79%	428.00%	182.43
C Manufacturing	352	95.94%	-7.55%	65.07%	538.12%	97.72%
D Utilities	2	29.21%	7.33%	29.21%	51.09%	30.94%
E Construction	12	79.41%	15.53%	52.10%	193.74%	60.42%
F Transportation	3	35.02%	27.63%	33.60%	43.84%	8.20%
G Information Technology	46	93.67%	-2.44%	71.52%	345.71%	80.95%
H Wholesale and Retail	12	94.02%	-3.06%	76.08%	233.05%	77.62%
J Real Estate	6	96.05%	19.65%	73.98%	292.88%	99.40%
K Social Services	12	151.68%	3.39%	130.05%	380.81%	115.96%
L Media	2	183.19%	159.31%	183.19%	207.08%	33.77%
M Conglomerate	2	52.73%	9.80%	52.73%	95.66%	60.71%

As shown in Table 5.3, the mean (median) value of IPO underpricing was 96.71% (67.07%) for firms listed on the SZSE SME board from 2006 to 2010, which was much higher than the average initial returns of 27% in the international markets (Loughran et al., 1994), but lower than firms listing on the main boards in the PRC[45] (Liu et al., 2014b; Shen et al., 2014; Lin & Tian, 2012). For the full sample, the

[45] Prior studies reported extremely high level of underpricing in PRC IPOs. For instance, Liu et al. (2014b) found IPO firms in the PRC listed between 1997 and 2009 had an average underpricing level of 123.02%. Shen et al. (2014) noted the average underpricing level of PRC IPO firms listed between 1998 and 2003 was 129.23%, while Lin and Tian (2012) reported the average underpricing level of IPO firms listed from 2001 to 2009 was 110.90% in the PRC.

lowest UP_i was -7.55%, while the highest UP_i was 538.12%, and the standard deviation was 95.21%.

Table 5.3, Panel A shows that annual averages of UP_i were all positive and the level of underpricing varied during the sample period. A breakdown of the sample firms by year indicates that the SME IPO underpricing experienced two stages. From 2006 to 2007, the mean value of underpricing increased dramatically from 91.92% to 207.15%. The extremely high level of underpricing in 2007 appeared to coincide with the bull market in the PRC, showing the highest individual IPO firm's UP_i reached 538.12%, and even the lowest one was still 51.02%. However, after 2007, the mean value of underpricing declined steadily from 207.15% in 2007 to 44.60% in 2010. In 2010, the maximum and minimum values of IPO underpricing decreased to 275.33% and -7.55% respectively. The decreasing trend of underpricing from 2007 to 2010 may be partly explained by the GFC that peaked in 2008.

Table 5.3, Panel B divides sample firms into different industry groups as specified by the CSRC. Sample firms from all industries were underpriced on average. IPO firms from the mining, social services and media industries had extremely high levels of underpricing, with average initial raw returns greater than 150%. In contrast, firms from the utilities industries had the lowest mean value of underpricing at 29.21%. In line with firms listing on the main boards, the vast majority of sample firms were from the manufacturing industry, with the average UP_i at 95.94%. The IPO firms with the maximum (538.12%) and minimum (-7.55%) underpricing were both from the manufacturing industry. For firms from the second biggest industry (i.e. information technology), the mean value of underpricing was 93.67%. Panel B of Table 5.3 indicates that IPO firms from most industries (except the utilities and transportation industries) had an average UP_i of more than 50%.

5.3.2 Post-issue stock performance

Table 5.4 reports the descriptive statistics of post-issue stock performance measured by 36-month $BHAR_i$. The statistics of $BHAR_i$ are presented in Panel A by IPO year and in Panel B by industry types.

Table 5.4 Descriptive statistics of $BHAR_i$ (262 IPOs)

	N	Mean	Min.	Med.	Max.	St. Dev.
Total	**262**	**3.12%**	**-127.60%**[46]	**-13.87%**	**249.16%**	**69.27%**
Panel A: IPO year distribution						
2006	51	-8.79%	-119.35%	-35.90%	168.94%	77.89%
2007	95	14.89%	-127.60%	-2.55%	249.16%	79.88%
2008	63	3.81%	-74.96%	-8.38%	220.72%	59.57%
2009	53	-7.33%	-17.59%	-17.59%	205.74%	44.51%
Panel B: Industry distribution						
A Agriculture	6	-16.55%	-60.50%	-23.37%	52.47%	39.15%
B Mining	2	37.73%	30.86%	37.73%	44.60%	9.71%
C Manufacturing	192	2.69%	-127.60%	-15.07%	249.16%	71.47%
D Utilities	1	-18.39%	-18.39%	-18.39%	-18.39%	N/A
E Construction	5	60.27%	-36.97%	66.16%	205.74%	87.17%
F Transportation	1	-37.11%	-37.11%	-37.11%	-37.11%	N/A
G Information Technology	27	8.60%	-62.66%	-8.83%	168.94%	64.88%
H Wholesale and Retail	8	16.31%	-72.77%	7.17%	127.71%	61.96%
J Real Estate	6	-36.77%	-103.50%	-20.27%	1.89%	41.47%
K Social Services	8	-17.17%	-94.58%	-22.78%	65.46%	49.21%
L Media	2	-25.25%	-46.94%	-25.25%	-3.55%	30.68%
M Conglomerate	1	-55.85%	-55.85%	-55.85%	-55.85%	N/A

As shown in Table 5.4, the mean and median values of 36-month $BHAR_i$ were 3.12% and -13.87% respectively, indicating small over-performance compared with the SME board composite market index on average. The minimum and maximum values of $BHAR_i$ were -127.60% and 249.16% respectively, and the standard deviation was 69.27% for 262 IPOs. This result differs from previous findings of underperformance in the US (Teoh, Welch et al., 1998a), France (Chahine, 2004) and Australia (Dimovski & Brooks, 2004), but is similar to over-performance reported in Thailand (Allen et al., 1999), Korea (Kim et al., 1995) and Taiwan (Chen et al., 2010). The over-performance of SME IPOs was also consistent with prior studies in the PRC, with empirical evidence of long-term positive IPO returns of firms listed on the main boards (e.g. Chi et al., 2010; Bai & Zhang, 2004).

Consistent with Ritter (1991), the post-issue stock performance of IPO firms varied substantially year by year, as indicated in Panel A of Table 5.4. Firms engaging in

[46] The post-issue stock performance of IPOs in this thesis is adjusted by market index and calculated following *Formula 7* ($BHAR_i = \left[\prod_{t=1}^{T}(1+r_{i,t})-1\right]-\left[\prod_{t=1}^{T}(1+r_{m,t})-1\right]$). For example, if the stock price goes to zero, than the return in the first part of the equation is zero. After adjustment for the market, it is possible that the overall return to be negative.

IPOs in 2006 and 2009 experienced long-term underperformance, with negative average $BHAR_i$ of -8.79% and -7.33% respectively. In contrast, firms listed in 2007 and 2008 had positive average long-term returns of 14.89% and 3.81% respectively. Moreover, the highest average $BHAR_i$ (14.89%) was recorded in 2007, while the lowest average $BHAR_i$ (-8.79%) was observed in 2006.

The sample firms are also categorized into industry groups, as shown in Table 5.4, Panel B. Firms from the construction industry had the highest average $BHAR_i$ (60.27%), while firms from conglomerate industry experienced the worst stock performance on average (-55.85%). Furthermore, firms from mining, manufacturing, construction, information technology and wholesale and retail industries had a positive average $BHAR_i$. By contrast, firms from agriculture, utilities, transportation, real estate, social services, media and conglomerate industries experienced long-term underperformance on average. Most of the sample firms were from the manufacturing industry and the mean value of $BHAR_i$ was around 2.69%. In summary, the evidence in Table 5.4 suggests firms listed in different IPO years and industries exhibited sizeable variations in their post-issue stock performance.

Table 5.5 provides $BHAR_i$ and buy-and-hold return of IPO *i* (BHR_i) across 36 event months. BHR_i is the raw return of IPO *i* without adjustment of any benchmark. It measures the total return from a buy and hold strategy where a stock is purchased at the beginning of the fourth month after the end of the first fiscal year following each IPO until its 3-year anniversary.

Table 5.5 $BHAR_i$ and BHR_i across 36 event months (262 IPOs)

Month	Number	$BHAR_i$ (%)		BHR_i (%)	
		Mean	Med.	Mean	Med.
1	262	-1.79%	-3.16%	5.24%	5.16%
2	262	-3.97%	-6.21%	0.84%	-0.50%
3	262	-3.32%	-5.97%	-6.38%	-9.54%
4	262	-2.37%	-6.68%	5.79%	1.88%
5	262	-5.04%	-11.16%	-1.58%	-5.61%
6	262	-6.60%	-9.08%	-4.76%	-6.60%
7	262	-8.50%	-11.40%	-7.77%	-8.00%
8	262	-6.51%	-9.81%	-0.76%	-5.25%

(Continued on next page)

Table 5.5 $BHAR_i$ and BHR_i across 36 event months (continued)

Month	Number	$BHAR_i$ (%)		BHR_i (%)	
		Mean	Med.	Mean	Med.
9	262	-5.24%	-10.73%	9.61%	1.15%
10	262	-3.46%	-6.78%	10.96%	0.02%
11	262	-4.88%	-7.03%	14.99%	3.97%
12	262	-5.26%	-7.33%	12.17%	-0.47%
13	262	-5.54%	-11.77%	12.90%	-0.67%
14	262	-4.72%	-11.03%	10.78%	-1.13%
15	262	-4.99%	-12.32%	6.07%	-5.15%
16	262	-4.23%	-12.18%	15.10%	2.20%
17	262	-3.78%	-10.63%	11.40%	-2.92%
18	262	-3.91%	-13.77%	11.46%	-3.14%
19	262	-4.12%	-15.00%	17.13%	2.49%
20	262	-1.80%	-13.97%	25.65%	7.57%
21	262	-1.93%	-13.13%	23.15%	6.19%
22	262	-2.21%	-14.22%	22.32%	10.75%
23	262	-0.92%	-11.75%	31.28%	19.87%
24	262	-0.45%	-13.83%	33.39%	23.34%
25	262	-0.97%	-14.45%	32.59%	24.06%
26	262	-1.50%	-15.82%	26.24%	15.61%
27	262	-1.76%	-15.05%	27.19%	12.63%
28	262	-0.17%	-17.14%	33.31%	19.59%
29	262	0.74%	-14.46%	35.50%	24.51%
30	262	0.68%	-17.36%	36.59%	25.24%
31	262	0.48%	-18.30%	43.29%	25.76%
32	262	0.76%	-15.84%	43.88%	26.06%
33	262	1.18%	-19.34%	39.54%	20.26%
34	262	1.35%	-17.50%	38.08%	21.28%
35	262	3.14%	-19.53%	47.39%	28.52%
36	262	3.12%	-13.87%	45.91%	30.76%

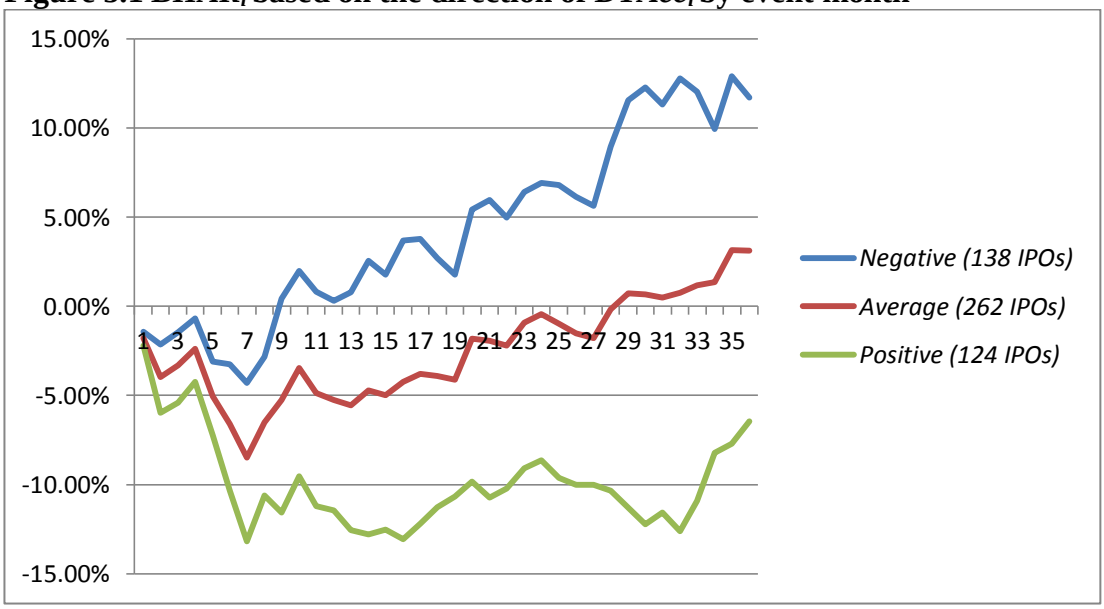
Legend:
$BHR_i=\prod_{t=1}^{T}(1+r_{i,t})-1$, $r_{i,t}$ is monthly return of the IPO stock i in the event month t.

Table 5.5 reports the mean and median values of $BHAR_i$ and BHR_i for 1-36 months after listing. The results show negative mean values of $BHAR_i$ in the first 28 months, which indicates the SME IPOs underperformed the market on average in the first 28 months. However, the median values of $BHAR_i$ were negative across the 36-month observation period. The mean $BHAR_i$ fell its value a lowest of -8.50% in Month 7, and then climbed gradually to be close to zero in Month 20. In the long term, however, the performance of SME IPOs exhibited different characteristics. The results presented from Month 29 show that average $BHAR_i$s were greater than the market index of the SME board. For example, the average $BHAR_i$s relative to the market index were 0.74% in Month 29 and 3.12% in Month 36. In Month 35, the

mean value of $BHAR_i$ reached the highest point at 3.14%, whereas the median $BHAR_i$ dropped to its bottom of -19.53%. The trend of the BHR_i followed a similar pattern with $BHAR_i$, but moved more dramatically. The average BHR_is hovered above zero in most months except Months 3, 5, 6, 7 and 8. The lowest mean value of BHR_i was detected in Month 7 (-7.77%), whereas the highest mean value was found in Month 35 (47.39%). The median values of BHR_i ranged from -9.54% in Month 3 to 30.76% in Month 36.

As stated in previous literature, incentives for earnings management had influence on long-term stock price (Teoh, Welch et al., 1998a). It is found that IPO firms engaged in income-increasing earnings management were accompanied with poor aftermarket stock performance in the long term (Chahine et al., 2012; Roosenboom et al., 2003). Figure 5.1 plots the time series distribution of $BHAR_i$s across a 36-month observation period. Since the focus of this thesis is on accruals, the full sample (262 IPO firms) is also partitioned into positive and negative groups based on the directional signs (positive and negative) on $DTAcc_i$ to find out the influence of different incentives of pre-IPO earnings management on post-issuer stock performance of SMEs. The $BHAR_i$s for the two groups are illustrated in the blue and green lines respectively.

Figure 5.1 $BHAR_i$ based on the direction of $DTAcc_i$ by event month



The line in the middle shows the average trend of $BHAR_i$s for 262 IPO firms across the 36-month observation period. As indicated in Figure 5.1, in the first seven months, the average $BHAR_i$s showed a decreasing trend and hit the lowest point in

Month 7. From then on, the average $BHAR_i$s began to rise steadily. In Month 24, it climbed close to zero, but dropped again in Months 25 and 26. On average, 262 IPO firms underperformed the market before Month 28. After Month 28, the average $BHAR_i$s showed a strong growth trend and attained around 3.12% at the end of Month 36. The trend in Figure 5.1 suggests that if investors held the 262 SME IPOs portfolio for over 28 months, they would have gained positive returns on average.

It can be inferred from the trend of $BHAR_i$ that various investors generate different returns depending on the occasion they entering the market. For investors allocated IPO share at the offering price, they have a high chance to make huge profits by selling it quickly owing to the pricing gap of IPOs. For investors entering the market shortly after the listing date at high price, it is possible they will never earn positive returns due to the inflated initial price. However, if investors purchase the stock after Month 7 as shown in Figure 5.1, they are rewarded considerable returns due to recovering performance of IPOs.

Recent domestic studies with the PRC have reported that IPOs in the PRC on main boards have had mild underperformance (Shen et al., 2014; Chan et al., 2004). However, SME IPOs in this study seem to have had a different pattern with a small long-term over-performance. This is in line with previous findings that smaller issuers have tended to perform better than larger issuers in the long term (Allen et al., 1999). The increasing trend of post-issue stock returns of SME IPOs may also be attributed to the expected growth potential of SMEs in the PRC and investors' enthusiasm for new market evaluation.

Figure 5.1 also shows the behavior of $BHAR_i$s based on whether pre-IPO earnings were managed upwards or downwards. All sample firms were divided into two groups based on the direction of $DTAcc_i$. Of the 262 IPOs, 124 firms had positive $DTAcc_i$ and 138 firms had negative $DTAcc_i$, which indicates that less than half of the IPO firms manipulated their earnings upwards by using income-increasing discretionary accruals. As a result, the trend in $BHAR_i$s over the time period for the two groups was rather different. The $BHAR_i$s of sample firms with negative $DTAcc_i$ climbed above zero in Month 9 and stayed positive in the remaining observation

period. The group of firms with positive $DTAcc_i$ had negative average $BHAR_i$s throughout the 36-month observation period. Furthermore, firms that employed income-increasing earnings management in the pre-IPO period underperformed the SME market by about 6.45% at the end of the observation period, whereas firms that adopted income-decreasing earnings management over-performed the SME market by around 11.72% at the end of Month 36. Those two results suggest that IPO firms with aggressive income-increasing earnings management underperformed in the long term.

5.3.3 Earnings management

Consistent with the main hypotheses, the aim of this thesis was to test the relationship between pre-IPO earnings management and IPO stock performance. Therefore, the key independent variables were total, current and long-term discretionary accruals one year prior to the IPO. To calculate those accruals, as described in Chapter 4, an estimation portfolio comprising size and industry matched non-IPO firms was used to obtain estimated coefficients. Table 5.6 presents the distribution of size and industry matched non-IPO firms based on IPO year and five industry sectors[47].

Table 5.6 Distribution of size and industry matched non-IPO firms

Industry	2006	2007	2008	2009	2010	Total
ABDM	30	19	44	24	46	163
C	92	85	108	93	134	512
EFJ	20	24	31	17	32	124
G	29	23	19	19	19	109
HKL	47	28	40	22	17	154
Total	218	179	242	175	248	1,062

Legend:
Twelve major industry groups were combined into five industry sectors by applying the Global Industry Classification Standard (GICS) when measuring accruals:
ABDM = Others: agriculture, mining, utilities and conglomerate;
C = Manufacturing;
EFJ = Industrials: construction, transportation and real estate;
G = Information technology; and
HKL = Consumer service: wholesale and retail, social services and media.

The estimation portfolio consisted of 1,062 size (e.g. by capital marketization) and industry matched non-IPO firms that had sufficient data to calculate accruals. Due to

[47] The five industry sectors were only applied in the estimation process of independent variables (total, current and long-term discretionary accruals). The regression models testing main hypotheses adopted the twelve industries specified by the CSRC.

time and size limitation, twelve major industries were combined into five sectors when testing discretionary accruals, as described in Chapter 4. The number of non-IPO firms in each industry sector in the corresponding year was more than 10 to ensure the accuracy of estimation.

In this thesis, discretionary accruals are used as the proxy for earnings management. Table 5.7 provides a time-series profile of asset-scaled accruals in percentages as well as operating performance of IPO firms from the IPO year -2 to +2.

Table 5.7 Time-series profile of asset-scaled accruals in percentages and operating performance from the IPO year -2 to +2

Fiscal year	-2	-1	0	+1	+2
Panel A: Accruals					
Total discretionary accruals (DTAcc%)					
Mean	-5.70	2.79	13.55	6.02	4.38
Median	-5.90	2.31	10.00	5.21	3.81
Std. dev.	18.09	11.20	17.81	10.32	10.53
Minimum	-73.99	-22.55	-42.35	-42.84	-52.45
Maximum	94.23	56.72	120.70	49.39	49.29
N	464	464	464	464	464
Current discretionary accruals (DCAcc%)					
Mean	-15.83	7.40	22.47	0.03	-1.52
Median	-9.84	5.49	17.23	1.50	-0.23
Std. dev.	32.35	25.20	37.75	13.95	15.41
Minimum	-206.32	-57.20	-65.59	-61.63	-87.75
Maximum	72.43	281.27	344.91	48.92	53.18
N	464	464	464	464	464
Long-term discretionary accruals (DLAcc%)					
Mean	10.13	-4.61	-8.92	5.99	5.90
Median	6.19	-2.65	-5.71	3.46	3.93
Std. dev.	27.36	24.60	35.48	13.33	13.91
Minimum	-47.38	-278.01	-340.77	-66.59	-51.88
Maximum	176.90	58.70	106.99	65.24	63.62
N	464	464	464	464	464
Total non-discretionary accruals (NDTAcc%)					
Mean	5.61	-2.48	-4.32	-2.68	-3.13
Median	5.44	-2.44	-4.28	-2.87	-1.98
Std. dev.	16.23	8.24	6.89	4.27	5.28
Minimum	-105.80	-42.00	-55.45	-19.92	-22.09
Maximum	111.91	57.90	21.51	14.32	33.15
N	464	464	464	464	464
Current non-discretionary accruals (NDCAcc%)					
Mean	16.56	-2.08	0.72	1.74	1.92
Median	7.69	-1.49	-1.44	-0.07	1.85
Std. dev.	28.93	7.62	11.01	5.72	9.51
Minimum	-72.37	-63.05	-69.18	-20.97	-45.22
Maximum	243.87	27.88	51.94	34.33	90.93
N	464	464	464	464	464

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Table 5.7 Time-series profile of asset-scaled accruals in percentages and operating performance from the IPO year -2 to +2 (continued)

Fiscal year	-2	-1	0	+1	+2
Long-term non-discretionary accruals (NDLAcc%)					
Mean	-10.95	-0.40	-5.04	-4.42	-5.05
Median	-3.35	0.09	-4.48	-3.39	-4.47
Std. dev.	22.94	7.37	9.13	5.66	7.46
Minimum	-218.04	-40.63	-49.36	-23.12	-57.77
Maximum	42.12	43.38	36.84	17.58	41.70
N	464	464	464	464	464
Panel B: Operating performance					
Change of cash flows from operations scaled by lagged total assets (ΔCFO%)					
Mean	4.49	3.09	-6.64	1.43	1.73
Median	3.04	2.82	-4.25	0.75	1.78
Std. dev.	15.69	12.20	16.39	11.06	10.70
Minimum	-54.43	-50.33	-98.65	-47.73	-61.73
Maximum	128.91	54.53	52.27	65.48	60.98
N	464	464	464	464	464
Change of net income scaled by lagged total assets (ΔNI%)					
Mean	3.87	3.73	2.56	0.75	0.32
Median	2.43	2.51	1.67	0.70	0.35
Std. dev.	7.80	7.07	5.14	3.96	4.41
Minimum	-21.81	-15.85	-11.09	-25.42	-25.39
Maximum	101.04	111.87	29.67	30.51	18.18
N	464	464	464	464	464

Table 5.7, Panel A provides time-series trends of asset-scaled accruals for the IPO year. Specifically, it demonstrates the total, current and long-term discretionary and non-discretionary accruals of IPO firms from two years before to two years after the IPO. In theory, non-discretionary accruals reflect firm factors, whereas discretionary accruals are largely affected by the accounting policy choices (Jones, 1991). It is easily observed in this study that the mean values of both total and current discretionary accruals peaked in the year of issuance, and then fell dramatically after going public. In particular, the mean value of total (current) discretionary accruals climbed to 13.55% (22.47%) of lagged assets at the end of the IPO year and then fell sharply to 6.02% (0.03%) of lagged assets one year after the IPO. As shown in Table 5.7, both *DTAcc* and *DCAcc* climbed sharply from negative to positive from year -2 to year -1, and then decreased dramatically from the first year of listing. It is reasonable to speculate that SMEs in the PRC started managing earnings one year before the IPO by increasing discretionary accruals and then reversed those accruals after going public. In contrast, long-term discretionary accruals bottomed out in the IPO year (-8.92%), but then increased sharply after going public. These trends are consistent with prior findings in which long-term accruals were less subject to

earnings management because they were more visible compared with current accruals (Teoh, Welch et al., 1998b). In this thesis the highest current discretionary accruals of lagged assets (344.91%) were found at the end of the IPO year, whereas the lowest long-term discretionary accruals (-340.77%) appeared in the same year. Moreover, the mean and median values of both total and current non-discretionary accruals were negative one year prior to the IPO, which may have been partly caused by a large depreciation component (Teoh, Welch et al., 1998b).

On the other hand, in respect of cash flows and discretionary accruals, the results as indicated in Panel B of Table 5.7 show that the change of cash flows from operations did not vary synchronously with the change of discretionary accruals. The mean percentage of changes in cash flows from operations scaled by the beginning total assets bottomed out in the year of issuance (-6.64%) and then increased steadily after the year of listing. The change in cash flows from operations showed an opposite trend to the change in total and current discretionary accruals. However, consistent with the trend of total and current discretionary accruals, the percentage change of net income (scaled by beginning assets) remained at a relatively high level in the year of IPO (2.56%) and then decreased sharply one year after the IPO (0.75%). This trend indicates that in spite of the improvement of cash flows from operations after issuance, the downturn in post-issue discretionary accruals led to a net income declination after the IPO. To sum up, Panel B provides evidence that IPO firms' bottom line earnings around the IPO year were mainly driven by discretionary accruals instead of cash flows from operations. Overall, Table 5.7 indicates that income-increasing earnings management occured in pre-IPO periods in SMEs.

Table 5.8 provides the descriptive statistics of key discretionary accruals (in the IPO year -1) for the full sample in percentages.

Table 5.8 Descriptive statistics of discretionary accruals (in the IPO year -1)

	$DTAcc_i$ (%)	$DCAcc_i$ (%)	$DLAcc_i$ (%)
Mean	2.79	7.40	-4.61
Median	2.31	5.49	-2.65
Std. dev.	11.20	25.20	24.60
Minimum	-22.85	-57.20	-278.01
Maximum	56.72	281.27	58.70
Skew.	0.713	4.768	-5.369
Kurt.	1.773	40.852	47.109
N	464	464	464

As indicated in Table 5.8, the mean (median) value of total discretionary accruals in the fiscal year prior to the IPO was 2.79% (2.31%) of lagged total assets, while the mean (median) value of current discretionary accruals was even higher at 7.40% (5.49%) of lagged total assets. On average, the long-term discretionary accruals were -4.61% of lagged total assets. The positive mean value of total discretionary accruals indicates that SME issuers borrowed from the future to manipulate current earnings. All evidence shows that pre-IPO earnings manipulation was short-term oriented at the expense of long-term profits. In summary, pre-IPO earnings management in PRC SMEs was mainly driven by current discretionary accruals at the expense of long-term interests.

The minimum value of $DTAcc_i$ was -22.85%, while the maximum was 56.72%. The standard deviation of $DTAcc_i$ was relatively small (11.20%), representing a narrow spread. Moreover, the skewness value of the $DTAcc_i$ for the full sample was 0.713 which is close to zero and suggests that the dispersion of $DTAcc_i$ for the full sample was generally normally distributed. The minimum and maximum values of $DCAcc_i$ were -57.20% and 281.27%$_i$ respectively, whereas the minimum and maximum values of $DLAcc_i$ were -278.01% and 58.70% respectively.

5.3.4 Main variables

Table 5.9 provides descriptive statistics of the main variables included in the models for underpricing (Panel A) and post-issue stock performance (Panel B).

Table 5.9 Descriptive statistics of main variables

Variables	Mean	Med.	S.D.	Min	Max
Panel A: Main variables for underpricing (464 IPOs)					
$UP_i(\%)$	96.71	67.07	95.21	-7.55	538.12
$DTAcc_i(\%)$	2.79	2.31	11.20	-22.55	56.72
$DCAcc_i(\%)$	7.40	5.49	25.20	-57.20	281.27
$DLAcc_i(\%)$	-4.61	-2.65	24.60	-278.01	58.70
$IMkt_i(\%)$	0.73	0.87	6.86	-21.52	24.31
AD_i	0.270	0.000	0.443	0.000	1.000
UW_i	0.240	0.000	0.430	0.000	1.000
$PreLev_i$	0.510	0.528	0.151	0.093	0.943
Lag_i	0.037	0.036	0.011	0.022	0.112
$IssueSize_i$	2.707	2.717	0.318	1.956	3.773
Age_i	0.846	0.903	0.239	0.301	1.380
SOE_i	0.120	0.000	0.329	0.000	1.000
$FinCrisis_i$	0.680	1.000	0.466	0.000	1.000

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Table 5.9 Descriptive statistics of main variables (continued)

Variables	Mean	Med.	S.D.	Min	Max
Panel B: Main variables for post-issue stock performance (262 IPOs)					
$BHAR_i(\%)$	3.12	-13.87	69.27	-127.60	249.16
$DTAcc_i(\%)$	0.73	-0.62	10.97	-22.55	46.20
$DCAcc_i(\%)$	2.43	1.51	9.55	-57.20	139.97
$DLAcc_i(\%)$	-1.69	-1.61	18.66	-153.63	58.70
$UP_i(\%)$	135.34	97.32	103.33	7.66	538.12
$\Delta NI_i(\%)$	2.72	1.65	5.10	-11.09	25.75
$MktRet_i(\%)$	42.79	55.79	32.82	-20.06	112.4
Liq_i	0.680	0.708	0.143	0.296	0.933
$PostLev_i$	0.336	0.334	0.165	0.025	0.830
B/M_i	0.254	0.225	0.135	0.041	0.885
$IssueSize_i$	2.553	2.500	0.282	1.956	3.431
UW_i	0.270	0.000	0.447	0.000	1.000
$Ln(P/E)_i$	1.605	1.600	0.217	1.081	2.779
SOE_i	0.190	0.000	0.394	0.000	1.000
$FinCrisis_i$	0.440	0.000	0.498	0.000	1.000

As indicated in Table 5.9, Panel A, the mean value of UP_i was 96.71%. Moreover, the value of UP_i ranged from -7.55% to 538.12%, with a standard deviation of 95.21%. The mean (median) value of $DTAcc_i$ was 2.79% (2.31%), while mean (median) values of $DCAcc_i$ and $DLAcc_i$ were 7.40% (5.49%) and -4.61% (-2.65%) respectively, indicating that the distributions of $DTAcc_i$ and $DCAcc_i$ were right-skewed, while $DLAcc_i$ was left-skewed. With respect to control variables, the mean value of $IMkt_i$ was 0.73%. In addition, around 27% and 24% of sample firms employed top-ten auditors and underwriters respectively in their IPO process. It would seem that a large proportion of SMEs went public with the assistance of non-top-ten auditors and underwriters. The mean value of $PreLev_i$ in the fiscal year prior to the IPO was around 0.510, indicating that total liabilities accounted for around half of total assets. The high level of $PreLev_i$ implies that SMEs had strong incentives to go public to increase their liquidity. On average, the listing date lagged two weeks behind the offer date. In addition, the mean value of firm age (measured by logarithm) was around 0.846 (7.05 years) and the mean value of SOE_i was 0.120, suggesting that 12% of sample firms were controlled by the State. Among all sample firms, around 68% of them listed after 2007 and experienced the GFC.

Table 5.9, Panel B reveals the mean value of $BHAR_i$s over the 36-month period was 3.12%. This suggests that despite the SME market gaining a high average return of

42.79% ($MktRet_i$) during that period, new issues still over-performed that benchmark. Due to the smaller sample pool in the post-issue stock performance (262 IPOs), the values of discretionary accruals were different from those presented in Panel A of Table 5.9. The mean values of $DTAcc_i$, $DCAcc_i$ and $DLAcc_i$ were 0.73%, 2.43% and -1.69% respectively in Panel B. In terms of control variables, the mean value of UP_i was 135.34% for the 262 IPOs and the average change of net income in the IPO year accounted for 2.72% of the IPOs' beginning total assets. In addition, the liquidity in the first trading day was around 0.680 on average. The average leverage was 0.336 at the end of the IPO year, which was lower than the 0.510 result recorded in the fiscal year prior to the IPO, indicating that IPOs helped SMEs raise funds from the capital market, thereby decreasing their leverage ratio. The average book-to-market ratio was 0.254 for 262 IPO firms and average price to earnings ratio was 1.605 (measured by natural logarithm).

5.4 Correlations

To ensure that multicollinearity did not affect the cross-sectional tests in the thesis, correlation coefficients between all possible pairs are calculated and results are presented in Tables 5.10 and 5.11.

Tables 5.10 and 5.11 report correlation matrixes between the dependent variables (UP_i and $BHAR_i$), independent variables ($DTAcc_i$, $DCAcc_i$ and $DLAcc_i$) along with control variables for underpricing and post-issue stock performance models respectively. The upper halves of Tables 5.10 and 5.11 report Spearman Correlation Coefficients (cr_s) and the lower halves present Pearson Pairwise Correlation Coefficients (cr_p). In Table 5.10, the $DTAcc_i$ and $DCAcc_i$ show significant and negative correlation with underpricing ($p<1\%$, cr_s), whereas $DLAcc_i$ is positively correlated with underpricing but insignificant. Although all discretionary accruals are negatively correlated to $BHAR_i$ in the upper half of Table 5.11, only $DTAcc_i$ shows a significant relationship with $BHAR_i$ ($p<5\%$, cr_s, and cr_p). In addition, UP_i has significant relationships with several control variables in Table 5.10: (a) AD_i: negative; $p<5\%$, cr_p; (b) $IMkt_i$: positive; $p<1\%$, cr_s and cr_p; (c) $PreLev_i$: positive; $p<5\%$, cr_s; (d) Lag_i: positive; $p<1\%$, cr_s and cr_p; (e) $IssueSize_i$: negative; $p<1\%$, cr_s and cr_p; (f) Age_i: negative; $p<5\%$, cr_s and cr_p; (g) SOE_i: positive; $p<1\%$, cr_s and cr_p;

Table 5.10 Pearson and Spearman correlation matrix for underpricing (464 IPOs)

Variables	UP_i	$DTAcc_i$	$DCAcc_i$	$DLAcc_i$	AD_i	UW_i	$IMkt_i$	$PreLev_i$	Lag_i	$IssueSize_i$	Age_i	SOE_i	$FinCrisis_i$
UP_i		-0.126**	-0.151**	0.053	-0.086	0.013	0.240**	0.117*	0.320**	-0.631**	-0.114*	0.162**	-0.549**
$DTAcc_i$	-0.083		0.434**	0.256**	0.015	-0.061	-0.025	-0.126**	-0.125**	0.187**	0.036	-0.124**	0.216**
$DCAcc_i$	-0.075	0.276**		-0.698**	0.070	-0.057	0.028	-0.308**	-0.045	0.127**	0.065	-0.107*	0.164**
$DLAcc_i$	0.039	0.173**	-0.899**		-0.039	0.031	-0.020	0.231**	-0.052	0.021	-0.033	0.004	0.001
AD_i	-0.105*	0.019	0.049	-0.041		0.032	-0.026	0.005	-0.063	0.113*	0.049	0.011	0.097*
UW_i	0.025	-0.037	-0.037	0.021	0.032		-0.106*	0.041	0.075	0.076	-0.039	0.094*	-0.067
$IMkt_i$	0.151**	-0.031	0.089	-0.094*	-0.043	-0.108*		-0.048	0.132**	-0.062	0.014	-0.077	-0.185**
$PreLev_i$	0.086	-0.111*	-0.349**	0.307**	0.021	0.028	-0.064		0.052	-0.095*	-0.090	0.076	-0.210**
Lag_i	0.246**	-0.070	-0.001	-0.031	-0.015	0.079	0.117*	0.039		-0.399**	-0.140**	0.104*	-0.575**
$IssueSize_i$	-0.530**	0.164**	0.080	-0.007	0.125**	0.075	-0.065	-0.095*	-0.352*		0.167**	-0.120**	0.554**
Age_i	-0.114*	0.034	0.041	-0.026	0.033	-0.027	0.015	-0.067	-0.118*	0.135**		-0.003	0.182**
SOE_i	0.124**	-0.104*	-0.086	0.041	0.011	0.094*	-0.095*	0.072	0.085	-0.101*	0.008		-0.169**
$FinCrisis_i$	-0.504**	0.183**	0.098*	-0.017	0.097*	-0.067	-0.205**	-0.206**	-0.523**	0.540**	0.118*	-0.169**	

Legend:

* and**indicate significance at p<5% and p<1% respectively (based on two-tailed tests).

See Table 4.6 for full definitions and descriptions for the dependent, independent and control variables.

Table 5.11 Pearson and Spearman correlation matrix for post-issue stock performance (262 IPOs)

Variables	$BHAR_i$	$DTAcc_i$	$DCAcc_i$	$DLAcc_i$	Liq_i	$PostLev_i$	B/M_i	$IssueSize_i$	UP_i	UW_i	$Ln(P/E)_i$	SOE_i	ΔNI_i	$MktRet_i$	$FinCrisis_i$
$BHAR_i$		-0.153*	-0.071	-0.013	0.015	-0.124*	-0.061	-0.187**	0.084	-0.010	0.014	-0.123*	0.064	-0.053	0.021
$DTAcc_i$	-0.140*		0.434**	0.222**	0.034	-0.069	-0.034	0.154*	-0.057	-0.043	0.022	-0.073	0.066	-0.081	0.101
$DCAcc_i$	0.002	0.360**		-0.729**	-0.099	-0.005	-0.101	0.016	-0.069	-0.051	0.043	-0.046	0.075	0.048	-0.036
$DLAcc_i$	-0.084	0.211**	-0.836**		0.121	-0.022	0.078	0.130*	-0.008	0.041	-0.016	-0.015	-0.043	-0.138*	0.136*
Liq_i	-0.037	0.018	-0.157*	0.176**		-0.182**	0.336**	0.134*	-0.177**	-0.024	-0.335**	0.057	-0.079	-0.549**	0.698**
$PostLev_i$	-0.114	-0.058	-0.072	0.042	-0.196**		0.063	-0.131*	0.141*	0.038	-0.033	0.063	-0.148*	0.317**	-0.335*
B/M_i	-0.103	-0.044	-0.121	0.101	0.287**	0.089		0.049	-0.489**	-0.014	-0.778**	0.083	-0.419**	-0.163**	0.367**
$IssueSize_i$	-0.171**	0.135*	0.029	0.049	0.134*	-0.120	0.033		-0.417**	0.164**	-0.133*	0.060	0.131*	-0.334**	0.400**
UP_i	0.074	-0.042	-0.018	-0.006	-0.165**	0.069	-0.413**	-0.360**		-0.008	0.441**	0.001	0.083	0.363**	-0.409**
UW_i	-0.038	-0.016	-0.008	-0.001	-0.018	0.046	-0.038	0.183**	0.005		-0.010	0.093	0.107	0.065	-0.032
$Ln(P/E)_i$	0.024	0.039	0.059	-0.039	-0.304**	-0.016	-0.682**	-0.138*	0.445**	-0.002		0.002	-0.020	0.134*	-0.378**
SOE_i	-0.108	-0.053	-0.046	0.017	0.059	0.057	0.114	0.051	0.002	0.093	0.067		-0.113	0.090	-0.042
ΔNI_i	0.023	0.105	0.073	-0.015	-0.082	-0.152*	-0.421**	0.212**	0.132*	0.070	0.023	-0.056		0.011	-0.031
$MktRet_i$	0.037	-0.109	0.062	-0.129*	-0.483**	0.357**	0.016	-0.475**	0.356**	0.055	0.020	0.098	0.078		-0.834**
$FinCrisis_i$	-0.057	-0.089	-0.081	0.137*	0.699**	-0.332**	0.342**	0.391**	-0.346**	-0.032	-0.390**	-0.042	-0.036	-0.771**	

Legend:

* and**indicate significance at p<5% and p<1% respectively (based on two-tailed tests).

See Table 4.6 for full definitions and descriptions for the dependent, independent and control variables.

(h) $FinCrisis_i$: negative; p<1%, cr_s and cr_p. In Table 5.11, $BHAR_i$ is also significantly correlated with several control variables: (a) $PostLev_i$: negative; p<5%, cr_s; (b) $IssueSize_i$: negative; p<1%, cr_s and cr_p; (c) SOE_i: negative; p<5%, cr_s.

Table 5.10 shows highly significant correlations (p<1%, cr_s and cr_p) between some control variables, such as $IssueSize_i$ and Age_i, $IssueSize_i$ and $FinCrisis_i$, $IMkt_i$ and $FinCrisis_i$, Lag_i and $FinCrisis_i$. Also in Table 5.11, several highly significant correlations (p<1%, cr_s and cr_p) can be seen between control variables (e.g. Liq_i and $PostLev_i$, Liq_i and B/M_i, $IssueSize_i$ and UP_i, $Ln(P/E)_i$ and B/M_i). Nevertheless, none of the correlation values between control variables or independent variables and control variables in Table 5.10 is above the critical limit of 0.80 (Cooper & Schindler, 2003; Hair et al., 1995), with the highest correlation (0.575, p<1%, cr_s) between $FinCrisis_i$ and Lag_i. Whereas in Table 5.11, only one correlation value is above the critical limit of 0.80 with the highest correlation (-0.834, p<1%, cr_s) between $FinCrisis_i$ and $MktRet_i$. Hence $FinCrisis_i$ was removed from the post-issue stock performance regression *Models 4, 5* and *6*. Consequently, it seems there was no other serious multicollinearity concern for model estimations in this thesis.

5.5 Univariate analysis

Based on the factors affecting underpricing and post-issue stock performance, this section reports univariate analysis using independent sample *t-tests*. The sample firms were divided into comparison groups based on the direction of discretionary accruals, leverage, issue size, underwriters' and auditors' reputation, ownership structure, manufacturing industry and GFC. Consistent with prior literature, sample firms were divided into income-increasing and income-decreasing groups based on the direction of corresponding discretionary accruals (Peasnell et al., 2000). A sample firm was defined as an income-increasing firm if the directional sign on discretionary accruals was positive; otherwise it was defined as an income-decreasing firm. The sample firms were also classified into two contrasting pairs based on leverage level. The high (low) leverage firm was defined as if a firm's pre-IPO leverage ratio was above (below) the median value of 0.528 in the underpricing model. In the post-issue stock performance model, the high (low) leverage firm was defined as if a firm's post-IPO leverage ratio was above (below) the median value of

0.334. In addition, sample firms were categorized into pairs based on the issue size. Firms whose $IssueSize_i$ was above the median value of 2.717 (2.500) in the underpricing (post-issue stock performance) model were classified as large firms, otherwise they were marked as small firms.

Table 5.12 reports univariate tests for underpricing.

Table 5.12 Univariate analysis for underpricing (464 IPOs)

	N	Mean underpricing	Mean difference	t-statistic
DTAcc:				
Income-increasing	268	86.16%	-24.98%	-2.699***
Income-decreasing	196	111.14%		
DCAcc:				
Income-increasing	303	87.84%	-25.57%	-2.773***
Income-decreasing	161	113.41%		
DLAcc:				
Income-increasing	189	93.32%	-5.72%	-0.653
Income-decreasing	275	99.04%		
PreLev:				
Low leverage	232	90.06%	-13.29%	-1.505
High leverage	232	103.35%		
IssueSize:				
Small	232	141.42%	89.43%	11.450***
Large	232	51.99%		
Underwriters' reputation:				
Non-top-ten	351	95.36%	-5.54%	-0.538
Top-ten	113	100.90%		
Auditors' reputation:				
Non-top-ten	340	102.74%	22.56%	2.647***
Top-ten	124	80.18%		
SOE firm:				
Non-SOE	407	92.31%	-35.81%	-2.677***
SOE	57	128.12%		
Industry:				
Non-manufacturing	112	99.11%	3.17%	0.306
Manufacturing	352	95.94%		
Global financial crisis (GFC):				
Pre-crisis	147	167.17%	103.14%	10.544***
Post-crisis	317	64.03%		

Legend:
*, ** and *** indicate significance at p<10%, p<5% and p<1% respectively (based on two-tailed tests).
See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

Table 5.12 compares the mean values of underpricing for each group based on several influencing factors. The mean values of underpricing in the income-

increasing *DTAcc*, *DCAcc* and *DLAcc* groups were 86.16%, 87.84% and 93.32%, compared with 111.14%, 113.41% and 99.04% in income-decreasing groups respectively. The mean values of underpricing were significantly higher ($p<1\%$) for firms adopting income-decreasing total and current discretionary accruals than those in the income-increasing groups. However, t-statistic suggests the difference of average underpricing between the income-increasing and income-decreasing *DLAcc* groups was insignificant.

In addition, the mean level of underpricing for small issuers was higher than the mean level underpricing for large issuers, and the difference was significant at the 1% confidence level. This finding is consistent with Samarakoon (2010) who documented that small issuers were more underpriced than large issuers on average due to information asymmetry. The mean underpricing for firms that employed one of the top-ten auditors was 80.18%, lower than those with non-top-ten auditors. This difference was also statistically significant ($p<1\%$). This evidence, consistent with prior literature (e.g. Firth & Liau-Tan, 1998), which states that high quality auditors are able to mitigate information asymmetry and add credibility to the IPO, leading to lower underpricing. Similar to the findings in the UK, firms controlled by the State had a higher mean level of underpricing than privately owned firms (Dewenter & Malatesta, 1997). This difference is also statistically significant at the 1% confidence level. Moreover, the mean levels of underpricing in pre-crisis and post-crisis subgroups were 167.17% and 64.03% respectively, and the difference is significant ($p<1\%$), which indicates that the initial returns of firms engaging in post-crisis IPOs were lower due to the GFC. However, the differences in the mean levels of underpricing between subgroups partitioned by pre-IPO leverage, underwriters' reputation and manufacturing industry were insignificant.

Table 5.13 reports univariate tests for post-issue stock performance.

Table 5.13 Univariate analysis for post-issue stock performance (262 IPOs)

	N	Mean *BHARs*	Mean difference	t-statistic
DTAcc:				
Income-increasing	124	-6.45%	-18.17%	-2.134**
Income-decreasing	138	11.72%		
DCAcc:				
Income-increasing	141	0.92%	-4.76%	-0.553
Income-decreasing	121	5.68%		
DLAcc:				
Income-increasing	115	0.08%	-5.41%	-0.627
Income-decreasing	147	5.50%		
PostLev:				
Low leverage	131	10.77%	15.30%	1.795*
High leverage	131	-4.53%		
IssueSize:				
Small	131	19.05%	31.86%	3.818***
Large	131	-12.81%		
Underwriters' reputation:				
Non-top-ten	190	4.76%	5.95%	0.620
Top-ten	72	-1.19%		
SOE firm:				
Non-SOE	212	6.76%	19.07%	1.758*
SOE	50	-12.31%		
Industry:				
Non-manufacturing	70	4.31%	1.63%	0.168
Manufacturing	192	2.69%		
Global financial crisis (GFC):				
Pre-crisis	146	6.62%	7.90%	0.958
Post-crisis	116	-1.28%		

Legend:
*, ** and *** indicate significance at p<10%, p<5% and p<1% respectively (based on two-tailed tests).
See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

Table 5.13 compares mean values of *BHARs* in subgroups. The mean values of *BHARs* for firms that adopted income-increasing *DTAcc*, *DCAcc* and *DLAcc* were -6.45%, 0.92% and 0.08% respectively, whereas the mean values of *BHARs* for firms that adopted income-decreasing *DTAcc*, *DCAcc* and *DLAcc* were 11.72%, 5.68% and 5.50% respectively. It seems that firms with income-decreasing discretionary accruals generally performed better on average during the 36-month observation period compared with firms with income-increasing discretionary accruals. Only the IPO firms with income-increasing *DTAcc* experienced long-term underperformance (-6.45%). The difference in average *BHARs* between firms with positive and negative

DTAcc was statistically significant at the 5% confidence level. However, there was no significant difference in average *BHARs* between subgroups partitioned by the direction of *DCAcc* and *DLAcc*.

Moreover, the mean *BHARs* of low and high leverage firms were 10.77% and -4.53% respectively, which suggests that firms with higher leverage ratios at the end of the IPO year tended to have lower average *BHARs* than lower leverage firms, and this difference was significant (p<10%). This finding is consistent with prior literature stating that IPO firms with a higher leverage ratio, indicating higher risk exposure, were likely to experience poorer long-term performance (Chen et al., 2010; Eckbo & Norli, 2005). In addition, the mean *BHARs* of small issuers were 31.86% higher than the mean *BHARs* of large issuers. The difference was highly significant at the 1% confidence level. There was also a significant difference in *BHARs* between SOEs and non-SOEs (p<10%). The mean *BHARs* for SOEs and non-SOEs were -12.31% and 6.76% respectively, suggesting that SOEs performed worse on average than non-SOEs, which is contrary to prior literature (e.g. Liu et al., 2012). However, there was no significant difference on average *BHARs* between other subgroups in Table 5.13.

5.6 Multivariate results

This section provides the regression results testing the main hypotheses (H_1, H_{1a}, H_{1b}, H_2, H_{2a} and H_{2b} respectively) in this thesis.

5.6.1 Underpricing

Table 5.14 reports multivariate results testing the first three hypotheses (H_1, H_{1a} and H_{1b} respectively). *Models 1, 2* and *3* were used to test the association between underpricing (UP_i) and total, current and long-term discretionary accruals ($DTAcc_i$, $DCAcc_i$ and $DLAcc_i$) respectively.

As shown in Table 5.14, F-Statistics were 31.229, 30.306 and 30.538 respectively, indicating that all regression models were highly significant (F<1%) in predicting UP_i. The explanatory power was high in all three models and the adjusted *R-Square* values ranged from 0.470 in *Model 2* to 0.478 in *Model 1*. The coefficients on $DTAcc_i$ and $DLAcc_i$ were both positive, while the coefficient on $DCAcc_i$ was negative.

Table 5.14 Multiple regression results for underpricing (464 IPOs)

Stats\Model		***Model 1 Results***			***Model 2 Results***			***Model 3 Results***		
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***P-value***	***Beta***	***t-statistic***	***P-value***	***Beta***	***t-statistic***	***P-value***
(Constant)			7.377	0.000***		7.363	0.000***		7.506	0.000***
$DTAcc_i$	+	0.091	2.579	0.010**						
$DCAcc_i$	+				-0.004	-0.111	0.912			
$DLAcc_i$	+							0.047	1.296	0.196
AD_i	-	-0.045	-1.313	0.190	-0.043	-1.244	0.214	-0.041	-1.196	0.233
UW_i	-	0.012	0.351	0.726	0.010	0.299	0.765	0.011	0.302	0.763
$IMkt_i$	+	0.069	1.946	0.052*	0.070	1.932	0.054*	0.072	2.005	0.046**
$PreLev_i$	?	0.004	0.104	0.917	-0.004	-0.112	0.911	-0.017	-0.453	0.651
Lag_i	+	-0.019	-0.452	0.651	-0.017	-0.396	0.692	-0.017	-0.389	0.698
$IssueSize_i$	-	-0.308	-6.584	0.000***	-0.302	-6.422	0.000***	-0.304	-6.469	0.000***
Age_i	-	-0.009	-0.257	0.798	-0.009	-0.270	0.788	-0.009	-0.268	0.789
SOE_i	+	0.050	1.424	0.155	0.042	1.187	0.236	0.042	1.200	0.231
$FinCrisis_i$	-	0.000	-0.006	0.996	0.002	0.023	0.982	0.006	0.077	0.938
Ind_i		YES			YES			YES		
$Year_i$		YES			YES			YES		
Model Summary										
R-Square		0.493			0.486			0.488		
Adj. R-Square		0.478			0.470			0.472		
F-Statistic		31.229***			30.306***			30.538***		
Number		464			464			464		

Legend:

Model 1: $UP_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 2: $UP_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 3: $UP_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively; YES=Listing years and industries were controlled for.

t statistics were computed using the heteroskedasticity-consistent estimate of the standard errors of the coefficients (White, 1980).

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

The positive signs on $DTAcc_i$ and $DLAcc_i$ are consistent with the directions predicted in H_1 and H_{1b}, but the negative sign on $DCAcc_i$ contradicts H_{1a}. It implies that IPO firms with higher total and long-term discretionary accruals were likely to have higher levels of underpricing, while current discretionary accruals were negatively related to underpricing. However, only the coefficient on $DTAcc_i$ was statistically significant ($p<5\%$), while both of coefficients on $DCAcc_i$ and $DLAcc_i$ were insignificant. Therefore, H_1 was supported, whereas H_{1a} and H_{1b} were rejected.

Consistent with Kimbro (2005) who found that total discretionary accruals had informative value in explaining initial returns in the PRC, results in this thesis indicate that only $DTAcc_i$ had a significant and positive influence on underpricing in the PRC SMEs. This finding is also in line with prior literature in Japan (Nagata, 2013; Nagata et al., 2007) and the PRC (Shen et al., 2014; Kimbro, 2005), but is contrary to Kao et al. (2009) who argued in their study that aggressive earnings management led to lower first trading day stock returns. In addition, contrary to prior literature (e.g. Shen et al., 2014; Chahine et al., 2012), this thesis did not find positive and significant relationships between underpricing and $DCAcc_i$ or $DLAcc_i$. This result possibly indicates that SME investors fixated on firms' bottom line earnings. Hence, they were misled by total discretionary accruals, but did not (or were not able to) react to short-term or long-term components of discretionary accruals.

Among all the control variables, only $IMkt_i$ *and* $IssueSize_i$ were statistically significant in all three models with signs consistent with expectations. Specifically, the coefficients on $IMkt_i$ were positive and marginally significant in *Models 1* and *2* ($p<10\%$), and moderately significant in *Model 3* ($p<5\%$), thus consistent with the prediction. The results indicate market sentiment had a positive impact on underpricing (Chi & Padgett, 2005a). Moreover, the coefficients on $IssueSize_i$ were highly significant ($p<1\%$) in all three models, with negative directional signs as expected. This finding is consistent with prior research (e.g. Samarakoon, 2010) and implies that smaller issuers tended to have higher levels of underpricing.

In terms of other control variables with insignificant coefficients, SOE_i was positively related to underpricing as predicted, whereas the coefficients on AD_i and

Age_i were negative across all regression models consistent with expectation. In line with the dispute on the relationship between underpricing and pre-IPO leverage ratio in prior literature (Jain & Padmavathi, 2009; Su, 2004), the coefficients on $PreLev_i$ were positive in *Model 1*, but negative in *Models 2* and *3*. In contrast to predictions, the coefficients on UW_i and $FinCrisis_i$ were positive. Although it was predicted that firms with high quality underwriters and listed after the GFC would be more likely to have lower level of underpricing, the positive coefficients on UW_i and $FinCrisis_i$ contradicted the predictions and prior findings (Agathee et al., 2012; Vong & Trigueiros, 2010). Also, the coefficients on Lag_i were negative across all three models, contrary to expectations. However, none of the coefficients on UW_i, Lag_i or $FinCrisis_i$ were significant.

5.6.2 Post-issue stock performance

Table 5.15 provides the results for testing the last three hypotheses (H_2, H_{2a} and H_{2b} respectively) related to IPO firms' post-issue stock performance. *Models 4, 5* and *6* tested the association between $BHAR_i$ and total, current and long-term discretionary accruals ($DTAcc_i$, $DCAcc_i$ and $DLAcc_i$) respectively.

As shown in Table 5.15, F-Statistics were 2.415, 2.161 and 2.173 in *Models 4, 5* and *6* respectively, all significant at the 1% confidence level. The adjusted *R-Square* values suggest the explanatory power of three models were low, from 0.070 in *Model 5* to 0.084 in *Model 4*. In Table 5.15, all coefficients on discretionary accruals were negative, consistent with the directions predicted in the hypotheses (H_2, H_{2a} and H_{2b}), which implies that all discretionary accruals were negatively related to post-issue stock performance. Specifically, the coefficient on $DTAcc_i$ was negative and significant at the 5% confidence level, which suggests that firms with higher $DTAcc_i$ before listing were associated with poorer post-issue stock performance. This result is consistent with the information asymmetry theory and in line with expectations. Nevertheless, in contrast to predictions, neither of the coefficients on $DCAcc_i$ nor $DLAcc_i$ were significant, which implies that $DCAcc_i$ and $DLAcc_i$ were not significantly related to $BHAR_i$. Therefore, H_2 was supported, but not H_{2a} or H_{2b}.

Table 5.15 Multiple regression results for post-issue stock performance (262 IPOs)

Stats\Model		*Model 4 Results*			*Model 5 Results*			*Model 6 Results*		
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***P-value***	***Beta***	***t-statistic***	***P-value***	***Beta***	***t-statistic***	***P-value***
(Constant)			2.432	0.016**		2.563	0.011**		2.494	0.013**
$DTAcc_i$	-	-0.130	-1.991	0.048**						
$DCAcc_i$	-				-0.028	-0.455	0.650			
$DLAcc_i$	-							-0.039	-0.624	0.533
Liq_i	+	-0.009	-0.105	0.916	0.000	-0.003	0.997	0.010	0.112	0.911
$PostLev_i$	-	-0.161	-2.410	0.017**	-0.162	-2.390	0.018**	-0.155	-2.291	0.023**
B/M_i	+	-0.115	-1.031	0.304	-0.120	-1.060	0.290	-0.109	-0.960	0.338
$IssueSize_i$	?	-0.205	-2.653	0.008***	-0.219	-2.819	0.005***	-0.220	-2.848	0.005***
UP_i	-	-0.045	-0.533	0.595	-0.055	-0.648	0.518	-0.046	-0.544	0.587
UW_i	+	-0.010	-0.168	0.867	-0.006	-0.098	0.922	-0.004	-0.069	0.945
$Ln(P/E)_i$	-	-0.090	-0.839	0.402	-0.115	-1.075	0.283	-0.113	-1.059	0.291
SOE_i	+	-0.065	-1.023	0.307	-0.053	-0.830	0.407	-0.053	-0.823	0.411
ΔNI_i	+	0.004	0.054	0.957	-0.008	-0.100	0.920	-0.005	-0.072	0.942
$MktRet_i$	+	-0.050	-0.508	0.612	-0.060	-0.596	0.552	-0.066	-0.656	0.512
Ind_i		YES			YES			YES		
$Year_i$		YES			YES			YES		
Model Summary										
R-Square		0.144			0.131			0.131		
Adj. R-Square		0.084			0.070			0.071		
F-Statistic		2.415***			2.161***			2.173***		
Number		262			262			262		

Legend:

Model 4: $BHAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 5: $BHAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 6: $BHAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively; YES=Listing years and industries were controlled for.

t statistics were computed using the heteroskedasticity-consistent estimate of the standard errors of the coefficients (White, 1980).

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

The negative and significant relationship between $DTAcc_i$ and $BHAR_i$ is consistent with prior PRC literature, which states that higher total discretionary accruals lead to poorer long-term stock performance (Shen et al., 2014; Chaney & Lewis, 1998). However, the finding in this thesis of the insignificant relationship between $DCAcc_i$ and post-issue stock performance is somewhat surprising because previous studies have found a significant influence of $DCAcc_i$ on post-issue stock performance in various countries, such as the US (S. S. Chen et al., 2013; S. C. Chang et al., 2010; DuCharme et al., 2000; Teoh, Welch et al., 1998a), UK (Chahine et al., 2012), Netherlands (Roosenboom et al., 2003) and Malaysia (Ahmad-Zaluki et al., 2011). Results from Table 5.15 show that SME investors in the PRC responded to the total discretionary accruals, but appear to have bypassed the components of discretionary accruals.

In terms of control variables, Table 5.15 suggests that only $PostLev_i$ and $IssueSize_i$ had significant coefficients across three models. Specifically, the coefficients on $PostLev_i$ were negative and significant in all three models at the 5% confidence level in line with expectation, which indicates that IPO firms with higher post-IPO leverage-related risks gained lower expected stock returns after issuance. This result is consistent with Brav et al. (2000) who documented that risky IPOs with lower credibility were likely to perform poorly in the long term. However, in contrast to the mixed prediction, $IssueSize_i$ had a negative and highly significant ($p<1\%$) relationship with post-issue stock performance in all three models. This result is in line with Allen et al. (1999) who found that smaller issuers tended to perform better than their larger counterparts in the long term, but in contrast to some literature arguing that smaller issuers were more likely to experience long-term underperformance than larger issuers due to inherent risks (Gregory et al., 2010; Drobetz et al., 2005; Brav et al., 2000).

Among other control variables with insignificant coefficients, UP_i and $Ln(P/E)_i$ had signs consistent with expectations across the three models. Specifically, UP_i and $Ln(P/E)_i$ were negatively related to the post-issue stock performance as predicted in Chapter 4. Moreover, the coefficients on Liq_i, B/M_i, UW_i, SOE_i, ΔNI_i and $MktRet_i$ were inconsistent with the predictions. Specifically, the results show B/M_i, UW_i, SOE_i and $MktRet_i$ were negatively associated with the post-issue stock performance.

In addition, the coefficients on Liq_i were negative in *Model 4* and positive in *Models 5* and *6*, whereas the coefficients on ΔNI_i were positive in *Model 4* and negative in *Models 5* and *6*. None of the coefficients on these variables were significant.

5.6.3 Regression analysis summary

Multiple regression models were used to test the relationship between earnings management (total, current and long-term discretionary accruals) and IPO short-term and long-term stock performance. Statistical evidence supported H_1 and H_2. However, H_{1a}, H_{1b}, H_{2a} and H_{2b} were rejected. The regression results for underpricing are summarized as follows:

- All regression models were highly significant (F<1%) predicting UP_i, and the explanatory power was also high, with the adjusted *R-Square* values ranging from 0.470 (*Model 2*) to 0.478 (*Model 1*).
- The total discretionary accruals ($DTAcc_i$) and the level of underpricing were positively associated at the 5% confidence level.
- The current discretionary accruals ($DCAcc_i$) were negatively related to the level of underpricing, but the relationship was insignificant.
- No significant association was found between long-term discretionary accruals ($DLAcc_i$) and the level of underpricing.
- The control variables were largely insignificant except for the followings:
  - $IMkt_i$ was found to have a positive and significant (p<10% in *Models 1* and *2*, p<5% in *Model 3*) relationship with underpricing.
  - $IssueSize_i$ was detected to have a negative and significant (p<1%) impact on the level of underpricing.

The results for post-issue stock performance are concluded as follows:

- All regression models were useful, but the explanatory power stayed low with adjusted *R-Square* values ranging from 0.070 (*Model 5*) to 0.084 (*Model 4*).
- There was a negative and significant relationship between total discretionary accruals ($DTAcc_i$) and $BHAR_i$ at the 5% confidence level.
- Current discretionary accruals ($DCAcc_i$) and $BHAR_i$ were negatively associated, but the relationship was insignificant.

- There was no statistical evidence to support the negative relationship between long-term discretionary accruals ($DLAcc_i$) and $BHAR_i$.
- Coefficients were significant on the following control variables:
  - There was some evidence that $PostLev_i$ was a significant ($p<5\%$) explanatory factor of $BHAR_i$.
  - $IssueSize_i$ had a negative and significant association ($p<1\%$) with $BHAR_i$.

5.7 Multiple regressions for partitioned subsamples

To mitigate concerns that the main results were subject to a specific subsample bias, additional multiple regressions partitioning the full sample by firm characteristics were conducted. In prior research (e.g. Chen et al., 2005; Chen et al., 2004; Teoh, Welch et al., 1998b) scholars generally decomposed sample firms based on the incentive of earnings management, issue size, underwriters' reputation, IPO year, ownership structure and industries to check the robustness of main results. Those traits were frequently found to influence the earnings management behavior and IPO stock performance. Consequently, in this section regression *Models 1-6* were reperformed by partitioning the full sample based on the incentives of earnings management, issue size, underwriters' reputation, global financial crisis (GFC), ownership structure and manufacturing industry.

5.7.1 Incentive for earnings management

As mentioned above, the full sample was separated into income-increasing (Panel A) and income-decreasing (Panel B) subgroups based on the directional signs (positive and negative) on discretionary accruals. Multivariate results from regressions of IPO underpricing and post-issue stock performance based on these two subgroups were reported in Tables 5.16 and 5.17 respectively.

As indicated in Table 5.16, F-Statistics were highly significant in three models and the explanatory power was high in all subgroups (adjusted *R-Square* values ranged from 0.460 to 0.532 in Panel A and 0.444 to 0.477 in Panel B). The coefficients on $DTAcc_i$ and $DLAcc_i$ were positive in both income-increasing and income-decreasing subsamples, but only significant on $DTAcc_i$ at the 5% confidence level in both panels. The directional signs and significance levels on total and long-term discretionary

accruals in both panels were consistent with the main findings reported in Table 5.14. The coefficients on $DCAcc_i$ were negative in Panel A (income-increasing) and positive in Panel B (income-decreasing). However, the coefficients on $DCAcc_i$ in both panels were not statistically significant. Based on the findings in partitioned subsamples in Table 5.16, it appears that the incentive for earnings management did not unduly influence the association between underpricing and discretionary accruals.

Regarding control variables, unlike the main results, the coefficients on $IMkt_i$ were positive in the income-increasing subgroups, while mixed in income-decreasing subgroups (negative in Panel B for *Models 1* and *2*, positive in Panel B for *Model 3*). However, the coefficient on $IMkt_i$ was only significant ($p<1\%$) for *Model 1* in the income-increasing subgroup (see Table 5.16, Panel A), suggesting that the significance of the $IMkt_i$ in Table 5.14 was driven by income-increasing total discretionary accruals subsamples. Moreover, the directional signs on $IssueSize_i$ were the same as reported in Table 5.14, but the significance levels were somewhat different in the models. Specifically, the coefficients on $IssueSize_i$ were negative and highly significant ($p<1\%$) for all three models in Panel B, but only significant in Panel A for *Models 1* and *2*. The remaining control variables in income-increasing subgroups were statistically insignificant and generally the same as those reported in Table 5.14. Compared with the main findings, differences that can be noted in income-increasing subgroups were the directional signs of the coefficients on (1) the UW_i in *Models 1* and *2* were negative; (2) the Lag_i in *Models 1* and *2* were positive; (3) the Age_i in *Models 1* and *3* were positive; (4) the $FinCrisis_i$ in *Models 1* and *3* were negative (see Table 5.16, Panel A). The coefficients on the remaining control variables in the income-decreasing subgroups were also insignificant and generally in line with main findings, except some differences in directional signs. The coefficients on Lag_i and Age_i were positive in *Model 3* (see Table 5.16, Panel B), whereas both coefficients were negative in all models in Table 5.14. In addition, the coefficients on the SOE_i and $FinCrisis_i$ are negative in *Model 2* (see Table 5.16, Panel B), contradicting the consistent positive signs on those variables in the main findings. However, none of these control variables had a statistically significant relationship with underpricing.

Table 5.17 presents the multiple regression results for testing post-issue stock performance based on the subsamples with different incentives for earnings management. As shown in Table 5.17, Panel A, F-Statistics were insignificant in *Model 4* and marginally significant in *Models 5* and *6*. In income-decreasing subgroups, F-Statistics were significant in *Models 4* (F<5%) and *6* (F<1%), but insignificant in *Model 5* (see Table 5.17, Panel B), indicating *Model 4* was not useful for the income-increasing subgroup, while *Model 5* was marginally useful for the income-decreasing subgroup. The explanatory power of the three models was again low, with adjusted *R-Square* values ranging from 0.029 to 0.084 in Panel A and 0.047 to 0.142 in Panel B. The coefficients on $DTAcc_i$ were negative in both panels, but significant (p<5%) only in the income-decreasing subgroup (see Table 5.17, Panel B), which implies the relationship between $DTAcc_i$ and $BHAR_i$ was more pronounced in income-decreasing firms. In addition, the directional signs on $DLAcc_i$ and $DCAcc_i$ were inconsistent in subgroups, but none of them were significant. The separating estimations for discretionary accruals based on direction did not provide comprehensive support for the main findings reported in Table 5.15. Only the findings from the income-decreasing subgroups were consistent with the results reported in Table 5.15, suggesting that the main findings were mainly driven by firms adopting the income-decreasing discretionary accruals.

In the main regressions, two control variables ($PostLev_i$ and $IssueSize_i$) were significantly associated with post-issue stock performance (see Table 5.15). In Table 5.17, however, $PostLev_i$ and $IssueSize_i$ were only found to be significant in some models in certain subgroups. Specifically, in the income-increasing subgroups, all coefficients on $PostLev_i$ were negative, but only significant in *Models 4* (p<10%) and *6* (p<5%) (see Table 5.17, Panel A). Panel B of Table 5.17 shows that $PostLev_i$ was negatively associated with $BHAR_i$ at different significance levels in the three models (p<5% in *Models 4* and *5*, p<10% in *Model 6*). In addition, the coefficients on $IssueSize_i$ were negative in all subgroups except Panel A of *Model 6*, but only significant in Panel A of *Model 5* (p<5%) and Panel B of *Model 6* (p<1%). This shows evidence that the influence of $PostLev_i$ and $IssueSize_i$ on post-issue stock performance was driven by the incentive of earnings management. Unlike the main findings in Table 5.15, some other control variables were found to be significantly related to post-issue stock performance. The coefficient on B/M_i was negative and

Table 5.16 Multiple regressions partitioning pooled sample by directional signs of discretionary accruals (underpricing)

Stats\Model		*Panel A: Income-increasing*						*Panel B: Income-decreasing*					
		Model 1 Results		*Model 2 Results*		*Model 3 Results*		*Model 1 Results*		*Model 2 Results*		*Model 3 Results*	
Variables\Stat	*Prediction*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*
(Constant)			5.964***		6.201***		2.793***		5.113***		4.073***		6.648***
$DTAcc_i$	+	0.099	2.195**					0.131	2.312**				
$DCAcc_i$	+			-0.046	-1.004					0.097	1.630		
$DLAcc_i$	+					0.014	0.254					0.077	1.603
AD_i	-	-0.014	-0.334	-0.046	-1.062	-0.020	-0.395	-0.070	-1.243	-0.050	-0.841	-0.058	-1.276
UW_i	-	-0.019	-0.433	-0.010	-0.219	0.003	0.058	0.074	1.303	0.052	0.846	0.008	0.169
$IMkt_i$	+	0.185	4.128***	0.131	2.825	0.085	1.557	-0.035	-0.600	-0.046	-0.751	0.050	1.054
$PreLev_i$	?	-0.009	-0.194	-0.054	-1.109	0.044	0.788	0.001	0.023	0.070	1.140	-0.054	-1.043
Lag_i	+	0.003	0.065	0.036	0.676	-0.095	-1.452	-0.059	-0.851	-0.105	-1.352	0.024	0.431
$IssueSize_i$	-	-0.307	-5.531***	-0.311	-5.582***	-0.110	-1.458	-0.340	-1.254***	-0.279	-3.066***	-0.390	-6.428***
Age_i	-	0.014	0.317	-0.009	-0.198	0.028	0.535	-0.029	-0.518	-0.009	-0.150	0.001	0.011
SOE_i	+	0.069	1.579	0.071	1.608	0.022	0.400	0.020	0.339	-0.009	-0.146	0.076	1.604
$FinCrisis_i$	-	-0.043	-0.510	0.011	0.127	-0.192	-1.637	0.017	0.129	-0.118	-0.833	0.096	0.991
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.557		0.485		0.564		0.484		0.523		0.481	
Adj. R-Square		0.532		0.460		0.529		0.444		0.477		0.453	
F-Statistic		22.681***		19.360***		16.077***		12.123***		11.440***		17.215***	
Number		268		303		189		196		161		275	

Legend:

Model 1: $UP_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 2: $UP_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 3: $UP_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

Table 5.17 Multiple regressions partitioning pooled sample by directional signs of discretionary accruals (post-issue stock performance)

		Panel A: Income-increasing						*Panel B: Income-decreasing*					
Stats\Model		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***	
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			1.025		2.897***		-0.798		1.427		0.909		3.674***
$DTAcc_i$	-	-0.004	-0.040					-0.184	-2.086**				
$DCAcc_i$	-			0.081	0.897					-0.083	-0.845		
$DLAcc_i$	-					0.084	0.826					-0.136	-1.602
Liq_i	+	-0.033	-0.246	-0.072	-0.587	0.056	0.353	-0.020	-0.155	0.115	0.816	0.083	0.733
$PostLev_i$	-	-0.212	-1.825*	-0.133	-1.307	-0.237	-2.207**	-0.198	-2.155**	-0.223	-2.199**	-0.153	-1.704*
B/M_i	+	-0.239	-1.403	-0.236	-1.542	0.171	0.864	0.035	0.210	0.025	0.132	-0.322	-2.270**
$IssueSize_i$	?	-0.087	-0.673	-0.240	-2.186**	0.062	0.494	-0.143	-1.217	-0.105	-0.765	-0.321	-3.027***
UP_i	-	0.008	0.059	-0.095	-0.783	-0.143	-1.092	0.016	0.142	0.015	0.118	-0.055	-0.478
UW_i	+	0.087	0.927	0.021	0.238	-0.014	-0.143	-0.067	-0.765	-0.065	-0.680	-0.042	-0.521
$Ln(P/E)_i$	-	-0.054	-0.316	-0.126	-0.813	0.055	0.338	-0.071	-0.464	-0.116	-0.715	-0.226	-1.592
SOE_i	+	-0.040	-0.415	-0.013	-0.154	-0.197	-1.859*	-0.043	-0.462	-0.084	-0.806	0.013	0.166
ΔNI_i	+	-0.121	-0.974	0.022	0.203	-0.038	-0.316	0.113	1.089	-0.012	-0.103	0.025	0.252
$MktRet_i$	+	-0.133	-0.206	-0.964	-1.831*	0.131	0.246	-0.441	-1.791*	-0.310	-1.036	-0.602	-2.370**
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.155		0.169		0.212		0.194		0.174		0.236	
Adj. R-Square		0.029		0.062		0.084		0.087		0.047		0.142	
F-Statistic		1.226		1.575*		1.652*		1.818**		1.368		2.508***	
Number		124		141		115		138		121		147	

Legend:

Model 4: $BHAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 5: $BHAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 6: $BHAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

significant at the 5% confidence level in Panel B of *Model 6*, and SOE_i was negatively related to $BHAR_i$ at the 10% confidence level in Panel A of *Model 6*. Moreover, $MktRet_i$ was an additional significant variable that was negatively associated with the post-issue stock performance (p<10% in Panel A of *Model 5* and Panel B of *Model 4*, p<5% in Panel B of *Model 6*). In line with the main findings, the remaining control variables were insignificant in both panels.

5.7.2 Issue size

Tables 5.18 and 5.19 provide the multivariate results for the small (Panel A) and large (Panel B) issue size subgroups. The cut-off point for partitioning the pooled sample in the underpricing models was the median (2.717) of $IssueSize_i$. For the post-issue stock performance regression models the cut-off point of $IssueSize_i$ was 2.500.

As presented in Table 5.18, the F-Statistics were highly significant in all models in both panels. The explanatory power was slightly lower than the full sample in Panel A, with adjusted *R-Square* values ranging from 0.281 in *Model 2* to 0.295 in *Model 1*. The explanatory power of the models in the large issue size subgroups was generally high and similar to the main findings (see Table 5.18, Panel B). Consistent with results reported in Table 5.14, the coefficients on $DTAcc_i$ were positive and significant at the 5% confidence level in both panels. The coefficients on $DCAcc_i$ and $DLAcc_i$ were also positive in all subgroups, but none of coefficients were significant. This evidence again shows only total discretionary accruals had a positive and significant impact on the level of underpricing, and issue size did not unduly influence that association.

In terms of control variables, $IssueSize_i$ remained significant (p<1%) with the negative directional signs in all models and subgroups. However, the influence of $IMkt_i$ on underpricing was affected by issue size. The positive and significant (p<1%) coefficients on $IMkt_i$ in the large issue size subgroups were consistent with the main findings reported in Table 5.14 (see Table 5.18, Panel B). However, there was no significant relationship between $IMkt_i$ and UP_i in small issue size subgroups (see Table 5.18, Panel A). While not considered as significant factors to induce underpricing in main findings, the coefficients on Age_i and SOE_i were positive and

Table 5.18 Multiple regressions partitioning pooled sample by issue size (underpricing)

Stats\Model		*Panel A: Small issue size*						*Panel B: Large issue size*					
		Model 1 Results		*Model 2 Results*		*Model 3 Results*		*Model 1 Results*		*Model 2 Results*		*Model 3 Results*	
Variables\Stat	*Prediction*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*
(Constant)			4.605***		4.564***		4.637***		3.673***		3.590***		3.693***
$DTAcc_i$	+	0.127	2.053**					0.095	2.075**				
$DCAcc_i$	+			0.004	0.060					0.003	0.056		
$DLAcc_i$	+					0.828	0.408					0.048	0.944
AD_i	-	-0.071	-1.264	-0.068	-1.198	-0.066	-1.159	-0.027	-0.587	-0.024	-0.522	-0.022	-0.471
UW_i	-	0.054	0.925	0.058	0.989	0.058	0.988	0.004	0.083	0.000	0.007	0.001	0.026
$IMkt_i$	+	0.002	0.035	-0.004	-0.059	0.001	0.022	0.204	4.135***	0.208	4.177***	0.208	4.194***
$PreLev_i$	?	0.001	0.024	-0.007	-0.114	-0.018	-0.291	0.062	1.277	0.058	1.085	0.038	0.718
Lag_i	+	-0.012	-0.175	-0.011	-0.158	-0.010	-0.149	-0.012	-0.219	-0.008	-0.141	-0.007	-0.128
$IssueSize_i$	-	-0.252	-3.604***	-0.242	-3.430***	-0.243	-3.454***	-0.167	-3.585***	-0.166	-3.527***	-0.169	-3.601***
Age_i	-	-0.056	-0.959	-0.061	-1.044	-0.061	-1.049	0.087	1.890*	0.086	1.866*	0.085	1.839*
SOE_i	+	-0.004	-0.067	-0.022	-0.366	-0.023	-0.385	0.236	4.968***	0.229	4.776***	0.229	4.784***
$FinCrisis_i$	-	0.170	1.337	0.162	1.258	0.173	1.349	-0.175	-1.783*	-0.155	-1.562	-0.147	-1.498
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.338		0.325		0.327		0.561		0.553		0.555	
Adj. R-Square		0.295		0.281		0.283		0.533		0.524		0.526	
F-Statistic		7.899***		7.453***		7.525***		19.840***		19.153***		19.295***	
Number		232		232		232		232		232		232	

Legend:

Model 1: $UP_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 2: $UP_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 3: $UP_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

Table 5.19 Multiple regressions partitioning pooled sample by issue size (post-issue stock performance)

		Panel A: Small issue size						*Panel B: Large issue size*					
Stats\Model		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***	
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			1.740*		1.948*		1.802*		0.055		0.115		0.080
$DTAcc_i$	-	-0.198	-1.832*					-0.092	-1.021				
$DCAcc_i$	-			0.054	0.563					-0.115	-1.253		
$DLAcc_i$	-					-0.142	-1.571					0.070	0.749
Liq_i	+	0.097	0.742	0.098	0.746	0.103	0.785	-0.138	-1.014	-0.148	-1.090	-0.134	-0.987
$PostLev_i$	-	-0.168	-1.706*	-0.154	-1.545	-0.156	-1.579	-0.206	-1.962*	-0.226	-2.152**	-0.225	-2.213**
B/M_i	+	-0.214	-1.258	-0.154	-0.883	-0.135	-0.791	-0.147	-0.851	-0.165	-0.959	-0.162	-0.936
$IssueSize_i$	?	-0.068	-0.668	-0.097	-0.950	-0.082	-0.805	0.039	0.358	0.042	0.388	0.043	0.399
UP_i	-	-0.091	-0.786	-0.098	-0.828	-0.078	-0.661	0.082	0.594	0.061	0.445	0.066	0.474
UW_i	+	-0.116	-1.250	-0.116	-1.228	-0.112	-1.204	0.025	0.257	0.029	0.302	0.030	0.308
$Ln(P/E)_i$	-	-0.182	-1.208	-0.241	-1.594	-0.231	-1.548	-0.055	-0.294	-0.073	-0.389	-0.075	-0.398
SOE_i	+	0.001	0.007	0.025	0.264	0.022	0.234	-0.132	-1.378	-0.125	-1.307	-0.120	-1.252
ΔNI_i	+	-0.075	-0.643	-0.073	-0.624	-0.077	-0.658	0.018	0.159	0.005	0.042	-0.003	-0.025
$MktRet_i$	+	-0.249	-1.360	-0.253	-1.366	-0.258	-1.404	0.241	0.391	0.255	0.417	0.257	0.417
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.163		0.141		0.156		0.146		0.150		0.142	
Adj. R-Square		0.045		0.020		0.038		0.017		0.022		0.031	
F-Statistic		1.386		1.165		1.321		1.133		1.169		1.100	
Number		131		131		131		131		131		131	

Legend:

Model 4: $BHAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 5: $BHAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 6: $BHAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

significant at the 10% and 1% confidence level respectively in large issue size subgroups in all three models (see Table 5.18, Panel B). This finding suggests that Age_i and SOE_i only had significant influences on underpricing in large IPO firms. In addition, in large issue size subgroups, there was a negative and significant association between $FinCrisis_i$ and underpricing in *Model 1* ($p<10\%$) (see Table 5.18, Panel B). The remaining control variables were statistically not significant in both panels.

Table 5.19 provides multiple regression results testing post-issue stock performance of partitioned subsamples based on the issue size. As shown in Table 5.19, F-Statistics reveal that all models were not useful in predicting post-issue stock performance in small and large issue size subgroups. The explanatory power of three regression models was poor in both panels, as evidenced by low adjusted *R-Square* values (less than 0.050). There were negative relationships between $DTAcc_i$ and $BHAR_i$ in both subgroups. However, the significant coefficient on $DTAcc_i$ was only found in the small issue size subgroup, with a lower significance level ($p<10\%$), compared with the main findings (see Table 5.19, Panel A). In line with the main findings in Table 5.15, there was no statistical evidence to support the association between $DCAcc_i$ and $BHAR_i$ or $DLAcc_i$ and $BHAR_i$. The results indicate that issue size had some moderating effect on the relationship between earnings management and post-issue stock performance, and the main results were more pronounced in small issue size subgroups.

In respect of control variables, the coefficients on $PostLev_i$ were negative and marginally significant ($p<10\%$) in Panels A and B of *Model 4*, whereas they were moderately significant ($p<5\%$) in Panel B of *Models 5* and *6*. In contrast with main findings in Table 5.15, none of the coefficients on $IssueSize_i$ were statistically significant. The findings on control variables were inconsistent with results reported in Table 5.15, which indicates that the issue size affected the relationship between $IssueSize_i$ ($PostLev_i$) and post-issue stock performance. Other control variables were not significantly related to post-issue performance.

5.7.3 Underwriters' reputation

Tables 5.20 and 5.21 report regression results by partitioning the sample firms based on underwriters' reputation, with Panel A for firms with one of the top-ten underwriters, and Panel B for firms with non-top-ten underwriters.

As shown in Table 5.20, all models were highly significant (F<1%). Meanwhile, the explanatory power of three models was similar to results in Table 5.14 (adjusted *R-Square* values ranged from 0.537 to 0.550 in Panel A and 0.442 to 0.449 in Panel B). In line with the main findings in Table 5.14, the coefficients on $DTAcc_i$ were positive in both subgroups, with different significance levels (p<10% in Panel A of *Model 1*, p<5% in Panel B of *Model 1*). The coefficients on $DCAcc_i$ were negative in Panel A (top-ten underwriter) and positive in Panel B (non-top-ten underwriter), but neither of coefficients were significant. Consistent with main findings, $DLAcc_i$ had positive and insignificant coefficients. The results suggest that the relationship between earnings management and underpricing was not overly affected by the underwriters' reputation.

Regarding control variables, as indicated in Table 5.20, only $IssueSize_i$ had negative and significant influence on underpricing in both panels, but the significance levels were different in subgroups. In top-ten underwriters subgroups, the coefficients on $IssueSize_i$ were negative and significant at the 5% confidence level in three models (see Table 5.20, Panel A), whereas there was a negative and highly significant (p<1%) relationship between $IssueSize_i$ and underpricing in all three models in non-top-ten underwriters subgroups (see Table 5.20, Panel B). In contrast with the main findings reported in Table 5.14, none of the coefficients on $IMkt_i$ were statistically significant.

Table 5.21 provides multiple regression results from testing post-issue stock performance for subsamples based on underwriters' reputation. F-Statistics in Table 5.21 revealed all models were useful (F<5%). The explanatory power of three models in the top-ten underwriters subgroups was slightly higher with adjusted *R-Square* values ranging from 0.202 to 0.209, whereas it was persistently low in non-top-ten underwriters subgroups with adjusted *R-Square* values ranging from 0.056 to 0.072. The coefficients on $DTAcc_i$ and $DLAcc_i$ were negative in both panels, but only

Table 5.20 Multiple regressions partitioning pooled sample by underwriters' reputation (underpricing)

Stats\Model		*Panel A: Top-ten underwriters*						*Panel B: Non-top-ten underwriters*					
		Model 1 Results		*Model 2 Results*		*Model 3 Results*		*Model 1 Results*		*Model 2 Results*		*Model 3 Results*	
Variables\Stat	*Prediction*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*
(Constant)			2.971***		2.958***		3.004***		6.737***		6.683***		6.820***
$DTAcc_i$	+	0.113	1.707*					0.091	2.143**				
$DCAcc_i$	+			-0.026	-0.371					0.006	0.133		
$DLAcc_i$	+					0.099	1.438					0.032	0.757
AD_i	-	-0.088	-1.320	-0.067	-0.985	-0.063	-0.942	-0.025	-0.616	-0.028	-0.694	-0.027	-0.674
$IMkt_i$	+	0.114	1.540	0.106	1.412	0.107	1.439	0.064	1.561	0.065	1.558	0.068	1.627
$PreLev_i$	?	-0.036	-0.497	-0.052	-0.674	-0.074	-0.974	0.035	0.822	0.028	0.622	0.016	0.356
Lag_i	+	0.036	0.440	0.035	0.422	0.035	0.431	-0.053	-1.065	-0.050	-0.998	-0.050	-0.994
$IssueSize_i$	-	-0.186	-2.151**	-0.178	-2.023**	-0.175	-2.006**	-0.363	-6.453***	-0.356	-6.298***	-0.359	-6.340***
Age_i	-	-0.008	-0.116	-0.006	-0.085	-0.002	-0.038	0.000	-0.011	-0.002	-0.058	-0.003	-0.073
SOE_i	+	0.088	1.293	0.064	0.943	0.069	1.033	0.039	0.941	0.035	0.840	0.035	0.833
$FinCrisis_i$	-	-0.072	-0.492	-0.076	-0.515	-0.071	-0.485	0.019	0.223	0.022	0.249	0.026	0.296
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.602		0.591		0.599		0.470		0.463		0.463	
Adj. R-Square		0.550		0.537		0.546		0.449		0.442		0.443	
F-Statistic		11.519***		10.998***		11.360***		22.966***		22.311***		22.391***	
Number		113		113		113		351		351		351	

Legend:

Model 1: $UP_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 IMkt_i+\gamma_3 PreLev_i+\gamma_4 Lag_i+\gamma_5 IssueSize_i+\gamma_6 Age_i+\gamma_7 Ind_i+\gamma_8 SOE_i+\gamma_9 FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 2: $UP_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 IMkt_i+\gamma_3 PreLev_i+\gamma_4 Lag_i+\gamma_5 IssueSize_i+\gamma_6 Age_i+\gamma_7 Ind_i+\gamma_8 SOE_i+\gamma_9 FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 3: $UP_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 IMkt_i+\gamma_3 PreLev_i+\gamma_4 Lag_i+\gamma_5 IssueSize_i+\gamma_6 Age_i+\gamma_7 Ind_i+\gamma_8 SOE_i+\gamma_9 FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

Table 5. 21 Multiple regressions partitioning pooled sample by underwriters' reputation (post-issue stock performance)

		Panel A: Top-ten underwriters						*Panel B: Non-top-ten underwriters*					
Stats\Model		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***	
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			0.833		0.809		0.768		2.990***		2.714***		2.659***
$DTAcc_i$	-	-0.003	-0.025					-0.136	-1.726*				
$DCAcc_i$	-			0.078	0.664					-0.059	-0.810		
$DLAcc_i$	-					-0.080	-0.684					-0.010	-0.132
Liq_i	+	0.125	0.711	0.137	0.781	0.131	0.752	-0.048	-0.450	-0.040	-0.369	-0.024	-0.225
$PostLev_i$	-	-0.292	-2.186**	-0.279	-2.096**	-0.272	-2.013**	-0.176	-2.160**	-0.169	-2.065**	-0.161	-1.969*
B/M_i	+	-0.241	-1.146	-0.217	-1.024	-0.210	-0.986	-0.124	-0.915	-0.125	-0.918	-0.121	-0.886
$IssueSize_i$	?	0.048	0.335	0.039	0.269	0.037	0.256	-0.221	-2.218**	-0.239	-2.397**	-0.240	-2.402**
UP_i	-	-0.048	-0.255	-0.018	-0.093	-0.025	-0.133	-0.040	-0.413	-0.061	-0.623	-0.060	-0.606
$Ln(P/E)_i$	-	-0.247	-1.049	-0.253	-1.115	-0.234	-1.025	-0.045	-0.355	-0.057	-0.449	-0.059	-0.468
SOE_i	+	-0.155	-1.301	-0.150	-1.290	-0.157	-1.352	-0.008	-0.102	-0.001	-0.010	0.001	0.019
ΔNI_i	+	-0.239	-1.525	-0.249	-1.776*	-0.227	-1.607	0.041	0.463	0.045	0.503	0.047	0.525
$MktRet_i$	+	-0.014	-0.025	0.006	0.011	-0.001	-0.003	-0.574	-2.105**	-0.574	-2.089**	-0.581	-2.110**
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.371		0.375		0.376		0.146		0.134		0.131	
Adj. R-Square		0.202		0.208		0.209		0.072		0.060		0.056	
F-Statistic		2.198**		2.245**		2.248**		1.976**		1.798**		1.174**	
Number		72		72		72		190		190		190	

Legend:

Model 4: $BHAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 Ln(P/E)_i+\gamma_7 SOE_i+\gamma_8 \Delta NI_i+\gamma_9 MktRet_i+\gamma_{10} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 5: $BHAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 Ln(P/E)_i+\gamma_7 SOE_i+\gamma_8 \Delta NI_i+\gamma_9 MktRet_i+\gamma_{10} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 6: $BHAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 Ln(P/E)_i+\gamma_7 SOE_i+\gamma_8 \Delta NI_i+\gamma_9 MktRet_i+\gamma_{10} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

significant for $DTAcc_i$ in the non-top-ten underwriters subgroup (see Table 5.21, Panel B). The coefficients on $DCAcc_i$ were positive in Panel A and negative in Panel B, but neither of them were significant. The results indicate that only $DTAcc_i$ had a significant and negative impact on firms' post-issue stock performance in IPO firms with non-top-ten underwriters. The insignificant relationship between discretionary accruals and post-issue stock performance in firms with top-ten underwriters suggests reputable underwriters helped to inhibit the influence of earnings management on long-term stock returns to some extent. This evidence also infers that the relationship between earnings management and post-issue stock performance in main findings was mainly driven by IPO firms employing non-top-ten underwriters.

With respect to control variables, the coefficients on $PostLev_i$ were negative and moderately significant ($p<5\%$) in all models in top-ten underwriters subgroups (see Table 5.21, Panel A). However, the significance levels on $PostLev_i$ were diverse in non-top-ten underwriters subgroups ($p<5\%$ in Panel B of *Models 4* and *5*, $p<10\%$ in Panel B of *Model 6*). In addition, the coefficient on ΔNI_i was negative and significant ($p<10\%$) in Panel A of *Model 5*. Moreover, the coefficients on $IssueSize_i$ and $MktRet_i$ were negative and significant ($p<5\%$) in non-top-ten underwriters subgroups across three models (see Table 5.21, Panel B). Other control variables were not significantly related to post-issue stock performance.

5.7.4 Global financial crisis (GFC)

Commencing in late 2007, there was a significant reduction in economic activities due to GFC. To investigate whether the relationship between earnings management and IPO stock performance was different between pre-crisis and post-crisis periods, all sample firms were divided into groups based on their listing year. An IPO firm listed in 2006 or 2007 was classified into the pre-crisis subsample (Panel A), otherwise firms were grouped into the post-crisis subsample (Panel B). Tables 5.22 and 5.23 report regression results for partitioning pooled sample by the GFC for underpricing and post-issue stock performance respectively.

In Table 5.22, all three models fit well in both panels ($F<1\%$). However, the explanatory power was slightly lower than that in Table 5.14, with adjusted *R-Square*

Table 5.22 Multiple regressions partitioning pooled sample by GFC (underpricing)

Stats\Model		*Panel A: Pre-crisis firm*						*Panel B: Post-crisis firm*					
		Model 1 Results		*Model 2 Results*		*Model 3 Results*		*Model 1 Results*		*Model 2 Results*		*Model 3 Results*	
Variables\Stat	*Prediction*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*
(Constant)			4.261***		3.974***		4.077***		5.647***		5.626***		5.786***
$DTAcc_i$	+	0.220	3.014***					0.090	1.882*				
$DCAcc_i$	+			-0.005	-0.070					0.024	0.480		
$DLAcc_i$	+					0.123	1.610					0.017	0.346
AD_i	-	-0.202	-2.857***	-0.197	-2.639***	-0.175	-2.376**	0.067	1.433	0.068	1.436	0.068	1.444
UW_i	-	0.073	1.054	0.076	1.048	0.074	1.031	-0.055	-1.138	-0.056	-1.167	-0.057	-1.173
$IMkt_i$	+	-0.060	-0.872	-0.051	-0.710	-0.043	-0.603	0.241	4.927***	0.238	4.828***	0.239	4.854***
$PreLev_i$	?	0.048	0.659	0.050	0.611	-0.001	-0.008	0.045	0.922	0.042	0.802	0.029	0.563
Lag_i	+	-0.074	-1.020	-0.063	-0.843	-0.072	-0.973	0.059	1.148	0.059	1137	0.061	1.163
$IssueSize_i$	-	-0.244	-3.301***	-0.217	-2.804***	-0.202	-2.656***	-0.376	-6.785***	-0.374	-6.687***	-0.378	-6.755***
Age_i	-	-0.035	-0.517	-0.043	-0.605	-0.041	-0.592	0.067	1.416	0.067	1.412	0.067	1.407
SOE_i	+	0.097	1.394	0.064	0.900	0.066	0.944	0.076	1.515	0.070	1.401	0.069	1.385
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.390		0.349		0.361		0.376		0.369		0.369	
Adj. R-Square		0.340		0.296		0.309		0.342		0.335		0.335	
F-Statistic		7.841***		6.574***		6.935***		11.150***		10.822***		10.811***	
Number		147		147		147		313[a]		313[a]		313[a]	

Legend:

Model 1: $UP_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 2: $UP_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{I,t}$

Model 3: $UP_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

a: Remove 4 outliers.

Table 5.23 Multiple regressions partitioning pooled sample by GFC (post-issue stock performance)

		Panel A: Pre-crisis firm						*Panel B: Post-crisis firm*					
Stats\Model		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***	
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			2.637***		2.755***		2.653***		-0.626		-0.858		-0.677
$DTAcc_i$	-	-0.091	-0.981					-0.167	-1.744*				
$DCAcc_i$	-			0.040	0.466					-0.230	-2.609**		
$DLAcc_i$	-					-0.082	-0.951					0.136	1.492
Liq_i	+	-0.055	-0.646	-0.042	-0.493	-0.040	-0.466	0.168	1.624	0.146	1.431	0.159	1.518
$PostLev_i$	-	-0.211	-2.371**	-0.206	-2.266**	-0.195	-2.137**	-0.185	-1.981*	-0.155	-1.699*	-0.150	-1.595
B/M_i	+	-0.121	-0.781	-0.104	-0.664	-0.096	-0.610	-0.110	-0.677	-0.135	-0.847	-0.122	-0.747
$IssueSize_i$	?	-0.141	-1.510	-0.159	-1.715*	-0.156	-1.687*	-0.024	-0.183	-0.009	-0.066	-0.003	-0.019
UP_i	-	-0.006	-0.053	-0.008	-0.066	0.004	0.036	-0.040	-0.373	-0.049	-0.466	-0.038	-0.354
UW_i	+	0.025	0.297	0.022	0.259	0.021	0.247	-0.082	-0.842	-0.102	-1.054	-0.096	-0.973
$Ln(P/E)_i$	-	-0.150	-1.146	-0.177	-1.373	-0.168	-1.306	0.069	0.395	0.088	0.513	0.106	0.602
SOE_i	+	0.005	0.056	0.021	0.232	0.013	0.143	-0.181	-1.952*	-0.193	-2.121**	-0.191	-2.045**
ΔNI_i	+	-0.106	-1.021	-0.118	-1.148	-0.113	-1.099	0.184	1.614	0.174	1.555	0.168	1.468
$MktRet_i$	+	-0.144	-1.714*	-0.141	-1.673*	-0.142	-1.686*	0.433	0.500	0.287	0.340	0.174	0.201
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.146		0.151		0.155		0.267		0.293		0.261	
Adj. R-Square		0.066		0.060		0.065		0.148		0.179		0.142	
F-Statistic		1.727*		1.664*		1.722*		2.252***		2.564***		2.185**	
Number		146		146		146		116		116		116	

Legend:

Model 4: $BHAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 5: $BHAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 6: $BHAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

values ranging from 0.296 to 0.340 in Panel A and 0.335 to 0.342 in Panel B. The coefficients on $DTAcc_i$ and $DLAcc_i$ were positive in both panels, whereas the coefficients on $DCAcc_i$ were negative in Panel A and positive in Panel B. In line with the results in Table 5.14, the positive association between $DTAcc_i$ and underpricing was significant in both panels, with different significance levels ($p<1\%$ in Panel A, $p<10\%$ in Panel B). However, none of the coefficients on $DCAcc_i$ or $DLAcc_i$ was significant. The different significance levels of $DTAcc_i$ imply that total discretionary accruals had less impact on underpricing for firms listed after the financial crisis than firms listed before the financial crisis. In summary, $DTAcc_i$ was an important determinant of underpricing, regardless of listing before or after the GFC. The results from pre-crisis and post-crisis subgroups were largely consistent with the main findings in Table 5.14, which suggests that the GFC had no undue influence on the relationship between earnings management and underpricing.

In the main findings, there were two control variables, $IMkt_i$ and $IssueSize_i$ that were significantly associated with underpricing (see Table 5.14). However, in Table 5.22, only the coefficients on $IssueSize_i$ were negative and highly significant ($p<1\%$) in all three models in both panels. The coefficients on $IMkt_i$ were negative in Panel A and positive in Panel B, but only significant ($p<1\%$) in all models in the post-crisis subgroups (see Table 5.22, Panel B), which suggests that the significance of $IMkt_i$ in the full sample was driven by firms that listed after the financial crisis. In addition, AD_i had a negative and significant ($p<1\%$ in *Models 1* and *2*, $p<5\%$ in *Model 3*) relationship with underpricing in the pre-crisis subsamples (see Table 5.22, Panel A).

Table 5.23 reports multiple regression results of post-issue stock performance based on pooled samples grouped by the GFC. As shown in Table 5.23, the F-Statistics were significant in both panels. The explanatory power of three models was poor in Panel A, as evidenced by low adjusted *R-Square* values (0.060 in *Model 5* to 0.066 in *Model 4*), while it was slightly higher in Panel B (adjusted *R-Square* values ranged from 0.142 in *Model 6* to 0.179 in *Model 5*). The coefficients on $DTAcc_i$ were negative in both panels, but only significant ($p<10\%$) in the post-crisis subsample. In addition, the directional signs of coefficients on $DCAcc_i$ and $DLAcc_i$ were different in subsamples. Specifically, the coefficients on $DCAcc_i$ were positive in Panel A and negative in Panel B, while the coefficients on $DLAcc_i$ were negative in Panel A and

positive in Panel B. However, only the coefficient on $DCAcc_i$ was moderately significant (p<5%) in the post-crisis subsample (see Table 5.23, Panel B). It seems that the associations between discretionary accruals and post-issue stock performance of pre-crisis and post-crisis subsamples were slightly different. The coefficients on $DTAcc_i$ and $DCAcc_i$ in partitioned subsamples in Table 5.23 did not fully support the main results reported in Table 5.15. Total and current discretionary accruals were significant influencing factors of post-issue stock performance only for the firms listed after the GFC, but not for the firms listed before the financial crisis, which suggests that the GFC had some moderating effect on the relationship between earnings management and post-issue stock performance, and the influences of discretionary accruals on long-term stock returns were more pronounced in post-crisis subgroups.

Regarding control variables, unlike the main findings reported in Table 5.15, $PostLev_i$ and $IssueSize_i$ were not significant in some subsamples as shown in Table 5.23. Specifically, the coefficients on $PostLev_i$ were negative and significant (p<5%) in all models in the pre-crisis subsamples, but only marginally significant (p<10%) in Panel B of *Models 4 and 5*. The coefficients on $IssueSize_i$ were negative and significant (p<10%) in *Models 5* and *6* in the pre-crisis subsamples (see Table 5.23, Panel A). Moreover, in the post-crisis subsamples, the coefficients on SOE_i were significant (p<10% in *Model 4*, p<5% in *Models 5* and *6*) with the directional signs in line with the main findings in Table 5.15 (see Table 5.23, Panel B). $MktRet_i$ was also negatively related to $BHAR_i$ and significant at the 10% confidence level in all models in Table 5.23, Panel A.

5.7.5 Ownership structure

Tables 5.24 and 5.25 show the regression results by breaking down the sample firms into SOE (Panel A) and non-SOE (Panel B) based on whether the firms' ultimate control was held by the State or not. Table 5.24 reports subsample regression results for underpricing, and Table 5.25 presents regression results of subsamples for post-issue stock performance respectively.

Table 5.24 Multiple regressions partitioning pooled sample by ownership structure (underpricing)

Stats\Model		*Panel A: SOE*						*Panel B: Non-SOE*					
		Model 1 Results		*Model 2 Results*		*Model 3 Results*		*Model 1 Results*		*Model 2 Results*		*Model 3 Results*	
Variables\Stat	*Prediction*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*
(Constant)			0.195		0.206		0.204		8.015***		8.074***		8.205***
$DTAcc_i$	+	0.183	1.765*					0.090	2.383**				
$DCAcc_i$	+			0.054	0.482					-0.009	-0.228		
$DLAcc_i$	+					0.094	0.858					0.049	1.274
AD_i	-	-0.043	-0.428	-0.053	-0.512	-0.055	-0.537	-0.030	-0.837	-0.027	-0.727	-0.025	-0.676
UW_i	-	0.209	-1.837*	-0.232	-1.974*	-0.216	-1.839*	0.006	0.177	0.007	0.189	0.006	0.174
$IMkt_i$	+	-0.169	-1.350	-0.161	-1.238	-0.162	-1.252	0.061	1.628	0.059	1.585	0.062	1.645
$PreLev_i$	?	0.212	1.841*	0.179	1.499	0.160	1.382	-0.011	-0.287	-0.018	-0.440	-0.031	-0.767
Lag_i	+	0.005	0.039	0.043	0.307	-0.010	-0.073	-0.029	-0.651	-0.026	-0.592	-0.025	-0.573
$IssueSize_i$	-	-0.120	-1.032	-0.112	-0.904	-0.080	-0.667	-0.354	-6.986***	-0.352	-6.899***	-0.354	-6.938***
Age_i	-	0.111	1.005	0.081	0.717	0.091	0.808	-0.002	-0.048	-0.002	-0.052	-0.002	-0.048
$FinCrisis_i$	-	0.125	0.683	0.175	0.908	0.111	0.567	-0.030	-0.388	-0.029	-0.369	-0.025	-0.319
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.675		0.651		0.656		0.504		0.497		0.499	
Adj. R-Square		0.542		0.508		0.515		0.487		0.480		0.482	
F-Statistic		5.067***		4.554***		4.643***		30.706***		29.847***		30.087***	
Number		56[b]		56[b]		56[b]		407		407		407	

Legend:

Model 1: $UP_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 2: $UP_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 3: $UP_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

b: Remove 1 outlier.

Table 5.25 Multiple regressions partitioning pooled sample by ownership structure (post-issue stock performance)

		Panel A: SOE						***Panel B: Non-SOE***					
Stats\Model		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***	
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			1.769*		1.872*		1.913*		2.120**		2.133**		2.089**
$DTAcc_i$	-	-0.325	-1.937**					-0.133	-1.845*				
$DCAcc_i$	-			-0.112	-0.713					-0.023	-0.321		
$DLAcc_i$	-					-0.102	-0.598					-0.045	-0.643
Liq_i	+	-0.069	-0.376	-0.106	-0.555	-0.098	-0.513	0.016	0.154	0.021	0.205	0.033	0.323
$PostLev_i$	-	-0.390	-2.062**	-0.254	-1.364	-0.300	-1.527	-0.190	-2.447**	-0.199	-2.536**	-0.188	-2.383**
B/M_i	+	0.007	0.025	-0.187	-0.652	-0.116	-0.385	-0.186	-1.489	-0.199	-1.574	-0.185	-1.465
$IssueSize_i$	?	-0.330	-1.533	-0.260	-1.133	-0.333	-1.423	-0.144	-1.557	-0.147	-1.579	-0.150	-1.609
UP_i	-	-0.512	-2.174**	-0.523	-2.121**	-0.515	-2.083**	0.031	0.343	0.027	0.299	0.036	0.391
UW_i	+	-0.205	-1.397	-0.194	-1.253	-0.175	-1.138	0.007	0.105	0.009	0.135	0.011	0.160
$Ln(P/E)_i$	-	0.130	0.500	0.001	0.004	0.065	0.235	-0.118	-0.930	-0.127	-0.990	-0.129	-1.005
ΔNI_i	+	0.425	1.809*	0.210	0.978	0.248	1.088	-0.069	-0.800	-0.072	-0.835	-0.068	-0.780
$MktRet_i$	+	-0.593	-1.476	-0.694	-1.650	-0.625	-1.468	-0.307	-1.027	-0.318	-1.054	-0.324	-1.076
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.407		0.349		0.347		0.154		0.140		0.141	
Adj. R-Square		0.119		0.034		0.030		0.085		0.069		0.071	
F-Statistic		1.415		1.108		1.094		2.221***		1.981**		2.003**	
Number		50		50		50		212		212		212	

Legend:

Model 4: $BHAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 \Delta NI_i+\gamma_9 MktRet_i+\gamma_{10} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 5: $BHAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 \Delta NI_i+\gamma_9 MktRet_i+\gamma_{10} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 6: $BHAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 \Delta NI_i+\gamma_9 MktRet_i+\gamma_{10} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

Results in Table 5.24 suggest that F-Statistics were highly significant in all models in subgroups with the explanatory power ranging from 0.508 to 0.542 in Panel A and 0.480 to 0.487 in Panel B. The coefficients on $DTAcc_i$ and $DLAcc_i$ were positive in both panels, but only significant on $DTAcc_i$ ($p<10\%$ in Panel A of *Model 1*, $p<5\%$ in Panel B of *Model 1*). The coefficients on $DCAcc_i$ were positive in Panel A (SOE) and negative in Panel B (non-SOE), but neither of these were significant. Findings from Tables 5.24 suggest that the SOE status of IPO firms did not unduly influence the relationship between discretionary accruals and underpricing.

With respect to control variables, the coefficients on UW_i were significant at the 10% confidence level in all three models in SOE subsamples, whereas the coefficient on $PreLev_i$ was only significant in Panel A of *Model 1* (see Table 5.24, Panel A). Moreover, the coefficients on $IssueSize_i$ were negative and significant ($p<1\%$) in three models in the non-SOE subgroups (see Table 5.24, Panel B).

Table 5.25 presents regression results for post-issue stock performance partitioning the full sample by SOE status. As shown in Table 5.25, Panel A, the overall fitness of the three models was poor, as evidenced by insignificant F-Statistics. However, in Panel B of Table 5.25, the F-Statistics were significant in all models ($F<1\%$ in *Model 4*, $F<5\%$ in *Models 5* and *6*). Adjusted *R-Square* values suggest the explanatory power of the models remained low in both subgroups. In line with the main findings in Table 5.15, the coefficients on total, current and long-term discretionary accruals were negative in both panels, but only significant on $DTAcc_i$ in both panels with different significance levels ($p<5\%$ in Panel A of *Model 4*, $p<10\%$ in Panel B of *Model 4*), which implies the relationship between $DTAcc_i$ and $BHAR_i$ was more pronounced in the SOE subsample. These results suggest that the SOE status of IPO firms did not overly influence the relationship between earnings management and long-term stock performance, and the significant relationship between $DTAcc_i$ and $BHAR_i$ existed in both SOE and non-SOE subsamples.

Regarding control variables, the coefficients on $PostLev_i$ were only significant at the 5% confidence level in Panel A of *Model 4* and all models in Panel B. In contrast to main findings in Table 5.15, $IssueSize_i$ was not a significant influencing factor in the post-issue stock performance, with insignificant coefficients in all subsamples. In

addition, in SOE subgroups, UP_i was negatively associated with $BHAR_i$ at the 5% confidence level in all models and ΔNI_i was only significant at the 10% confidence level in *Model 4* (see Table 5.25, Panel A).

5.7.6 Manufacturing industry

As suggested in previous sections, most of sample firms were from the manufacturing industry and stock performance varied across different industries (see Tables 5.3 and 5.4). To test whether industry classification affected the main findings, regressions were performed for manufacturing firms (Panel A) and non-manufacturing firms (Panel B) respectively. Table 5.26 reports subsample results for underpricing, whereas Table 5.27 shows the subgroup results for post-issue stock performance.

In Table 5.26, the F-Statistics were highly significant in all subgroups and the explanatory power was similar to that in Table 5.14. In line with the main findings in Table 5.14, the coefficients on $DTAcc_i$ and $DLAcc_i$ were positive in all subsamples, but only significant on $DTAcc_i$ at the 5% confidence level in both panels. The coefficients on $DCAcc_i$ were positive in Panel A and negative in Panel B, and again insignificant. Results in Tables 5.26 suggest the industry classification did not overly influence the relationship between earnings management and underpricing in the main findings.

Some of the control variables had statistical significance. Specifically, in line with the main findings, the coefficients on $IssueSize_i$ were negative and highly significant ($p<1\%$) in all models in both panels. Unlike the main findings in Table 5.14, the coefficients on $IMkt_i$ were only marginally significant ($p<10\%$) in *Models 1* and *3* in non-manufacturing subgroups (see Table 5.26, Panel B). In addition, as shown in Panel B of Table 5.26, UW_i was positively and significantly related to underpricing at the 5% confidence level in all models. There was no evidence to support the relationship between UW_i and underpricing in the main findings reported in Table 5.14.

Table 5.26 Multiple regressions partitioning pooled sample by industry (underpricing)

Stats\Model		*Panel A: Manufacturing*						*Panel B: Non-manufacturing*					
		Model 1 Results		*Model 2 Results*		*Model 3 Results*		*Model 1 Results*		*Model 2 Results*		*Model 3 Results*	
Variables\Stat	*Prediction*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*	*Beta*	*t-statistic*
(Constant)			6.570***		6.217***		6.356***		3.216***		3.616***		3.684***
$DTAcc_i$	+	0.107	2.537**					0.148	2.026**				
$DCAcc_i$	+			0.009	0.194					-0.003	-0.045		
$DLAcc_i$	+					0.041	0.922					0.063	0.929
AD_i	-	-0.038	-0.953	-0.035	-0.885	-0.034	-0.839	-0.095	-1.369	-0.097	-1.363	-0.094	-1.332
UW_i	-	-0.018	-0.451	-0.020	-0.491	-0.020	-0.489	0.188	2.645**	0.179	2.483**	0.181	2.513**
$IMkt_i$	+	0.050	1.228	0.053	1.293	0.057	1.373	0.148	1.945*	0.123	1.605	0.128	1.679*
$PreLev_i$	?	0.032	0.767	0.037	0.807	0.017	0.359	-0.009	-0.128	-0.024	-0.333	-0.030	-0.413
Lag_i	+	-0.011	-0.231	-0.008	-0.163	-0.008	-0.162	-0.001	-0.011	0.016	0.174	0.016	0.169
$IssueSize_i$	-	-0.357	-6.429***	-0.340	-6.115***	-0.341	-6.137***	-0.262	-3.316***	-0.294	-3.693***	-0.297	-3.768***
Age_i	-	-0.008	-0.197	-0.013	-0.314	-0.014	-0.334	0.236	0.814	0.003	0.041	0.007	0.105
SOE_i	+	0.053	1.289	0.055	1.316	0.054	1.304	0.113	1.524	0.074	1.004	0.074	1.016
$FinCrisis_i$	-	0.064	0.742	0.086	0.984	0.090	1.029	-0.050	-0.380	-0.045	-0.341	-0.044	-0.329
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.486		0.477		0.478		0.579		0.560		0.563	
Adj. R-Square		0.467		0.457		0.458		0.577		0.506		0.510	
F-Statistic		24.633***		23.692***		23.812***		11.257***		10.481***		10.644***	
Number		352		352		352		112		112		112	

Legend:

Model 1: $UP_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 2: $UP_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 3: $UP_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

Table 5.27 Multiple regressions partitioning pooled sample by industry (post-issue stock performance)

		Panel A: Manufacturing						*Panel B: Non-manufacturing*					
Stats\Model		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***		***Model 4 Results***		***Model 5 Results***		***Model 6 Results***	
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			0.844		1.325		1.317		1.460		1.265		1.197
$DTAcc_i$	-	-0.172	-2.296**					-0.243	-1.820*				
$DCAcc_i$	-			-0.068	-0.937					-0.074	-0.552		
$DLAcc_i$	-					-0.004	-0.059					-0.104	-0.807
Liq_i	+	0.030	0.275	0.033	0.298	0.045	0.407	-0.078	-0.471	-0.038	-0.227	-0.108	-0.110
$PostLev_i$	-	-0.196	-2.479**	-0.220	-2.725***	-0.207	-2.550**	-0.165	-1.039	-0.097	-0.603	-0.147	-0.880
B/M_i	+	-0.082	-0.614	-0.098	-0.722	-0.087	-0.634	-0.275	-1.280	-0.249	-1.126	-0.235	-1.069
$IssueSize_i$	?	-0.098	-0.966	-0.141	-1.402	-0.150	-1.494	-0.170	-1.135	-0.181	-1.172	-0.161	-1.046
UP_i	-	-0.047	-0.476	-0.077	-0.768	-0.069	-0.684	0.163	0.949	0.167	0.941	0.172	0.972
UW_i	+	-0.047	-0.658	-0.048	-0.654	-0.047	-0.647	0.154	1.122	0.177	1.253	0.176	1.253
$Ln(P/E)_i$	-	-0.058	-0.471	-0.102	-0.830	-0.105	-0.851	-0.307	-1.330	-0.290	-1.223	-0.304	-1.283
SOE_i	+	-0.039	-0.535	-0.034	-0.466	-0.037	-0.494	-0.054	-0.378	-0.039	-0.260	0.003	0.023
ΔNI_i	+	0.022	0.250	0.002	0.028	0.001	0.012	-0.075	-0.459	-0.056	-0.331	-0.052	-0.307
$MktRet_i$	+	-0.368	-1.484	-0.355	-1.413	-0.350	-1.390	-1.986	-2.156**	-1.930	-2.020**	-2.099	-2.201**
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Model Summary													
R-Square		0.172		0.152		0.148		0.392		0.356		0.361	
Adj. R-Square		0.107		0.085		0.080		0.162		0.111		0.118	
F-Statistic		2.630***		2.262***		2.188**		1.700*		1.456		1.484	
Number		192		192		192		70		70		70	

Legend:

Model 4: $BHAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 5: $BHAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Model 6: $BHAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See Table 4.6 for full definitions and descriptions for dependent, independent and control variables.

Table 5.27 presents the multiple regression results of post-issue stock performance based on pooled samples grouped by manufacturing industry. As shown in Table 5.27, the F-Statistics were significant in all models in Panel A, while only significant in Panel B of *Model 4*. The explanatory power was generally low in Panel A, but slightly higher in non-manufacturing firms with adjusted *R-Square* values ranging from 0.111 to 0.162 in Panel B. The directional signs and the significance levels of the coefficients on discretionary accruals in both panels were similar to the main findings in Table 5.15. Specifically, the coefficients on all discretionary accruals were negative in both panels, but only significant on $DTAcc_i$ ($p<5\%$ in Panel A of *Model 4*, $p<10\%$ in Panel B of *Model 4*). The results in Table 5.27 provide statistical evidence that the industry classification did not overly influence the relationship between discretionary accruals and post-issue stock performance reported in Table 5.15.

As indicated in Table 5.27, the majority of coefficients on the control variables were insignificant, aside from the $PostLev_i$ in Panel A and $MktRet_i$ in Panel B. Specifically, in Panel A of Table 5.27, the coefficients on $PostLev_i$ were negative and significant ($p<5\%$ in *Models 4* and *6*, $p<1\%$ in *Model 5*). Furthermore, the coefficients on $MktRet_i$ were negative and significant ($p<5\%$) in all models in the non-manufacturing subsamples (see Table 5.27, Panel B).

5.8 Summary

In this chapter the empirical results of this thesis were provided. The first two sections contained demographic characteristics and key descriptive statistics for the full sample. The third and fourth sections comprised correlation results and univariate analysis. In the fifth section main regression results for underpricing and post-issue stock performance were presented. The empirical results suggest a positive and significant relationship between pre-IPO total discretionary accruals and underpricing, whereas current and long-term discretionary accruals were not statistically related to the initial stock returns. Therefore, H_1 was supported while H_{1a} and H_{1b} were rejected. In addition, the higher level of total discretionary accruals prior to the IPO was found to be associated with poorer long-term stock performance. However, there was no statistical evidence to support the relationship between

current or long-term discretionary accruals and post-issue stock performance. Consequently, H_2 was supported, but not H_{2a} or H_{2b}.

Finally, to test the robustness of the main findings, the models in Tables 5.14 and 5.15 were repeated by partitioning sample firms into subgroups based on firm characteristics. The regression results of underpricing from the pooled samples were qualitatively consistent with the primary findings, implying that firm characteristics did not overly affect the main regression results in underpricing. In terms of post-issue stock performance, despite some coefficients in subsamples (e.g. income-increasing subsample, large issue subsample, top-ten subsample and pre-crisis subsample) being less significant than the full sample, the results in the robustness checks were generally in line with the main findings. Therefore, overall the subsamples robustness checks supported the primary results reported in Tables 5.14 and 5.15.

In the next chapter a sensitivity analysis is conducted to ensure the main findings in this chapter are robust to alternative measures of variables.

Chapter 6: Sensitivity analysis

6.1 Introduction

In Chapter 5 the main results of the thesis were presented. When using discretionary accruals as proxies for earnings management, $DTAcc_i$ had a positive impact on IPO underpricing and negative impact on post-issue stock performance. However, there was no statistical evidence to support the association between current or long-term discretionary accruals and IPO stock performance. Overall, H_1 and H_2 were accepted while H_{1a}, H_{1b}, H_{2a} and H_{2b} were all rejected.

In this chapter a sensitivity analysis is conducted to ensure the results in the prior chapter are robust to alternative measures of underpricing, post-issue stock performance and earnings management.

6.2 Sensitivity tests

In this section main regression models (*Models 1* to *6*) are replicated by replacing dependent variables (UP_i and $BHAR_i$) and applying alternative measures of discretionary accruals.

6.2.1 Alternative measures of underpricing

Although computing initial returns is a relatively straightforward procedure (i.e. underpricing based on raw returns), there is still much debate as to whether raw returns or market-adjusted returns should be used in testing the relationship between IPO returns and factors known to influence returns. The initial raw returns are generally considered as a popular method to test the relationship between IPO underpricing and other factors (Shen et al., 2014; Coakley et al., 2009), whereas market-adjusted initial returns are normally used to verify the phenomenon of underpricing (Chen et al., 2004). To ensure the robustness of the results, market-adjusted initial returns (*MktIR*) was used to replace the initial raw returns in *Models 1*, 2 and *3*. In addition, Chang et al. (2008) further examined initial returns of primary and secondary markets and found that the initial abnormal returns in the secondary market were also significantly positive in the PRC. Following Chang et al. (2008),

this research also conducts further analysis on underpricing based on the primary and secondary markets separately.

6.2.1.1 Using *MktIR* as an alternative measure of underpricing

The market-adjusted initial return of IPO *i* (denoted $MktIR_i$) is calculated as in *Formula 33*:

$$MktIR_i = (P_{i1} / P_{i0}) - (I_{i1} / I_{i0}) \quad [33]$$

Where:
$MktIR_i$ = Market-adjusted initial return on stock of IPO *i*;
P_{i1} = closing price of stock of IPO *i* at the end of first day of trading;
P_{i0} = offer price of the stock of IPO *i*;
I_{i1} = SME board composite market index at the end of first trading day of IPO firm *i*; and
I_{i0} = SME board composite market index at the end of offer day of IPO firm *i*.

Table 6.1 presents results using $MktIR_i$ to re-run *Models 1*, *2* and *3*. The overall fitness of the three equations was good (F<1%) and the explanatory power was high (adjusted *R-Square* values ranged from 0.461 in *Equation* 2 to 0.469 in *Equation 1*). The directional signs and significance levels of coefficients on discretionary accruals were exactly the same as the main findings reported in Table 5.14. More specifically, the coefficients on $DTAcc_i$ and $DLAcc_i$ were both positive, but only significant on $DTAcc_i$ (p<5%). The only negative coefficient was on $DCAcc_i$, but it was insignificant. The results suggest that the association between earnings management and underpricing reported in Table 5.14 was not sensitive to the alternative measure of underpricing.

Regarding control variables, consistent with main findings, the coefficients on $IssueSize_i$ were negative and highly significant (p<1%) in all three equations. However, in contrast to the results in Table 5.4, there was no specified significance of $IMkt_i$ in Table 6.1.

Table 6.1 Sensitivity tests using $MktIR_i$ as an alternative measure of underpricing

Stats\Equation		*Equation 1 Results*		*Equation 2 Results*		*Equation 3 Results*	
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			7.377***		7.363***		7.506***
$DTAcc_i$	+	0.092	2.579**				
$DCAcc_i$	+			-0.004	-0.111		
$DLAcc_i$	+					0.047	1.296
AD_i	-	-0.045	-1.313	-0.043	-1.244	-0.042	-1.196
UW_i	-	0.012	0.351	0.011	0.299	0.011	0.302
$IMkt_i$	+	-0.003	-0.072	-0.002	-0.068	0.000	0.001
$PreLev_i$	?	0.004	0.104	-0.004	-0.112	-0.017	-0.453
Lag_i	+	-0.019	-0.452	-0.017	-0.396	-0.017	-0.389
$IssueSize_i$	-	-0.310	-6.584***	-0.304	-6.422***	-0.306	-6.469***
Age_i	-	-0.009	-0.257	-0.009	-0.270	-0.009	-0.268
SOE_i	+	0.051	1.424	0.042	1.187	0.043	1.200
$FinCrisis_i$	-	0.000	-0.006	0.002	0.023	0.006	0.077
Ind_i		YES		YES		YES	
$Year_i$		YES		YES		YES	
Equation Summary							
R-Square		0.485		0.477		0.479	
Adj. R-Square		0.469		0.461		0.463	
F-Statistic		30.180***		29.272***		29.500***	
Number		464		464		464	

Legend:

Equation 1: $MktIR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Equation 2: $MktIR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Equation 3: $MktIR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See *Formula 33* for definition and description for dependent variable and Table 4.6 for full definitions and descriptions for independent and control variables.

6.2.1.2 Further analysis of underpricing based on primary and secondary markets

As previously discussed, Chang et al. (2008) separated IPO initial returns based on the primary and secondary markets. They (Chang et al., 2008) found that in addition to the primary market, initial abnormal returns in the secondary market were also significantly positive due to the high risk involved. To test the formation of underpricing and its relationship with earnings management, this thesis used initial returns in the primary market ($UPPri_i$) and secondary market ($UPSec_i$) separately to replace UP_i in the regression models in this section. $UPPri_i$ is defined as the percentage of difference between the beginning price in the first trading day and the offer price, whereas $UPSec_i$ is defined as the percentage of difference between the closing price and the beginning price in the first trading day. *Formulas 34* and *35* are performed to calculate $UPPri_i$ and $UPSec_i$ respectively:

$$UPPri_i = (P_{ib} - P_{i0})/P_{i0} \quad [34]$$

$$UPSec_i = (P_{i1} - P_{ib})/P_{ib} \quad [35]$$

Where:
$UPPri_i$ = Initial return in the primary market on stock of IPO *i*;
$UPSec_i$ = initial return in the secondary market on stock of IPO *i*;
P_{ib} = beginning price of stock of IPO *i* in the first trading day;
P_{i0} = offer price of the stock of IPO *i*; and
P_{i1} = closing price of stock of IPO *i* at the end of first trading day.

Table 6.2 provides mean and median values of the initial returns in the primary and secondary markets in contrast to initial raw returns shown in earlier section of the thesis.

Table 6.2 UP_i, $UPPri_i$ and $UPSec_i$ based on IPO year and industry

	N	UP_i		$UPPri_i$		$UPSec_i$	
		Mean	**Med.**	**Mean**	**Med.**	**Mean**	**Med.**
Total	***464***	***96.71%***	**67.07%**	**90.36%**	**64.45%**	**3.55%**	**1.80%**
Panel A: IPO year distribution							
2006	51	91.92%	86.38%	89.44%	80.45%	2.01%	1.73%
2007	96	207.15%	184.40%	198.30%	182.50%	3.12%	3.61%
2008	67	120.20%	85.01%	106.65%	77.25%	8.14%	2.97%
2009	53	65.28%	54.38%	61.95%	55.64%	2.05%	1.05%
2010	197	44.60%	30.09%	40.09%	29.76%	3.00%	1.72%
Panel B: Industry distribution							
A Agriculture	11	90.20%	72.20%	88.53%	74.90%	0.38%	0.30%
B Mining	4	171.62%	122.79%	153.40%	114.18%	6.03%	6.02%
C Manufacturing	352	95.94%	65.07%	87.86%	60.24%	4.51%	2.56%
D Utilities	2	29.21%	29.21%	21.86%	21.86%	5.42%	5.42%
E Construction	12	79.41%	52.10%	77.25%	58.49%	1.81%	0.58%

(*Continued on next page*)

Table 6.2 UP_i, $UPPri_i$ and $UPSec_i$ based on IPO year and industry (continued)

	N	UP_i		$UPPri_i$		$UPSec_i$	
		Mean	**Med.**	**Mean**	**Med.**	**Mean**	**Med.**
F Transportation	3	35.02%	33.60%	36.22%	38.88%	-0.72%	0.69%
G Information Technology	46	93.67%	71.52%	96.30%	79.89%	-0.58%	-2.74%
H Wholesale and Retail	12	94.02%	76.08%	86.65%	83.25%	1.79%	-1.31%
J Real Estate	6	96.05%	73.98%	105.70%	94.84%	-5.81%	-5.69%
K Social Services	12	151.68%	130.05%	149.49%	128.01%	2.17%	2.05%
L Media	2	183.19%	183.19%	168.57%	168.57%	5.54%	5.54%
M Conglomerate	2	52.73%	52.73%	48.16%	48.16%	1.69%	1.69%

As shown in Table 6.2, the average (median) UP_i was 96.71% (67.07%) and the mean (median) value of $UPPri_i$ was 90.36% (64.45%). However, the average (median) $UPSec_i$ was only 3.55% (1.80%). Since UP_i was comprised of $UPPri_i$ and $UPSec_i$, it seems the high level of underpricing was mainly formed in the primary market. This finding is consistent with prior literature which has documented that the large disparity between the two markets was induced by speculators whose purpose for investment was not for investing in good firms, but to take advantage of the price difference (Chang et al., 2008). This price gap also led to excessive demand for subscription of IPOs in the primary market. Before 2012, all institutional pre-IPO shareholders needed to wait for three months since the listing date to sell their shares in an IPO, while individual investors were not subject to any restriction of lock up period (CSRC, 2012). As a result, it could be inferred from Table 6.2 that individual investors who get the stock at the offering price and immediately sell it would make a profit by taking advantage of the price gap. On the other hand, those investors who buy IPO shares shortly after opening will pay the high price and are the losers.

As indicated in Table 6.2, Panel A, all IPOs were underpriced in both primary and secondary markets across the sample period. The mean values of UP_i and $UPPri_i$ were highest in 2007 (207.15% and 198.30% respectively) and lowest in 2010 (44.60% and 40.09% respectively). However, the mean values of $UPSec_i$ had a different trend, with the highest value in 2008 (8.14%) and the lowest value in 2006 (2.01%). In Table 6.2, Panel B, although IPO firms were underpriced in the primary market in all industries, not all of them were underpriced in the secondary market. Firms from transportation, information technology and real estate industries had negative average $UPSec_i$ values, while firms from agriculture, mining, manufacturing, utilities,

construction, wholesale and retail, social services, media and conglomerate industries gained positive $UPSec_i$ returns on average in the first trading day. In addition, for firms from information technology, and real estate industries, the levels of underpricing were extremely high in the primary market (average $UPPri_i$ were 96.30% and 105.70% respectively), in contrast to the negative initial returns in the secondary market (average $UPSec_i$ were -0.58% and -5.81% respectively), which implies that firms from those industries were substantially overvalued in the primary market.

To further investigate in which market (primary or secondary market) earnings management influenced underpricing, $UPPri_i$ (Panel A) and $UPSec_i$ (Panel B) were replaced as alternative measures of underpricing to test the hypotheses. The results are presented in Table 6.3.

As presented in Table 6.3, the F-Statistics were highly significant in all equations. Meanwhile, the explanatory power of the three equations was consistently high in Panel A (adjusted *R-Square* values ranged from 0.488 in *Equation 2* to 0.500 in *Equation 1*), but much lower in Panel B (adjusted *R-Square* values ranged from 0.023 in *Equation 3* to 0.025 in *Equation 1*). Compared with the main findings, the coefficients on $DTAcc_i$ and $DCAcc_i$ were positive in Panel A, but negative in Panel B. However, only $DTAcc_i$ in Panel A was significantly ($p<1\%$) related to underpricing. The coefficients on $DLAcc_i$ were positive in both panels, but neither of these were significant. This suggests that $DTAcc_i$ affected underpricing in the primary market, but did not have any significant influence on initial returns in the secondary market.

In terms of control variables, the coefficients on $IssueSize_i$ were negative and highly significant in all equations in both panels, consistent with the main findings reported in Table 5.14. The coefficients on $IMkt_i$[48] were positive and marginally significant ($p<10\%$) in all equations in the primary market (see Table 6.3, Panel A). In the secondary market, the coefficients on $FinCrisis_i$ were positive and significant ($p<10\%$) in all three equations, while the coefficients on $PreLev_i$ were positive but only significant ($p<10\%$) in *Equation 1* (see Table 6.3, Panel B).

[48] Because $IMkt_i$ represents market sentiment during the period between offering and listing, there is no need for it to be controlled for in the equations in the secondary market.

Table 6.3 Sensitivity tests using $UPPri_i$ and $UPSec_i$ as alternative measures of underpricing

Stats\Equation		*Panel A: UPPri – Primary market*						*Panel B: UPSec – Secondary market*					
		Equation 1 Results		*Equation 2 Results*		*Equation 3 Results*		*Equation 1 Results*		*Equation 2 Results*		*Equation 3 Results*	
Variables\Stat	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			7.382***		7.317***		7.492***		1.465		1.521		1.471
$DTAcc_i$	+	0.112	3.219***					-0.044	-0.911				
$DCAcc_i$	+			0.008	0.226					-0.040	-0.790		
$DLAcc_i$	+					0.044	1.244					0.018	0.375
AD_i	-	-0.049	-1.472	-0.048	-1.401	-0.045	-1.337	0.003	0.055	0.004	0.076	0.002	0.050
UW_i	-	0.040	1.164	0.038	1.093	0.038	1.094	-0.037	-0.788	-0.037	-0.783	-0.037	-0.775
$IMkt_i$	+	0.064	1.832*	0.063	1.791*	0.066	1.880*						
$PreLev_i$	?	-0.037	-1.038	-0.042	-1.123	-0.058	-1.567	0.085	1.687*	0.075	1.421	0.083	1.585
Lag_i	+	-0.027	-0.664	-0.025	-0.598	-0.024	-0.585	0.019	0.338	0.019	0.336	0.019	0.324
$IssueSize_i$	-	-0.263	-5.754***	-0.256	-5.542***	-0.258	-5.588***	-0.170	-2.669***	-0.173	-2.720***	-0.174	-2.722***
Age_i	-	-0.012	-0.369	-0.013	-0.382	-0.013	-0.382	0.001	0.013	0.001	0.015	0.001	0.012
SOE_i	+	0.049	1.408	0.039	1.122	0.039	1.122	0.002	0.052	0.005	0.101	0.006	0.134
$FinCrisis_i$	-	-0.075	-1.038	-0.074	-1.008	-0.069	-0.941	0.187	1.852*	0.190	1.879*	0.188	1.858*
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Equation Summary													
R-Square		0.515		0.504		0.505		0.054		0.054		0.053	
Adj. R-Square		0.500		0.488		0.490		0.025		0.024		0.023	
F-Statistic		34.050***		32.566***		32.781***		1.834**		1.819**		1.782**	
Number		464		464		464		464		464		464	

Legend:

Panel A-Equation 1: $UPPri_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel A-Equation 2: $UPPri_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel A-Equation 3: $UPPri_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 1: $UPSec_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 PreLev_i+\gamma_4 Lag_i+\gamma_5 IssueSize_i+\gamma_6 Age_i+\gamma_7 Ind_i+\gamma_8 SOE_i+\gamma_9 FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 2: $UPSec_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 PreLev_i+\gamma_4 Lag_i+\gamma_5 IssueSize_i+\gamma_6 Age_i+\gamma_7 Ind_i+\gamma_8 SOE_i+\gamma_9 FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 3: $UPSec_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 PreLev_i+\gamma_4 Lag_i+\gamma_5 IssueSize_i+\gamma_6 Age_i+\gamma_7 Ind_i+\gamma_8 SOE_i+\gamma_9 FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See *Formulas 34* and *35* for definitions and descriptions for dependent variables and Table 4.6 for full definitions and descriptions for independent and control variables.

The findings in Table 6.3 indicate that high levels of underpricing induced by earnings management mainly occured in the primary market in which speculative investors took advantage of the gap between offering and listing prices. In the secondary market, however, IPO firms exhibited general market performance and the stock returns were influenced by factors other than earnings management.

6.2.2 Alternative measures of post-issue stock performance

In this thesis $BHAR_i$ is used in the main analysis as metric for measuring post-issue stock performance. $BHAR_i$ was considered the best measure of long-term stock performance because it reflected the compounding monthly returns an investor would realize when purchasing and holding a stock for a specific time period (Jaskiewicz et al., 2005). However, $BHAR_i$ was sensitive to the selection of benchmarks. To ensure the robustness of the results, alternative benchmarks were used to calculate $BHAR_i$ and the main regressions in Table 5.15 were reperformed. In addition, CAR_i was used to replace $BHAR_i$ to conduct sensitivity tests, given that CAR_i is another popular metric for measuring long-term stock performance (Barber & Lyon, 1997).

6.2.2.1 Using alternative benchmarks to calculate *BHARs*

As previously mentioned, the *BHARs* calculation is sensitive to benchmark selection. For instance, Sapusek (2000) found neutral, over-performance, and underperformance of German IPOs in the long term when using different benchmark indices and matched-firm to calculate the *BHARs*. Among various benchmarks, Barber and Lyon (1997) concluded that the matched-firm approach eliminated new listing bias, rebalancing bias and skewness problems. Hence, in this section, two alternative methods were used to calculate *BHARs*. First, 36-month buy-and-hold returns adjusted by the SZSE main board composite index were used to identify the relationship between discretionary accruals and post-issue stock performance. Second, each sample firm was matched with a control firm based on size and *B/M* ratio. Buy-and-hold returns adjusted by matched-firm were used as an alternative measure of post-issue stock performance. Consistent with prior literature (Fama & French, 1993), matched firms were selected based on their closest size (measured by market value at the end of the issuing month) and *B/M* ratio (measured by book value

at the end of the fiscal year prior to the IPO divided by market value at the end of the issuing month) following suggestions by Barber and Lyon (1997).

The buy-and-hold adjusted returns by the SZSE main board composite index (denoted $BHARsz_i$) and buy-and-hold adjusted returns by matched firm (denoted $BHARmf_i$) are calculated in *Formulas 36* and *37* respectively:

$$BHARsz_i = \left[\prod_{t=1}^{T}(1+r_{i,t})-1\right]-\left[\prod_{t=1}^{T}(1+r_{sz,t})-1\right] \quad [36]$$

Where:
$BHARsz_i$ = Buy-and-hold return adjusted by the SZSE main board composite index for stock of IPO *i* for 36-month holding period;
$r_{i,t}$ = monthly return on stock of IPO *i* in the calendar month *t*;
$r_{sz,t}$ = monthly return of the SZSE main board composite market index in the calendar month *t*; and
T = 36 months.

$$BHARmf_i = \left[\prod_{t=1}^{T}(1+r_{i,t})-1\right]-\left[\prod_{t=1}^{T}(1+r_{mf,t})-1\right] \quad [37]$$

Where:
$BHARmf_i$ = Buy-and-hold return adjusted by matched firm for stock of IPO *i* for 36-month holding period;
$r_{i,t}$ = monthly return on stock of IPO *i* in the calendar month *t*;
$r_{mf,t}$ = monthly return of the matched firm in the calendar month *t*; and
T = 36 months.

To test the relationship between earnings management and *BHARs*, all sample firms were partitioned into positive and negative groups based on the directional signs on $DTAcc_i$. Accordingly, the positive group contained 124 IPO firms and the negative group contained 138 IPO firms. Table 6.4 compares the mean values of *BHARs* between those two groups based on various benchmarks and holding periods.

As shown in Table 6.4, Panel A, BHARs were reported using various benchmarks. Raw returns used zero as benchmark, while adjusted returns used the SME board composite index, the SZSE main board composite index and matched firms respectively. All returns were reported based on the 36-month observation period in Panel A of Table 6.4. It is observed that 262 SME IPOs generally over-performed various benchmarks (e.g. zero, the SME board, the SZSE main board and matched firms) during the 36-month observation period. The results also show that mean values of BHARs varied with the benchmark selected. For 262 IPOs, the mean value of BHARs was highest when adjusted by the SZSE main board composite market

index (49.86%), while lowest when adjusted by the SME board composite market index (3.12%). It shows again that post-issue stock performance was very sensitive to benchmark selection. When using BHARs to measure post-issue stock performance, the positive groups underperformed the negative groups on average by 26.28% in raw returns, 18.17% in SME market adjusted returns, 20.97% in SZSE market adjusted returns and 9.09% in matched firm adjusted returns. Moreover, the differences in average BHARs between each group were significant with various benchmarks. The only exception was in the matched firm adjusted returns group.

Table 6.4 *BHARs* using various benchmarks and holding periods based on the direction of $DTAcc_i$

Various returns	*BHARs*				
	All	**Positive**	**Negative**	**Mean difference**	**t-statistic**
	262	124	138		
Panel A[49]: Benchmark variations					
Raw returns	45.91%	32.06%	58.34%	-26.28%	-2.767***
SME market adjusted returns	3.12%	-6.45%	11.72%	-18.17%	-2.161**
SZSE market adjusted returns	49.86%	38.81%	59.78%	-20.97%	-2.517**
Matched firm adjusted returns	6.74%	1.95%	11.04%	-9.09%	-0.795
Panel B[50]: Holding period variations					
12 months	-5.26%	-11.45%	3.08%	-14.53%	-3.021***
24 months	-0.45%	-8.64%	6.91%	-15.55%	-2.502**
36 months	3.12%	-6.45%	11.72%	-18.17%	-2.161**

Legend:
*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.
Positive firms had positive *DTAcc*, while negative firms had negative *DTAcc*.

For brevity, Table 6.4, Panel B reports the average *BHARs* adjusted by the SME board composite market index with various holding periods. In contrast with some prior literature reporting long-term underperformance (Gregory et al., 2010; Ritter, 1991), the average *BHARs* of 262 SME IPOs exhibited an increasing trend from -5.26% to 3.12% from 12 months to 36 months. In addition, IPO firms with negative $DTAcc_i$ still generally performed better than firms with positive $DTAcc_i$ during various holding periods. IPO firms in the negative group over-performed those in the positive group on average by 14.53% (12 months), 15.55% (24 months) and 18.17% (36 months) respectively when evaluated by *BHARs*. All those differences were significant in all groups with various holding periods.

[49] In Panel A, the benchmarks for *BHAR* were various: zero for 'Raw return', SME board composite market index for 'SME market adjusted return', SZSE main board composite index for 'SZSE market adjusted return' and matched firms for 'Matched firm adjusted return'. All returns were reported based on the 36-month observation period in Panel A.

[50] In Panel B, the benchmark for *BHAR* was the SME board composite market index with various holding periods.

To further investigate whether the main results were sensitive to alternative benchmarks of *BHARs*, the SZSE main board composite index (Panel A) and matched firms (Panel B) were replaced as alternative benchmarks to calculate *BHARs*. Table 6.5 presents regression results for post-issue stock performance by reperforming *Models 4*, *5* and *6*.

As shown in Table 6.5, the F-Statistics were highly significant in all equations and the explanatory power was slightly improved in Panel A (adjusted *R-Square* values ranged from 0.111 to 0.126 in Panel A) compared with the results reported in Table 5.15, but consistently low in Panel B (adjusted *R-Square* values ranged from 0.068 to 0.078 in Panel B). In line with the results reported in Table 5.15, findings show that the coefficients on $DTAcc_i$ were again negative and significant in both panels ($p<5\%$ in Panel A, $p<10\%$ in Panel B). The coefficients on $DCAcc_i$ were negative in Panel A and positive in Panel B, whereas both coefficients were negative on $DLAcc_i$. However, none of the coefficients on $DCAcc_i$ or $DLAcc_i$ were significant. The results suggest that the relationship between earnings management and post-issue stock performance was not sensitive to alternative benchmarks measuring *BHARs*.

The results of control variables in Panel A of Table 6.5 were generally the same as those reported in Table 5.15. $PostLev_i$ and $IssueSize_i$ were consistently negative and significant ($p<5\%$) related to post-issue stock performance in all equations (see Table 6.5, Panel A). In Panel B of Table 6.5, however, none of the control variables was significantly related to long-term stock returns. In summary, the main results reported in Table 5.15 were generally robust to alternative benchmarks measuring *BHARs*.

Table 6.5 Sensitivity tests using alternative benchmarks to calculate *BHARs*

		Panel A: BHARssz-using SZSE main board index as benchmark						***Panel B: BHARsmf-using matched firms as benchmark***					
Stats\Equation		***Equation 4 Results***		***Equation 5 Results***		***Equation 6 Results***		***Equation 4 Results***		***Equation 5 Results***		***Equation 6 Results***	
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			3.263***		3.381***		3.304***		1.193		1.384		1.266
$DTAcc_i$	-	-0.132	-2.071**					-0.118	-1.751*				
$DCAcc_i$	-			-0.022	-0.355					0.031	0.498		
$DLAcc_i$	-					-0.047	-0.773					-0.093	-1.485
Liq_i	+	-0.034	-0.397	-0.024	-0.269	-0.014	-0.157	-0.126	-1.401	-0.105	-1.165	-0.100	-1.118
$PostLev_i$	-	-0.139	-2.165**	-0.137	-2.103**	-0.130	-2.004**	-0.076	-1.044	-0.080	-1.085	-0.070	-0.947
B/M_i	+	-0.093	-0.856	-0.095	-0.863	-0.083	-0.759	-0.089	-0.784	-0.081	-0.713	-0.071	-0.620
$IssueSize_i$	?	-0.166	-2.089**	-0.182	-2.276**	-0.184	-2.303**	-0.047	-0.559	-0.071	-0.842	-0.066	-0.794
UP_i	-	-0.029	-0.352	-0.038	-0.463	-0.029	-0.351	0.131	1.548	0.127	1.484	0.139	1.616
UW_i	+	-0.024	-0.400	-0.019	-0.317	-0.018	-0.290	-0.042	-0.677	-0.036	-0.574	-0.036	-0.570
$Ln(P/E)_i$	-	-0.109	-1.052	-0.136	-1.302	-0.133	-1.280	-0.070	-0.653	-0.096	-0.894	-0.087	-0.818
SOE_i	+	-0.052	-0.844	-0.040	-0.637	-0.040	-0.639	-0.068	-1.044	-0.059	-0.897	-0.060	-0.923
ΔNI_i	+	0.003	0.046	-0.008	-0.113	-0.006	-0.079	0.058	0.762	0.050	0.651	0.054	0.711
$MktRet_i$	+	-0.197	-0.851	-0.199	-0.853	-0.201	-0.863	-0.277	-1.108	-0.274	-1.089	-0.280	-1.118
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Equation Summary													
R-Square		0.180		0.166		0.167		0.142		0.132		0.139	
Adj. R-Square		0.126		0.111		0.113		0.078		0.068		0.075	
F-Statistic		3.351***		3.040***		3.075***		2.224***		2.044***		2.169***	
Number		262		262		262		260[c]		260[c]		260[c]	

Legend:

Panel A-Equation 4: $BHARsz_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel A-Equation 5: $BHARsz_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel A-Equation 6: $BHARsz_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 4: $BHARmf_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 5: $BHARmf_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 6: $BHARmf_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See *Formulas 36* and *37* for definitions and descriptions for dependent variables and Table 4.6 for full definitions and descriptions for independent and other control variables.

c: Remove 2 outliers.

6.2.2.2 Using *CARs* as an alternative measure of post-issue stock performance

Compared with *BHARs*, *CARs* produce fewer spurious rejections of market efficiency (Fama, 1998). Hence the *CARs* are considered as an alternative measure of long-term stock performance. 36-month cumulative returns adjusted by the SME board composite index of the individual IPO firm *i* (denoted CAR_i) is calculated using *Formula 38*:

$$CAR_i = \sum_{t=1}^{T} (r_{i,t} - r_{m,t}) \quad [38]$$

Where:

CAR_i = Cumulative average adjusted return on stock of IPO *i* for 36-month holding period;
$r_{i,t}$ = monthly return on the stock of IPO *i* in the event month *t*;
$r_{m,t}$ = monthly return on the SME board composite market index in the event month *t*; and
T = 36 months.

To further test the relationship between earnings management and *CARs*, all sample firms were partitioned into positive and negative groups based on the directional signs on $DTAcc_i$. Table 6.6 reports the mean values of *CARs* with various benchmarks and holding periods, and compares the mean difference between each group.

Table 6.6 *CARs* using various benchmarks and holding periods based on the direction of $DTAcc_i$

Various returns	*CARs*				
	All	**Positive**	**Negative**	**Mean difference**	**t-statistic**
	262	124	138		
Panel A[51]: Benchmark variations					
Raw returns	62.89%	51.09%	73.50%	-22.41%	-2.886***
SME market adjusted returns	12.13%	4.33%	19.13%	-14.80%	-2.487**
SZSE market adjusted returns	54.04%	43.80%	63.24%	-19.44%	-3.104***
Matched firm adjusted returns	1.31%	-3.89%	5.99%	-9.88%	-1.251
Panel B[52]: Holding period variations					
12 months	-0.26%	-6.52%	5.36%	-11.88%	-3.328***
24 months	6.02%	-1.58%	12.84%	-14.42%	-3.038***
36 months	12.13%	4.33%	19.13%	-14.80%	-2.487**

Legend:
*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.
Positive firms had positive *DTAcc*, while negative firms had negative *DTAcc*.

[51] In Panel A, the benchmarks for *CAR* were various: zero for 'Raw return', SME board composite market index for 'SME market adjusted return', SZSE main board composite index for 'SZSE market adjusted return' and matched firms for 'Matched firm adjusted return'. All returns were reported based on the 36-month observation period in Panel A.

[52] In Panel B, the benchmark for *CAR* was the SME board composite market index with various holding periods.

Table 6.6, Panel A reports average *CARs* with various benchmarks based on the 36-month observation period. The mean values of *CARs* of 262 SME IPOs were generally positive, which indicates SME IPOs once again over-performed various benchmarks (e.g. zero, the SME board, the SZSE main board and matched firms) during the 36-month observation period even when evaluated by *CARs*. Specifically, the average *CARs* were highest when measured by raw returns (62.89%), and lowest when adjusted by matched firms (1.31%). The mean values of *CARs* with various benchmarks were lower in the positive group than those in the negative group (22.41% in raw returns, 14.80% in SME market adjusted returns, 19.44% in SZSE market adjusted returns and 9.88% in matched firm adjusted returns). Those differences between each group were significant except in groups adjusted by matched firms.

In Table 6.6, Panel B shows the average *CARs* adjusted by the SME board composite market index with various holding periods. The growth trend was from -0.26% to 12.13%, with the holding periods ranging from 12 months to 36 months. In addition, the over-performance of negative group compared with positive group was also observed when using *CARs*, by 11.88% (12 months), 14.42% (24 months) and 14.80% (36 months) respectively. All those differences were significant in all groups in Panel B.

In summary, even though there are controversies over the sensitivity of IPO post-issue stock performance measurement, results show that on average PRC SMEs had positive 36-month post-issue stock returns measured by both *BHARs* and *CARs* with various benchmarks. In addition, the differential in mean values of post-issue stock returns between firms with different incentive of earnings management was apparent. In general, income-decreasing firms significantly over-performed income-increasing firms on average.

To ensure the main findings were robust, CAR_i[53] was replaced as an alternative measure of long-term stock returns. Table 6.7 provides multiple regression results for post-issue stock performance by rerunning *Models 4*, *5* and *6*.

[53] For brevity, only the SME board composite index was used as benchmark of *CAR* when rerunning *Models 4, 5* and *6*. Since the SME IPOs traded on the SME board, therefore the SME board composite index had the advantage of the close match of industry mix with the sample IPOs (Ritter, 1991).

Table 6.7 Sensitivity tests using CAR_i as an alternative measure of post-issue stock performance

Stats\Equation		***Equation 4 Results-CARs***		***Equation 5 Results-CARs***		***Equation 6 Results-CARs***	
Variables\Stats	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			1.916*		2.059**		1.999**
$DTAcc_i$	-	-0.129	-1.991**				
$DCAcc_i$	-			-0.042	-0.674		
$DLAcc_i$	-					-0.024	-0.394
Liq_i	+	-0.021	-0.237	-0.015	-0.162	-0.004	-0.040
$PostLev_i$	-	-0.145	-2.193**	-0.148	-2.198**	-0.141	-2.096**
B/M_i	+	-0.117	-1.062	-0.124	-1.111	-0.113	-1.012
$IssueSize_i$	?	-0.188	-2.453**	-0.200	-2.609**	-0.203	-2.647***
UP_i	-	-0.040	-0.480	-0.051	-0.612	-0.043	-0.515
UW_i	+	0.007	0.110	0.010	0.169	0.013	0.203
$Ln(P/E)_i$	-	-0.016	-0.148	-0.040	-0.379	-0.040	-0.379
SOE_i	+	-0.075	-1.191	-0.064	-1.007	-0.063	-0.987
ΔNI_i	+	0.015	0.207	0.004	0.051	0.005	0.069
$MktRet_i$	+	0.105	1.063	0.097	0.978	0.091	0.914
Ind_i		YES		YES		YES	
$Year_i$		YES		YES		YES	
Equation Summary							
R-Square		0.160		0.148		0.147	
Adj. R-Square		0.101		0.088		0.087	
F-Statistic		2.728***		2.486***		2.465***	
Number		262		262		262	

Legend:

Equation 4: $CAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 \frac{B}{M_i}+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Equation 5: $CAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 \frac{B}{M_i}+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Equation 6: $CAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 \frac{B}{M_i}+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

See *Formula 38* for definition and description for dependent variable and Table 4.6 for full definitions and descriptions for independent and control variables.

In Table 6.7, the explanatory power of three equations remained low, with adjusted *R-Square* values ranging from 0.087 in *Equation 6* to 0.101 in *Equation 4*. In line with the main findings, all the coefficients on the discretionary accruals were negative, but only significant (p<5%) on $DTAcc_i$, which indicates the main results reported in Table 5.15 were robust to the alternative measure of post-issue stock performance.

With respect to control variables, the coefficients on $PostLev_i$ were negative and significant at the 5% confidence level in all three equations, while the coefficients on $IssueSize_i$ were negative and significant at different significance levels (p<1% in *Equation 6*, p<5% in *Equations 4* and *5*). Results in Table 6.7 were generally consistent with main findings reported in Table 5.15.

6.2.3 Alternative measures of earnings management

The main regressions in this thesis used the modified Jones (1991) model to measure earnings management. The modified Jones (1991) model was widely used and accepted as a popular method and it was particularly applicable in the IPO setting to test earnings management. However, prior scholars have argued that for firms with extremely high earnings, the modified Jones (1991) model was likely to be biased with measurement errors by containing some non-discretionary accruals components (Dechow et al., 1995). To mitigate such possible inference bias and broaden the analyses, two alternative measures of earnings management were adopted to test if the main results were robust or not.

Firstly, the original Jones (1991) model was used as an alternative measure of discretionary accruals in sensitivity tests. The difference between the Jones (1991) model and the modified Jones (1991) model was that the latter assumed all credit sales change in the event year arose from earnings management, while the former did not. Secondly, as discretionary accruals were always associated with return on assets (*ROA*) (Dechow et al., 1995), the performance-matched model was adopted in this section to adjust discretionary accruals by *ROA* matched firms. This approach followed suggestions by Kothari et al. (2005) who took *ROA* into accruals consideration. More specifically, in performance-matched model, each IPO firm was

matched with a non-issuing firm (excluding IPO *i* and any firm listing within two years of the IPO year -1) in the same industry (Fan, 2007). The criterion to select matched firm was similar to *ROA* within a 20% variation in the same industry. If there was no firm with *ROA* within 20% of the IPO firm, the closest *ROA* firm in the same industry was chosen. Discretionary accruals for matched firms were estimated as the unstandardized residuals in the cross-sectional regressions based on industry classification[54]. Then the performance-matched discretionary accruals of IPO firm *i* in the IPO year -1 were calculated as the difference between discretionary accruals from the modified Jones (1991) model and the corresponding discretionary accruals of the performance-matched firm. Table 6.8 shows mean and median values of discretionary accruals using alternative measures in contrast to the modified Jones (1991) model.

Table 6.8 Discretionary accruals measured by various models

Description	N	*DTAcc*		*DCAcc*		*DLAcc*	
		Mean	Median	Mean	Median	Mean	Median
Modified Jones (1991) model	464	2.79%	2.31%	7.40%	5.49%	-4.61%	-2.65%
Original Jones (1991) model	464	2.41%	1.62%	7.41%	5.64%	-5.00%	-3.26%
Performance-matched model	464	0.70%	-0.02%	5.75%	3.96%	-5.05%	-3.57%

Table 6.8 presents mean and median values of discretionary accruals lagged by the beginning total assets estimated by different models. Across the discretionary accruals, average *DTAcc* and *DCAcc* were positive in all three models, while mean values of *DLAcc* were negative in all cases. Figures in Table 6.8 suggest that the performance-matched model yielded the lowest *DTAcc*, while modified Jones (1991) model produced the highest *DTAcc*. The mean (0.70%) and median (-0.02%) values of *DTAcc* were both close to zero under the performance-matched model, while the mean and median values of *DTAcc* were 2.79% and 2.31% respectively under the modified Jones (1991) model. In addition, the mean value of *DCAcc* under the performance-matched model (5.75%) was also lower than those in other measures. However, the highest average *DCAcc* (7.41%) was from the original Jones (1991) model. The mean values of *DLAcc* were similar in three alternative measures (ranged from -5.05% to -4.61%), but the lowest mean value was again under the

[54] Consistent with the calculation process of accruals in main findings, the five industry sectors were still applied in the sensitivity tests.

performance-matched model. In conclusion, the mean values of discretionary accruals were similar under the original and modified Jones (1991) models, while the performance-matched model produced the lowest discretionary accruals.

To test the sensitivity of the relationship between earnings management and IPO stock performance, the main regression models (*Models 1* to *6*) in Tables 5.14 and 5.15 were reperformed using the original Jones (1991) model (Panel A) and the performance-matched model (Panel B) to measure earnings management. Results are reported in Tables 6.9 and 6.10.

As indicated in Table 6.9, findings from the use of two alternative discretionary accrual model estimates were similar to the main results reported in Table 5.14. The F-Statistics in all equations were highly significant and the explanatory power was similar to that in Table 5.14. The coefficients on $DTAcc_i$ were positive and significant in both panels, though at different significance levels ($p<5\%$ in Panel A, $p<10\%$ in Panel B). It seems that the $DTAcc_i$ had a higher significance level in the original and modified Jones (1991) model ($p<5\%$), and a lower significance level ($p<10\%$) in the performance-matched model. Consistent with the main findings in Table 5.14, another two discretionary accruals ($DCAcc_i$ and $DLAcc_i$) remained insignificant even when using alternative models to measure discretionary accruals, but their directional signs (negative and positive respectively) were consistent with the main findings. In conclusion, the results suggest that the main findings in Table 5.14 were not sensitive to alternative measures of earnings management.

With respect to control variables, the significance levels of coefficients on $IMkt_i$ are slightly higher in all equations in both panels ($p<5\%$ in Panel A, $p<1\%$ in Panel B) compared with main findings in Table 5.14. The coefficients on $IssueSize_i$ are consistently highly significant ($p<1\%$) in all equations in both panels with the same directional signs as the main findings in Table 5.14. Moreover, there is a positive and significant ($p<10\%$) association between SOE_i and underpricing in three equations under the performance-matched model (see Table 6.9, Panel B), while there is no significant evidence to support the relationship between them in Table 5.14.

Table 6.9 Sensitivity tests using alternative measures of discretionary accruals (underpricing)

		Panel A: Original Jones (1991)model						*Panel B: Performance-matched model*					
Stats\Equation		***Equation 1 Results***		***Equation 2 Results***		***Equation 3 Results***		***Equation 1 Results***		***Equation 2 Results***		***Equation 3 Results***	
Variables\Stat	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			7.391***		7.178***		7.499***		6.497***		6.711***		6.889***
$DTAcc_i$	+	0.089	2.538**					0.066	1.801*				
$DCAcc_i$	+			-0.003	-0.086					-0.019	-0.522		
$DLAcc_i$	+					0.045	1.257					0.055	1.530
AD_i	-	-0.045	-1.314	-0.043	-1.245	-0.041	-1.195	-0.033	-0.938	-0.030	-0.872	-0.028	-0.801
UW_i	-	0.013	0.362	0.010	0.299	0.011	0.302	0.001	0.038	0.008	0.223	0.008	0.221
$IMkt_i$	+	0.069	4.946**	0.070	1.931**	0.072	2.001**	0.125	3.430***	0.124	3.396***	0.127	3.481***
$PreLev_i$	?	0.004	0.103	-0.004	-0.105	-0.017	-0.443	-0.011	-0.299	-0.014	-0.375	-0.022	-0.602
Lag_i	+	-0.020	-0.469	-0.017	-0.392	-0.016	-0.388	0.014	0.317	0.015	0.352	0.016	0.370
$IssueSize_i$	-	-0.307	-6.578***	-0.302	-6.422***	-0.303	-6.461***	-0.264	-5.608***	-0.276	-5.772***	-0.281	-5.928***
Age_i	-	-0.010	-0.281	-0.009	-0.269	-0.009	-0.269	-0.012	-0.349	-0.011	-0.326	-0.011	-0.302
SOE_i	+	0.050	1.416	0.042	1.187	0.042	1.198	0.070	1.964*	0.064	1.782*	0.064	1.790*
$FinCrisis_i$	-	0.002	0.020	0.002	0.021	0.006	0.075	-0.009	-0.123	-0.001	-0.012	0.007	0.091
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Equation Summary													
R-Square		0.493		0.486		0.488		0.487		0.484		0.486	
Adj. R-Square		0.477		0.470		0.472		0.471		0.467		0.470	
F-Statistic		31.199***		30.305***		30.524***		30.122***		29.711***		29.997***	
Number		464		464		464		459 [d]		459 [d]		459 [d]	

Legend:

Panel A-Equation 1: $UP_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel A-Equation 2: $UP_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel A-Equation 3: $UP_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 1: $UP_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 2: $UP_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 3: $UP_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 AD_i+\gamma_2 UW_i+\gamma_3 IMkt_i+\gamma_4 PreLev_i+\gamma_5 Lag_i+\gamma_6 IssueSize_i+\gamma_7 Age_i+\gamma_8 Ind_i+\gamma_9 SOE_i+\gamma_{10} FinCrisis_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

Panel A: Original Jones (1991) model was used to estimate discretionary accruals; Panel B: Performance-matched model was used to estimate discretionary accruals.

See the second paragraph of section 6.2.3 for descriptions for independent variables and Table 4.6 for full definitions and descriptions for dependent and control variables.

d: Remove 5 outliers.

Table 6.10 Sensitivity tests using alternative measures of discretionary accruals (post-issue stock performance)

		Panel A: Original Jones (1991)Model						*Panel B: Performance-matched*					
Stats\ Equation		***Equation 4 Results***		***Equation 5 Results***		***Equation 6 Results***		***Equation 4 Results***		***Equation 5 Results***		***Equation 6 Results***	
Variables\Stat	***Prediction***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***	***Beta***	***t-statistic***
(Constant)			2.636***		2.781***		2.704***		2.935***		2.970***		2.894***
$DTAcc_i$	-	-0.145	-2.309**					-0.112	-1.694*				
$DCAcc_i$	-			-0.032	-0.522					-0.043	-0.684		
$DLAcc_i$	-					-0.048	-0.768					-0.016	-0.249
Liq_i	+	-0.021	-0.238	-0.020	-0.220	-0.006	0.071	-0.059	-0.662	-0.056	-0.623	-0.044	-0.492
$PostLev_i$	-	-0.191	-2.819***	-0.193	-2.802***	-0.183	-2.672***	-0.162	-2.374**	-0.172	-2.513**	-0.171	-2.494**
B/M_i	+	-0.169	-1.603	-0.193	-1.809*	-0.177	-1.646	-0.141	-1.297	-0.182	-1.691*	-0.173	-1.583
$IssueSize_i$	?	-0.132	-1.670*	-0.139	-1.741*	-0.144	-1.802*	-0.200	-2.401**	-0.183	-2.198**	-0.175	-2.119**
UP_i	-	-0.031	-0.376	-0.031	-0.380	-0.022	-0.264	-0.023	-0.280	-0.018	-0.213	-0.014	-0.169
UW_i	+	-0.007	-0.113	-0.004	-0.064	-0.002	-0.033	0.010	0.161	0.006	0.092	0.005	0.072
$Ln(P/E)_i$	-	-0.049	-0.470	-0.072	-0.684	-0.071	-0.674	-0.078	-0.728	-0.099	-0.932	-0.096	-0.893
SOE_i	+	-0.062	-0.975	-0.051	-0.792	-0.050	-0.782	-0.094	-1.463	-0.090	-1.398	-0.086	-1.324
ΔNI_i	+	-0.004	-0.050	-0.023	-0.313	-0.021	-0.274	0.008	0.103	0.010	-0.127	0.000	0.006
$MktRet_i$	+	-0.484	-2.023**	-0.491	-2.032**	-0.491	-2.032**	-0.361	-1.510	-0.384	-1.602	-0.397	-1.659*
Ind_i		YES		YES		YES		YES		YES		YES	
$Year_i$		YES		YES		YES		YES		YES		YES	
Equation Summary													
R-Square		0.151		0.134		0.135		0.144		0.135		0.133	
Adj. R-Square		0.092		0.074		0.075		0.083		0.073		0.072	
F-Statistic		2.563***		2.219***		2.241***		2.356***		2.193***		2.166**	
Number		262		262		262		257[e]		257[e]		257[e]	

Legend:

Panel A-Equation 4: $BHAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel A-Equation 5: $BHAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel A-Equation 6: $BHAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 4: $BHAR_i=\alpha_0+\beta_1 DTAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 5: $BHAR_i=\alpha_0+\beta_1 DCAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

Panel B-Equation 6: $BHAR_i=\alpha_0+\beta_1 DLAcc_i+\gamma_1 Liq_i+\gamma_2 PostLev_i+\gamma_3 B/M_i+\gamma_4 IssueSize_i+\gamma_5 UP_i+\gamma_6 UW_i+\gamma_7 Ln(P/E)_i+\gamma_8 SOE_i+\gamma_9 \Delta NI_i+\gamma_{10} MktRet_i+\gamma_{11} Ind_i+\sum_{k=1}^{n-1}\varphi_k Year_i^k+\varepsilon_{i,t}$

*, **, ***=Significant at the 1%, 5% and 10% confidence levels respectively.

Panel A: Original Jones (1991) model was used to estimate discretionary accruals; Panel B: Performance-matched model was used to estimate discretionary accruals.

See the second paragraph of section 6.2.3 for descriptions for independent variables and Table 4.6 for full definitions and descriptions for dependent and control variables.

e: Remove 5 outliers.

Table 6.10 presents regression results for post-issue stock performance using alternative measures of earnings management. Consistent with the main results in Table 5.15, the F-Statistics were highly significant in all equations in both panels and the explanatory power remained low as indicated by adjusted *R-Square* values (ranged from 0.074 to 0.092 in Panel A, 0.072 to 0.083 in Panel B). As shown in Table 6.10, the coefficients on $DTAcc_i$ were still negative and significant when using two alternative measures of earnings management. The significance levels of $DTAcc_i$ were the same in Panel A compared with the main findings (p<5%), but lower in Panel B (p<10%). The coefficients on $DCAcc_i$ and $DLAcc_i$ were again negative and insignificant in both panels in Table 6.10. These findings suggest that using alternative measures to calculate accruals yielded in results that are generally consistent with the main findings.

In terms of control variables, the coefficients on $PostLev_i$ and $IssueSize_i$ remained negative and significant in both panels with different significance levels. Specifically, $PostLev_i$ was highly significant (p<1%) in Panel A but moderately significant (p<5%) in Panel B. $IssueSize_i$ was marginally significant (p<10%) in Panel A but moderately significant (p<5%) in Panel B. In addition, the coefficients on *B/M* were negative and marginally significant (p<10%) in *Equation 5* in both panels, while there was no significant evidence supporting the relationship between *B/M* and post-issue stock performance in Table 5.15. Moreover, the coefficients on $MktRet_i$ were negative and significant in all equations in Panel A (p<5%) and Panel B of *Equation 6* (p<10%), whereas none of the coefficients on $MktRet_i$ was significant in Table 5.15. Those results of control variables were slightly different from the main findings.

6.3 Summary

To ascertain the validity of the main results reported in Tables 5.14 and 5.15, several sensitivity tests were conducted by using alternative measures of dependent and independent variables. The results from those sensitivity tests suggest that the associations between discretionary accruals and IPO stock performance were not sensitive to alternative measures of underpricing, post-issue stock performance and earnings management.

In Chapter 7 the findings are summarized and the contributions of this thesis are outlined. The implications of this thesis and future research directions are also discussed.

Chapter 7: Implications and conclusions

7.1 Summary of results

Underpricing and long-term underperformance have been two common anomalies associated with IPO firms in global capital markets. Earnings management has been viewed as a major cause of many of these anomalies (Roosenboom et al., 2003; Teoh, Welch et al., 1998a). Prior scholars have documented that aggressive earnings management led to a higher level of underpricing and lower level of long-term stock returns in various countries, namely, the US (S. S. Chen et al., 2013; DuCharme et al., 2000; Teoh, Welch et al., 1998a), Netherlands (Roosenboom et al., 2003) and Malaysia (Ahmad-Zaluki et al., 2011). A similar relationship has also been detected in large firms listed on the main boards in the PRC (Shen et al., 2014; Geng et al., 2010; Kimbro, 2005). Given the lack of available pre-IPO information for SME IPO issuers in the PRC and the deficient regulatory environment in the PRC IPO market, SMEs have a strong incentive to manage earnings prior to going public. Prior studies, however, have overwhelmingly focused on the IPO issues of large firms or SOEs with little attention been paid to SMEs, despite the fact that SMEs are the backbone of the national economy of many countries in Asia and the Pacific (Asian Development Bank, 2014). Prior to this study, there was a clear absence of research which considers the linkages between earnings management and the level of underpricing and post-issue stock performance of SME IPOs in the PRC.

This research partly addresses a literature gap by empirically examining two research questions: whether earnings management influences the level of underpricing of SME IPOs in the PRC; and whether there is any association between earnings management and post-issue stock performance of SME IPOs in the PRC. The research questions have been tested with a sample of 464 IPO firms listed on the SZSE SME board as of 31 December 2010. The initial raw returns are used to measure underpricing and a 36-month buy-and-hold abnormal returns are used to identify post-issue stock performance. The cross-sectional modified Jones (1991) model is employed to estimate earnings management. Consistent with prior literature

(e.g. Shen et al., 2014; Xiong et al., 2010), three proxies are used to measure earnings management for total, current and long-term discretionary accruals.

Table 7.1 provides a summary of the hypotheses tested in this thesis related to the two research questions.

Table 7.1 Acceptance/rejection of hypotheses

Hypothesis	Description	Results
Panel A: Underpricing		
H_1	*The total discretionary accruals and level of underpricing of SME IPOs in the PRC are positively associated.*	**Accepted**
H_{1a}	*The current discretionary accruals and level of underpricing of SME IPOs in the PRC are positively associated.*	**Rejected**
H_{1b}	*The long-term discretionary accruals and level of underpricing of SME IPOs in the PRC are positively associated.*	**Rejected**
Panel B: Post-issue stock performance		
H_2	*The total discretionary accruals and post-issue stock performance of SME IPOs in the PRC are negatively associated.*	**Accepted**
H_{2a}	*The current discretionary accruals and post-issue stock performance of SME IPOs in the PRC are negatively associated.*	**Rejected**
H_{2b}	*The long-term discretionary accruals and post-issue stock performance of SME IPOs in the PRC are negatively associated.*	**Rejected**

Descriptive statistics show that PRC SMEs in the sample started to manage earnings upwards one year prior to the IPO by using income-increasing discretionary accruals. This result suggests that SME IPO issuers opportunistically advanced accruals in the pre-IPO period with the aim of improving reporting earnings and hence increased the firms' listing opportunities. This finding corresponds with prior studies from the US (Ducharme et al., 2000) and Netherlands (Roosenboom et al., 2003) on the expected use of income-increasing discretionary accruals from the preceding year of the IPO. This finding is also consistent with research which found similar earnings management behavior around the IPO year of PRC IPO firms listed on the main boards (Shen et al., 2014; Aharony et al., 2010; Kao et al., 2009).

In addition, the average level of underpricing in this study for SME IPOs was 96.71%, which was significantly higher than those reported in developed markets

(Hahn et al., 2013; Ritter, 2011), but lower than those detected in the large PRC firms (Liu et al., 2014b; Shen et al., 2014). Consistent with prior literature (Chang et al., 2008; Mok & Hui, 1998), the SME IPO market in the PRC was characteristed by speculative bubbles and a high level of underpricing mainly attributed to the primary market and further boosted in the secondary market.

Compared with long-term underperformance in the developed markets and large firms in the PRC (Shen et al., 2014; Wen & Cao, 2013; Su & Bangassa, 2011b; Gregory et al., 2010), PRC SMEs had a different pattern, that is, long-term over-performance. The average stock returns of SMEs showed an increasing trend in the long term and the SME IPOs had average positive returns over the 36-month observation period compared with different benchmarks and measurements. This finding is consistent with the long-term over-performance detected in the developing markets of Thailand (Allen et al., 1999), Malaysia (Corhay et al., 2002; Dawson, 1987) and Istanbul (Durukan, 2002). One possible explanation to the over-performance is that SME investors ignored the risks associated with new issues in the hot market (e.g. pre-IPO earnings management). The over optimism of investors in the hot market may have reduced the need for proper due diligence associated with SME IPOs and this led to long-term over-performance (Helwege & Liang, 2004). Another possible explanation is that PRC SMEs survive longer than listed firms in other countries. Compared with the number of delisting firms in the developed markets, the delisting rate has been extremely low in the PRC SMEs (e.g. none of the SME IPOs were delisted within three years after issuance [Shenzhen Stock Exchange, 2013a]). In addition, the timing of the observation period also contributed to the over-performance. Loughran et al. (1994) found that over-performance of Swedish IPOs was time sensitive and peculiar to the specific time period during 1980 to 1990. Most IPO firms in this research endured the post-GFC recovery period in their 36-month post-issue phase. Therefore a growth trend of post-issue stock returns in this period was not surprising.

Using multiple regression models, this study found that there was a significant and positive relationship between the magnitude of total discretionary accruals and underpricing by using multiple regression models (see Table 5.14). This finding suggests that an SME firm in the PRC adopting aggressive total discretionary

accruals prior to the IPO was likely to have a higher level of underpricing. However, there was no statistical evidence to support the relationship between current or long-term discretionary accruals and IPO underpricing. The multivariate results, based on the pooled samples and sensitivity tests, consistently supported the main findings. Therefore, as summarized in Table 7.1, H_1 was supported, whereas H_{1a} and H_{1b} were rejected. Consistent with Kimbro (2005), who found that total discretionary accruals had informative value in explaining stock returns of PRC IPOs, total discretionary accruals were found to have a significant and positive influence on underpricing. This result is also in line with prior research in Japan (Nagata, 2013; Nagata et al., 2007) and the PRC (Shen et al., 2014, Kimbro, 2005). However, the insignificant relationship between current discretionary accruals and IPO stock performance in this thesis is in contrast to studies in the US, UK (Chahine et al., 2012) and Malaysia (Ahmad-Zaluki et al., 2011).

The significant association found between total discretionary accruals and underpricing of SME IPOs in this thesis suggests that SME investors were sensitive to bottom line earnings, which typically affect expectations about a firm's future potential and influence stock valuation. Due to the asymmetric information problem in the IPO market, investors priced IPOs heavily relying on prospectuses document disclosure. Among the available financial information, bottom line earnings are important proxies for investor decision making. Consequently, issuers had incentives to manage earnings upwards by taking advantage of the information gap. The statistical analysis shows that total and current discretionary accruals started to increase dramatically one year prior to the IPO, leading to inflated net income (see Table 5.7). The results show that investors were unable to identify the discretionary accruals and only fixated on the bottom line earnings. Overvaluation was likely due to earnings manipulation resulted in a high level of underpricing.

The insignificant associations between current or long-term discretionary accruals and underpricing suggests that SME investors in the PRC were not sophisticated enough to identify current or long-term components of discretionary accruals. It was found that 90% of investors in PRC capital market were individual investors who lacked professional financial knowledge and experience in investing (Chi & Padgett, 2005a). Chang et al. (2008) found the main aim of individual investors in subscribing

for IPO shares was not to invest in high quality firms, but to take advantage of the price difference between primary and secondary markets. Few investors paid attention to the sources of earnings of the IPO firms and appear to have little knowledge of the composition of discretionary accruals. Therefore, they did not (or were not able to) react to current or long-term components of discretionary accruals which led to insignificant associations between current/long-term discretionary accruals and underpricing.

Multiple regression results in Chapter 5 (see Table 5.15) also indicate that there was a significant and negative association between total discretionary accruals and post-issue stock performance. However, the research failed to find any significant relationship between current or long-term discretionary accruals and the post-issue stock performance. The additional tests based on the subsamples generally provided support for the main findings. The main findings were robust for alternative measures of both dependent and independent variables and H_2 was supported, while H_{2a} and H_{2b} were rejected. The negative and significant relationship between total discretionary accruals and long-term stock performance is in line with prior literature in various countries, such as, the US (Chaney & Lewis, 1998) and the PRC (Shen et al., 2014). The insignificant relationship between current discretionary accruals and post-issue stock performance is contrary to the previous results in the US (S. S. Chen et al., 2013; S. C. Chang et al., 2010; DuCharme et al., 2000; Teoh, Welch et al., 1998a), UK (Chahine et al., 2012), Netherlands (Roosenboom et al., 2003) and Malaysia (Ahmad-Zaluki et al., 2011).

In this thesis the significant relationship between total discretionary accruals and post-issue stock performance of SME IPOs indicates that SME investors responded to bottom line earnings. Acute information asymmetry between the issuer and investors creates a situation whereupon opportunistically manipulated earnings can temporarily deceive investors and lead them to form overly optimistic expectations about IPO firms' prospect (DuCharme et al., 2000). In the long term, however, IPO firms with inflated earnings were forced to reverse accruals in the subsequent period and unable to sustain the pre-issue performance levels. The results in this thesis show that total and current discretionary accruals of SMEs began to fall in the year following the IPO, resulting in a decline in earnings (see Table 5.7). When the facts

became apparent with information disclosed in the aftermarket, investors were disappointed by the post-IPO results and IPO firm values tended to decline during the post-issue period. As a result, adoption of earnings management that inflated earnings actually resulted in substantial future costs (i.e. poor long-term stock performance) to the issuers employing these tactics (DuCharme et al., 2000).

In addition, SME investors in the PRC responded to the total discretionary accruals and bypassed the components of discretionary accruals indicating that investors were unable to identify and respond promptly to current or long-term components of discretionary accruals. Consequently, current and long-term discretionary accruals had no significant impact on post-issue stock performance.

Besides the main findings, this study found that the incentive for earnings management, issue size, underwriters' reputation and the GFC had some moderating influence on the association between discretionary accruals and post-issue stock performance. In addition, the high level of underpricing was formed in the primary market and the significant influence of total discretionary accruals on underpricing mainly took place in the primary market. In the primary market speculative investors took advantage of the price gap between offering and listing prices.

The overall results about the relationship between earnings management and IPO stock performance over short and long horizons embodied the asymmetric information theory. Due to the information shortage, the bottom line earnings are one of the reliable indicators of SME IPO's performance. As a result, investors heavily relied on the bottom line earnings to price the IPO during the pre-listing period, showing significant association between total discretionary accruals and underpricing. In the aftermarket, with the reduction of the information gap, SME investors realized the downward trend of the bottom line earnings. Therefore, investors adjusted their expectations about the SME IPO's stock performance, leading to the negative relationship between total discretionary accruals and post-issue stock performance. Due to the limited accounting knowledge and restricted access to the internal information, SME investors were unable to distinguish the composition of discretionary accruals, which indicates there was always an information disadvantage accompanied with investors in the PRC.

7.2 Contributions of this thesis

The findings in this thesis make an important contribution to the literature in earnings management and IPO stock performance for PRC SMEs. Compared to prior literature, this thesis provides several contributions which are summarized in Table 7.2.

Table 7.2 Summary of major contributions

No.	Description of major contributions from this thesis
1	Investigated IPO issues for firms listed on the SME board in the PRC
2	Undertook a comprehensive study of IPO stock performance over short and long horizons for SMEs in the PRC
3	Tested the earnings management behavior for SMEs around the IPO year
4	Undertook one of the first studies to test the association between earnings management and IPO stock returns based on SMEs

Firstly, this thesis enriches the IPO literature by testing a number of important SME IPO issues. Prior scholars who explored IPO anomalies generally used large firms (e.g. Song et al., 2014; Wen & Cao, 2013; Ritter, 1991). SMEs play an active role in capital markets and raise considerable equity funds in the PRC as discussed in Chapter 2, but very little research had been done on SME IPOs. The limited research on SMEs is in sharp contrast with SMEs' pivotal status to economic development in global markets. By examining IPO firms listed on the SME board in the PRC, this thesis has broadened previous research on the IPO issues and examined SMEs in a comprehensive manner.

Secondly, the thesis examined a broad perspective of IPO stock performance over short and long horizons in PRC SMEs. Academic studies on large IPOs have generally reported moderate underpricing and significant long-term underperformance in developed markets (e.g. Hahn et al., 2013; Gregory et al., 2010; Dimovski & Brooks, 2004; Ritter, 1991), whereas the extremely high initial returns and mixed post-issue performance (i.e. mild underperformance and over-performance) have been found in developing countries (e.g. Shen et al., 2014; Su & Bangassa, 2011b; How et al. 2007). The findings in this thesis reveal that PRC SMEs during 2006 to 2010 had a different pattern of IPO stock performance compared with large firms, that is, an extremely high level of underpricing and small over-performance in the long term.

Thirdly, this research contributes to the earnings management literature by examining the earnings management behavior of SMEs around the IPO year. Based on asymmetric information theory, extant research has documented how an IPO has created strong incentives for firms to engage in income-increasing earnings management (Chen et al., 2005; DuCharme et al., 2000; Teoh, Welch et al., 1998a). Although asymmetric information problems surrounding SMEs are more profound than for large firms, little attention has been paid to the opportunistic behavior of SMEs in the pre-IPO period. This research sought to extend the earnings management literature beyond the prior application to large IPO firms to a broader spectrum of issuers. The results indicate that the SME issuers adopted an aggressive income-increasing earnings management in the fiscal year prior to the IPO and the year of issuance. The findings in this thesis highlight the importance of risks associated with earnings quality of SME IPOs.

Finally, this thesis is one of the first studies conducted to test the association between earnings management and IPO stock returns for SMEs. The results of this thesis add an earnings management perspective to the IPO stock performance in SMEs. Whereas many previous researchers have only explored determinants either in underpricing or long-term stock performance, this study, through earnings management seeks to explain both the short-term and long-term stock performance of SME IPOs. In particular, the results indicate that pre-IPO total discretionary accruals had a positive impact on underpricing and a negative influence on the post-issue stock performance. Moreover, SMEs seemed to adopt aggressive total discretionary accruals to increase the initial returns on the cost of long-term stock price. The results suggest that investors need to be aware of risks when investing in SMEs and in particular the likelihood of manipulated earnings.

7.3 Implications of the results

The findings from this thesis have wide ranging implications for various stakeholders. Firstly, findings from this thesis may help investors to make rational investment decisions on SME IPOs. Since the income-increasing earnings management was prevalent in the pre-IPO period, SME investors are advised to make a critical review with regards to financial earnings and take a cautious approach in valuing IPOs. The

high level of underpricing suggests that SME investors can be misled by inflated earnings and pay too high a price for SME IPOs. Therefore, SME investors are advised to conduct rational evaluations on new issues and carefully assess the overall quality of SME IPOs. Additional findings also reveal that the high level of underpricing mainly occurred in the primary market and IPO firms became evident in the general market performance in the secondary market. This indicates that investors who purchase shares in the secondary market are over optimistic about the prospects of IPOs and are likely to incur losses. If investors are able to identify these risks, their goals are less likely to be undermined.

Although in this study the post-issue stock performance of SMEs was better than that of some developed markets, it is clear that investors still need to exercise caution when investing in SMEs. Scholars in developed markets generally found long-term underperformance was due to investors' reaction to diminished asymmetric information in the aftermarket (e.g. Dimovski & Brooks, 2004; Teoh, Welch et al., 1998a). In the PRC SME market, however, IPO firms over-performed various benchmarks in the long term, which indicates that the SME market was still hot and investors were unable to analyze and promptly react to disclosed information. Consistent with prior studies (e.g. Shen et al., 2014), results in this thesis suggest that pre-IPO earnings management not only increased initial returns, but also had a negative impact on long-term stock performance. Therefore, it is imperative that investors with long-term investment goals avoid the overreaction to bottom line earnings and carefully assess disclosed information in the aftermarket.

Secondly, the findings in this thesis imply that financial analysts need to be encouraged to play a more active role in reducing the amount of asymmetric information between issuers and investors in PRC SMEs. One major role of the financial analysts is to generate data that are useful to investors in reducing the informational advantages of issuers (D'Mello & Ferris, 2000). The underpriced SME IPOs indicate the existence of a significant asymmetric information gap between the insiders and outsiders in the PRC market and may suggest that analysts have failed to take an active role in producing relevant information. Findings also suggest investors were unable to identify discretionary accruals and mispriced SME IPOs reflected in inflated earnings. Compared with unsophisticated investors, analysts generally do not

naively project sales and are able to untangle the effect of accruals on future earnings growth of IPO firms (Zheng & Stangeland, 2007). To improve market efficiency, financial analysts need to make accurate forecasts about earnings and articulate the risks associated with new issues.

Thirdly, the results of this thesis may also help PRC authorities to improve the approval system in the IPO market. SME issuers were found to adopt an aggressive income-increasing earnings management prior to the IPO being motivated by the need to inflate earnings to meet the rigid listing requirement about profit. It appears that the PRC authorities' objective of guiding capital resources toward well-performing sectors partially motivated earnings management (Chen & Yuan, 2004). To restrict future speculative behavior, such as earnings management, PRC authorities need to improve valuation mechanisms used to measure profits by adopting multiple indicators and by implementing strict rules concerning earnings quality. In addition, the extremely high level of underpricing indicating investors' ex ante uncertainty on the valuation of SME IPOs is due in part at least to asymmetric information. Sustained disclosure was found to be useful in reducing the information asymmetry and the adverse selection present at the equity offering (Lang & Lundholm, 2000). When making the decision to approve an IPO application, it is suggested that PRC authorities encourage voluntary disclosure by issuers to decrease the level of information asymmetry and increase the transparency of IPO firms' financial status.

Fourthly, the findings of this thesis provide a rationale for regulators to strengthen the monitoring of the IPO market and improve the regulatory system. Such regulations can act to inhibit issuers from taking excess profits at the expense of investors' interests. Prevalent pre-IPO earnings management behavior in SMEs and the behavior's impact on stock performance suggest the PRC regulators' screening process is inefficient. Whether regulators can 'see through' earnings management in many countries is unknown (Healy & Wahlen, 1999). The CSRC guidelines in the PRC do not specifically require regulators to screen out earnings management and regulators are less likely to react to the signs of earnings manipulation due to their limited information-processing capacities (Chen & Yuan, 2004). The limited ability or willingness of regulators to screen out candidates practicing earnings management

allows IPO firms with sub optimal performance to meet accounting thresholds, which exposes investors to high risks. To protect investors and ensure sustainable development of the capital market the PRC regulators need to strengthen the oversight on opportunistic behavior and provide a more effective screening function.

Finally, the results of this thesis will shed light on SMEs in other emerging economies. Due to their very nature of high failure rates and severe asymmetric information problems, SMEs face significant challenges with their credibility and prospect when seeking to list in the capital market. Accordingly, investing in SMEs in an emerging market governed by a poor regulatory system is risky. The findings in this thesis reveal that PRC SMEs manipulated earnings upwards prior to going public, implying that the earnings quality of SMEs was questionable and significantly affected IPO firms' stock performance. In addition, PRC SMEs were found to have a high level of underpricing and post-issue over-performance, indicating that the hot market phenomena on the SME board persisted into the long term. To ensure the healthy development of the SME IPO market, authorities need to create an environment in which those SMEs with genuine financial performance and growth potential are allowed to enter into the market and raise finance. Results from this thesis provide insights, that could be generalized to SMEs' development in other emerging markets.

7.4 Future research directions

This thesis has provided important evidence that PRC SMEs' pre-IPO earnings management influenced the stock price over short and long horizons. Due to data limitation, however, this thesis is not without caveats. The following sub-sections suggest some directions for future studies regarding earnings management and IPO stock performance as well as SME IPOs.

7.4.1 Future research on earnings management and IPO stock performance

Firstly, different approaches to measure earnings management could be applied in future studies. This thesis used only the *aggregate accruals approach* to test earnings management as a result of limited internal financial information on SMEs. As noted

in previous chapters, other than the *aggregate accruals approach*, earnings management could be estimated in several ways, including the *specific accruals approach* (Beneish et al., 2012; Osma, 2008; McNichols, 2000; McNichols & Wilson, 1988) and *frequency distribution approach* (Degeorge et al., 1999). To develop a more complete picture of earnings management, researchers could consider additional approaches for measuring earnings management.

In addition, advanced models to estimate discretionary accruals could be developed in future studies. It is widely accepted that all popular models for detecting earnings management have application conditions and shortcomings (McNichols, 2002). This thesis used the most appropriate existing models to measure earnings management based on prior literature (i.e. original and modified Jones [1991] models and the performance-matched model). However, those models are also not free from bias. Accordingly, advanced models with less estimation bias and errors would improve the methodology in the future studies. Besides, the effectiveness of the existing models of earnings management in the PRC capital market remains doubtful due to the particular market system. It is important for future researchers to invent flexible models to test earnings management within various contexts by taking the operating environment into consideration.

Moreover, more specific industry classifications could be employed when estimating discretionary accruals in the future. Due to the data restrictions, this thesis only classified IPO firms into one of five industry sectors instead of CSRC 12 major industry classes when measuring discretionary accruals. Future researchers could break down the industry sectors into more detailed groups and categorize industries according to different international standards. Also, in future studies researchers could investigate firms in specific industry sectors concerning the association between earnings management and IPO stock performance.

Another promising direction would be to conduct longitudinal studies on earnings management and IPO stock performance in the future. Due to the short history of the SME board, this thesis only used the cross-sectional models to measure earnings management and long-term stock performance, which does not provide evidence over a longitudinal time span. Dechow et al. (1995) documented that the original and

modified Jones (1991) models were more effective when modeling the time-series process to generate non-discretionary accruals. In addition, use of longitudinal data would be beneficial for examining the influence of earnings management on stock performance over time. For instance, this thesis failed to find the significant relationship between current or long-term discretionary accruals and stock performance. A longitudinal study of SMEs would enable the researchers to examine precisely which parts of discretionary accruals impact on IPO stock performance.

Finally, in future studies researchers could use a longer time span (e.g. 5 years to 10 years) to further investigate the post-issue stock performance of SME IPOs. Due to the limited history of the SME board, this thesis used only a 36-month observation period to test the long-term stock performance. If the observation period is extended, the increasing trend of post-issue stock performance may change. To further explore the long-term performance of SME IPOs, a longer time span needs to be applied in future studies.

7.4.2 Future research on SMEs

This thesis relied on data from firms listed on the SZSE SME board, which had a relatively short history of six years by the end of 2010. Due to the short history of the SZSE SME board, only 464 IPOs were gathered in the sample pool. On 23 October 2009, the SZSE launched the ChiNext board which aims to provide solid support for growth-oriented venture enterprises stressing innovation. Firms listing on the ChiNext board are even smaller than firms listing on the SME board and also meet the definition of SMEs. Therefore, to expand the research scope and sample size, firms listing on the ChiNext board could be included in the SME sample pool in the future.

In addition, future research could study SMEs in other regions and countries. Although SMEs have some common characteristics worldwide (e.g. difficulty in financing, asymmetric information and poor corporate governance), there are some discrepancies in regulatory environment and market discipline. Consequently, the patterns of association between earnings management and IPO stock performance for SMEs in other regions may vary from that in the PRC.

7.5 Concluding remarks

Although earnings management and IPO anomalies have drawn considerable attention from domestic and international researchers (Rangan, 1998; Jiraporn et al., 2008), to date, very little research has been done on the SME IPOs. By examining the firms listed on the SZSE SME board in the PRC, valuable insights into the relationship between earnings management and SME IPOs' stock performance is provided over short and long horizons. Based on asymmetric information theory, a significant variation of earnings management was observed around the IPO year and the magnitude of pre-IPO total discretionary accruals was positively associated with IPO underpricing and negatively related to post-issue stock performance. However, little evidence was generated to support the relationship between current or long-term discretionary accruals and IPO stock performance. In addition, SME IPOs were found to over-perform various benchmarks during the 36-month observation period.

This research has provided important contributions to the IPO and earnings management literature. The findings also offer theoretical references to other countries and stakeholders, such as investors, financial analysts, authorities and regulators. For example, the results of this thesis assist investors in assessing earnings management risks before making investment decisions. Findings also suggest that PRC authorities need to improve their supervision functions and disclosure systems in the IPO market to ensure outside investors are well protected. The results of this thesis also provide insight into other SME IPOs in emerging markets.

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Appendix A: Listing requirements for SZSE SME board

Firms listing on the SZSE SME board need to meet the following requirements:

(1) It must have been profitable in the last three consecutive years with net profits no less than RMB 30 million in aggregate; the net profits shall be calculated based on the amount before and after deducting non-recurring profits and losses, whichever is smaller;

(2) The net cash flow from business operation in the last three years shall exceed RMB 50 million in aggregate; or the revenue in the last three financial years shall exceed RMB 300 million in aggregate;

(3) The total share capital before the offer shall not be less than RMB 30 million;

(4) The intangible assets as at the end of the last reporting period (after deducting land use rights, aquaculture rights, mining rights, etc.) shall not account for more than 20% of the net assets;

(5) There shall be no uncovered losses as at the end of the last reporting period;

(6) Its performance results shall not be heavily reliant on tax benefits;

(7) It shall be free from any serious debt service risk;

(8) It shall be free from the risk of significant contingent events; and

(9) Requirement on sustainable profitability. The issuer may not fall under any of the following circumstances that would have a significant adverse impact on its sustainable profitability:

   (a) Its business model or its mix of products or services has undergone or will undergo a material change which has or would have a significant adverse impact on its sustainable profitability;

   (b) Its position in the industry or the business environment for its industry has undergone or will undergo a material change which has or would have a significant adverse impact on its sustainable profitability;

   (c) Its revenues or net profits in the most recent financial year are heavily reliant on a related party or any client susceptible to great uncertainty;

   (d) Its net profits in the most recent year have been primarily derived from investment returns off its consolidated financial statements;

   (e) There is a risk of material adverse change in respect of the availability or use of any important assets or technologies being used by the issuer, such as trademarks, patents, proprietary technology and franchise rights; or

(f) Other circumstances that would have a significant adverse impact on its sustainable profitability.

Source:

Shenzhen Stock Exchange (not dated).

Appendix B: Major industry classes

Table B.1 Major industry classes specified by the CSRC

Code.	No.	Title	Description
A	1	Agriculture	Agriculture, forestry, animal husbandry, fishery
B	2	Mining	Coal, Oil and Gas, Mining services
C	3	Manufacturing	Food, beverage, textiles, apparel, machinery, metal and non-metal ,petrochemicals, paper & printing, electronics, timber & furnishings, pharmaceuticals
D	4	Utilities	Electricity, gas, water products and supply
E	5	Construction	Building, railway, highway
F	6	Transportation	Railway, highway, pipe, water, airline
G	7	Information Technology	Communication, computer equipment, IT applications
H	8	Wholesale & Retail	Wholesales, retails, agency services
J	9	Real Estate	Real estate development, Real estate management
K	10	Social Services	Public service, post, professional & research service, restaurants
L	11	Media	Publications, sounds and pictures, broadcasts, arts
M	12	Conglomerate	Multi-industry

Source:
Shen et al. (2014) and Song et al. (2014)

Appendix C: Example of accruals estimation

Assume that CSOA Limited, an SME listed on the Junk Nation Stock Exchange on 11 August 2054. The fiscal reporting period of CSOA Limited is from 1 January to 31 December. The following table summarizes the relevant key data supplied by Sam Flattery the CFO of CSOA Limited.

Table C.1 Computation of discretionary accruals

Account	31 December 2054	31 December 2053	Difference
Current assets	4.321	2.145	2.176
Cash	0.181	0.036	0.145
Current liabilities	1.692	0.841	0.851
Long-term debt*	0.042	0.369	-0.327
Taxes payable	0.264	0.452	-0.188
Net income	9.316	6.458	2.858
Cash flows from operations	6.158	7.158	-1.000
Revenue	18.486	12.698	5.788
Receivable	5.985	2.148	3.837
PPE	14.365		
Total assets		22.364	

Legend:
Long-term debt classified as part of short-term debt.

When calculating total discretionary accruals, the first step would be to calculate total accruals using *Formula 13*:

$TAcc_{i,t} = NI_{i,t} - CFO_{i,t} = 9.316 - 6.158 = 3.158$

Assume that CSOA Limited belongs to the Rip-Off industry sector that comprises 31 firms that have been listed on the Golden Slippery Stock Exchange for two years or more. Total accruals can be computed for each of these 31 firms as per *Formula 13*. The Jones (1991) model is then performed as per *Formula 14*:

$(TAcc_{j,t}/TA_{j,t-1}) = a_0(1/TA_{j,t-1}) + a_1(\Delta Rev_{j,t}/TA_{j,t-1}) + a_2(PPE_{j,t}/TA_{j,t-1}) + \varepsilon_{j,t}$

Assume that regression performed using the estimated portfolio of 31 firms from the Rip-Off industry yield the following fitted values for $\hat{a}_0$, $\hat{a}_1$, $\hat{a}_2$: 0.142, 0.284 and 0.074.

The total discretionary accruals for CSOA Limited would then be calculated as:

$DTAcc_{i,t} = (TAcc_{i,t}/TA_{i,t-1}) - NDTAcc_{i,t}$

$DTAcc_{i,t} = (TAcc_{i,t}/TA_{i,t-1}) - [\hat{a}_0(1/TA_{i,t-1}) + \hat{a}_1((\Delta Rev_{i,t}/TA_{i,t-1}) - (\Delta Rec_{i,t}/TA_{i,t-1})) + \hat{a}_2(PPE_{i,t}/TA_{i,t-1})]$

$DTAcc_{i,t} = (3.158/22.364) - [0.142(1/22.364) + 0.284((5.788/22.364) - (3.837/22.364)) + 0.074(14.365/22.364)]$

$DTAcc_{i,t} = (0.141) - [0.142(0.045) + 0.284(0.259 - 0.172) + 0.074(0.642)]$

$DTAcc_{i,t} = (0.141) - (0.064 + 0.025 + 0.048)$

$DTAcc_{i,t}$ = (0.141) – (0.137)
$DTAcc_{i,t}$ = 0.004

For current discretionary accruals the first step would be to calculate current accruals using *Formula 17*:

$CAcc_{i,t} = (\Delta CA_{i,t} - \Delta Cash_{i,t}) – (\Delta CL_{i,t} - \Delta LTD_{i,t} - \Delta ITP_{i,t})$ = (2.176 – 0.145) – (0.851 – (-0.327) – (-0.188)
$CAcc_{i,t}$ = (2.176 – 0.145) – (0.851 – (-0.327) – (-0.188))
$CAcc_{i,t}$ = (2.176 – 0.145) – (0.851 – (-0.327) – (-0.188))
$CAcc_{i,t}$ = (2.031) – (0.137)
$CAcc_{i,t}$ = 0.665

Again, assume that CSOA Limited belongs to the Rip-Off industry sector that comprises 31 firms that have been listed on the Golden Slippery Stock Exchange for 3 years or more. The Jones (1991) model would then be performed as per *Formula 18*:

$(CAcc_{j,t}/TA_{j,t-1}) = u_0(1/TA_{j,t-1}) + u_1(\Delta Rev_{j,t}/TA_{j,t-1}) + \varepsilon_{j,t}$

Assume that regression performed using the estimated portfolio of 31 firms from the Rip-Off industry yield the following fitted values for $\hat{u}_0$, $\hat{u}_1$: 0.094 and 0.152

The current discretionary accruals for CSOA Limited would then be calculated as:

$DCAcc_{i,t} = (CAcc_{i,t}/TA_{i,t-1}) – NDCAcc_{i,t}$
$DCAcc_{i,t} = (CAcc_{i,t}/TA_{i,t-1}) – [\hat{u}_0(1/TA_{i,t-1}) + \hat{u}_1((\Delta Rev_{i,t}/TA_{i,t-1}) – (\Delta Rec_{i,t}/TA_{i,t-1}))]$
$DCAcc_{i,t}$ = (0.665/22.364) – [0.094(1/22.364) + 0.152((5.788/22.364) – (3.837/22.364))]
$DCAcc_{i,t}$ = (0.030) – [0.094(0.045) + 0.152(0.259 – 0.172)]
$DCAcc_{i,t}$ = (0.030) – [0.094(0.045) + 0.152(0.087)]
$DCAcc_{i,t}$ = (0.030) – [(0.004) + (0.013)]
$DCAcc_{i,t}$ = (0.030) – (0.017)
$DCAcc_{i,t}$ = 0.013

Finally, the long-term discretionary accruals for CSOA Limited are then calculated as:

$DLAcc_{i,t} = DTAcc_{i,t} – DCAcc_{i,t}$ = –0.009

Appendix D: Geographical distribution of sample firms

Following prior historical and geographical literature (Zi, 2006), the south and north area in the PRC is normally divided by Qinling Mountains and Huai River. Table D.1 presents IPO firms' geographical distribution based on south and north areas.

Table D.1 Geographical distribution of sample firms

Province of registration	Number	Percentage
North Area		
Bei Jing	20	4.31%
Tian Jin	6	1.29%
Shan Dong	39	8.41%
He Nan	15	3.23%
He Bei	7	1.51%
Liao Ning	8	1.72%
Xin Jiang	8	1.72%
Shan Xi	3	0.65%
Ji Lin	4	0.86%
Nei Meng	1	0.22%
Gan Su	3	0.65%
Tibet	1	0.22%
Shan Xi	1	0.22%
Hei Long Jiang	1	0.22%
Ning Xia	1	0.22%
Total North Area	*118*	*25.43%*
South Area		
Shang Hai	18	3.88%
Chong Qing	1	0.22%
Guang Dong	101	21.77%
Zhe Jiang	78	16.81%
Jiang Su	62	13.36%
Si Chuan	16	3.45%
Hu Nan	14	3.02%
Hu Bei	7	1.51%
An Hui	13	2.80%
Gui Zhou	2	0.43%
Fu Jian	19	4.09%
Yun Nan	6	1.29%
Jiang Xi	4	0.86%
Guang Xi	4	0.86%
Hai Nan	1	0.22%
Total South Area	*346*	*74.57%*
Total	***464***	***100%***

As shown in Table D.1, most of the sample firms are from the south area (74.57%), and more than half of the sample firms are from three provinces (Guang Dong, Zhe Jiang and Jiang Su). This distribution is not surprising because those three provinces

are regarded as cradles of SMEs, with a strong momentum of development in the PRC. Thus a mass of SMEs with expansion ambitions in those provinces seek opportunities to go public. Among all provinces, Guang Dong has the largest number of IPO firms (21.77%). Again it is not surprising because the headquarters of the SME board is located in Guang Dong.