Information spillovers and partial private-sector oversight: An empirical analysis from China's IPO market

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Abstract

This thesis examines information spillovers and partial private-sector oversight in the context of initial public offerings (IPOs), using a unique mainly hand-collected dataset from China's A-share market. By exploiting the announcements of investors' bidding results under the hybrid IPO auction mechanism, Chapter 2 examines the effect of information spillovers on investor participation and IPO price discovery. This study found that the information produced by contemporaneous investors with different levels of sophistication affects the investor participation and price revision for current IPOs in different ways, suggesting that the informativeness of contemporaneous bidding results varies based on investor sophistication. Additionally, the information generated by institutional investors when participating in the current sealed-bid auction influences the retail participation in the current public tranche.

China's IPO market has moved from centralized governmental oversight to partial private-sector oversight by introducing a sponsorship regulatory system. Chapter 3 details the sponsorship system's role in mitigating IPO underpricing. Relative to the period when government agencies took sole charge of IPO oversight, firms suffer less underpricing when going public under the sponsorship system. The reputation of sponsoring entities and their premarket information production contribute to explaining the reduction in IPO underpricing. The China Securities Regulatory Commission (CSRC) plays a specific role in lowering underpricing by imposing sanctions on sponsors.

By using buy-and-hold returns and Fama-French five-factor models, Chapter 4 demonstrates that the long-run performance of IPOs screened by the sponsorship system is better than under government-dominated systems. Furthermore, IPOs with reputable sponsoring entities perform better and quickly gain CSRC approval. The CSRC's regulatory review of IPO admission documents has a negative impact on long-run performance. The regulatory actions taken by the CSRC are effective, as the number of IPO businesses has declined for the sanctioned sponsors and the IPOs managed by representatives perform better once they receive a penalty.

List of Contents

Abstract **2**

List of Contents **3**

List of Tables **6**

List of Figures **8**

Acknowledgements **9**

Author's declaration **10**

Chapter 1: Introduction **11**

1.1 Motivations for the study 12

1.1.1 The importance of studying information spillovers in the IPO market 12

1.1.2 The importance of studying partial private-sector oversight in the IPO market 15

1.2 Empirical issues and the main findings of this thesis 19

1.3 The contributions of this thesis 23

1.4 The major limitations of this thesis 28

1.5 The plan of study 29

Chapter 2: Evidence of information spillovers in the context of China's hybrid IPO auctions **31**

2.1 Introduction 32

2.2 China's hybrid IPO auction mechanism 39

2.3 Literature review and hypothesis development 46

2.3.1 Related literature and research objectives 46

2.3.2 Hypothesis development 55

2.4 Data, methodology and descriptive statistics 61

2.4.1 IPO sample and data collection 61

2.4.2 Sample description 63

2.4.3 Methodology and construction of variables 68

2.4.3.1 Definition of contemporaries 68

2.4.3.2 Measures of investor participation 69

2.4.3.3 Measure of IPO price discovery 71

2.4.3.4 Measures of information spillovers 72

2.4.3.5 Firm- and offer-specific characteristics 81

2.4.3.6 Empirical models 85

2.4.4 Descriptive statistics 87

2.4.5 Correlation analysis 91

2.5 Empirical results 94

2.5.1 The effect of information spillovers on institutional participation 94

2.5.1.1 Robustness tests using alternative information-spillover measures 102

2.5.1.2 Robustness tests at the investor level 109

2.5.2 The effect of information spillovers on retail participation 115
2.5.2.1 Spillover effects on institutional participation versus retail participation 121
2.5.3 Information spillovers within the sealed-bid hybrid IPO auction mechanism 123
2.5.3.1 Additional evidence of information spillovers within the sealed-bid hybrid IPO auction procedure 132
2.5.4 The effect of information spillovers on IPO price discovery...................... 135
2.5.5 Robustness tests for potential endogeneity concerns using two-stage least squares regressions (2SLS) 146
2.6 Conclusions 154
2.6.1 Summary of the main findings.. 154
2.6.2 Contributions, implications and limitations of the study 156
Chapter 3: Does the reduction of state control affect IPO underpricing? Evidence from China's A-share market 160
3.1 Introduction 161
3.2 Institutional setting of China's IPO market.. 168
3.3 Literature review and hypothesis development 172
3.4 Data, methodology and descriptive statistics 183
3.4.1 Data and sample 183
3.4.2 Variable definition and methodology 186
3.4.2.1 IPO underpricing 186
3.4.2.2 Distinguishing regulatory systems 186
3.4.2.3 Reputation measures for the sponsor institution 187
3.4.2.4 Reputation measures for the sponsor representative 189
3.4.2.5 Risk factors revealed by sponsoring entities 190
3.4.2.6 Processing times for the IPO admission review 191
3.4.2.7 Disciplinary actions 191
3.4.2.8 Control variables 192
3.4.2.9 Empirical models... 194
3.4.3 Descriptive statistics 195
3.4.4 Correlation analysis 202
3.5 Empirical results 204
3.5.1 Multivariate comparisons of IPO underpricing across regulatory systems . 204
3.5.2 Impact of sponsoring entities' reputation on IPO underpricing 209
3.5.3 Information disclosure by sponsoring entities and IPO admission review.. 217
3.5.4 Disciplinary actions against sponsoring entities 222
3.5.5 Robustness tests 227
3.5.5.1 Sponsor fixed effects 227
3.5.5.2 Interaction effects of sponsor institutions and sponsor representatives . 231
3.5.5.3 Bootstrap method.. 235
3.6 Conclusion 236

Chapter 4: Partial private-sector oversight in China's A-share IPO market: An empirical study on the experience of the sponsorship system................................238

4.1 Introduction...239

4.2 The institutional background of China's IPO market...246

4.2.1 Regulatory systems in China...246

4.2.2 Sponsor institution vs sponsor representative....................................251

4.3 Literature review and hypothesis development...252

4.4 Data, methodology and descriptive statistics..259

4.4.1 Data and sample description...259

4.4.2 Methodology and construction of variables.......................................262

4.4.2.1 Event-time approach...262

4.4.2.2 Calendar-time approach...264

4.4.2.3 Construction of variables...266

4.4.3 Descriptive statistics and post-IPO stock performance..........................273

4.5 Empirical results...283

4.5.1 Comparison of post-IPO returns across regulatory systems......................283

4.5.2 Effect of sponsoring entities' reputation on post-IPO stock performance ...288

4.5.2.1 Analysis of the interaction effects between sponsor institution and sponsor representative...305

4.5.3 Analysis of information disclosure in the issuance sponsorship letter.........309

4.5.4 IPO admission review...313

4.5.5 Effect of the CSRC's disciplinary actions..317

4.5.6 Calendar-time factor model regressions...322

4.6 Conclusion..330

Chapter 5: Conclusions and recommendations for future research......................332

5.1 Summary of the main findings of each chapter...332

5.2 The contributions and implications of each chapter...339

5.3 Recommendations for future research...343

Appendices...345

Appendix 1: A summary of the variable definitions used in Chapter 2....................345

Appendix 2: A summary of variable definitions used in Chapter 3..........................349

Appendix 3: Tables 3.11–3.15..350

Appendix 4: A summary of the variable definitions used in Chapter 4....................358

References...360

List of Tables

Table 1.1: Table of definitions for the key terms used in this thesis........................11
Table 2.1: Sample distribution: Hybrid IPO auctions with a public tranche, 2006 – 2012 66
Table 2.2: Descriptive Statistics........................88
Table 2.3: Correlation Matrix........................92
Table 2.4: The effect of contemporaneous information spillovers on institutional participation 96
Table 2.5: The effect of contemporaneous spillovers on institutional participation: robustness tests by alternative spillover measures........................104
Table 2.6: The effect of spillovers on the probability of institutional participation at the investor level........................112
Table 2.7: The effect of contemporaneous information spillovers on retail participation 118
Table 2.8: Information spillovers within the sealed-bid hybrid IPO auction mechanism 124
Table 2.9: Analysis of information spillovers within the sealed-bid IPO selling procedure based on auction duration 133
Table 2.10: The effect of information spillovers on IPO price discovery........................138
Table 2.11: Two-stage least squares regressions........................148
Table 3.1: A summary of empirical studies on the underpricing of Chinese IPOs........................176
Table 3.2: Distribution of the sample of Chinese A-share IPOs over 1992 to 2012........................185
Table 3.3: Descriptive statistics 200
Table 3.4: Pearson Correlation Coefficients 203
Table 3.5: Multivariate comparisons of the market-adjusted initial returns across regulatory systems........................205
Table 3.6: The impact of sponsoring entities' reputation on the market-adjusted initial returns of IPOs 212
Table 3.7: Analyses of information disclosure by sponsoring entities and IPO admission review by the CSRC........................220
Table 3.8: Disciplinary actions against sponsor institutions and sponsor representatives 225
Table 3.9: Analyses of the reputation impacts of sponsoring entities with fixed-effects models........................229
Table 3.10: Interaction effects of sponsor institution and sponsor representative........................233
Table 4.1: Comparison across regulatory systems........................248
Table 4.2: IPO sample distribution: full sample 261
Table 4.3: Post-listing stock return performance of China's A-share IPOs from 1992 to 2012........................275
Table 4.4: Descriptive Statistics........................281

Table 4.5: Post-IPO stock returns across regulatory systems 285
Table 4.6: Effect of sponsoring entities' reputation on post-IPO stock performance ...291
Table 4.7: Comparisons of the performance of IPO firms screened by sponsoring entities with different levels of reputation 303
Table 4.8: Effect of reputation concerning the interactions between the sponsor institution and sponsor representative 307
Table 4.9: Analyses of information disclosure by sponsoring entities and centralized regulatory review by CSRC 311
Table 4.10: Tobit analysis for the determinants of the processing times of the CSRC's admission reviews 316
Table 4.11: Comparison across disciplinary actions on sponsor institutions and sponsor representatives..319
Table 4.12: Robustness tests by calendar-time factor model regressions 325
Table 3.11: By a bootstrap method, comparing the market-adjusted initial returns across regulatory systems...350
Table 3.12: By a bootstrap method, examining the impact of sponsoring entities' reputation...351
Table 3.13: By a bootstrap method, analysing the information disclosure by sponsoring entities and the IPO admission review by the CSRC 353
Table 3.14: By a bootstrap method, analysing the disciplinary actions taken against sponsor institutions and sponsor representatives 355
Table 3.15: By a bootstrap method, analysing the interaction effects of sponsor institution and sponsor representative 357

List of Figures

Figure 2.1: The offering procedure of hybrid IPO auctions in China 41

Figure 3.1: Time series of underpricing (LHS lines) and volume (RHS bars) for China's A-share IPOs, 1992 to 2012 196

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Author's declaration

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References.

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Chapter 1: Introduction

Table 1.1: Table of definitions for the key terms used in this thesis

Key terms	Definitions
Hybrid IPO auction mechanism	An IPO placement method that combines a sealed-bid auction tranche (i.e. a price-setting tranche), which is used to set the offer price on the basis of institutional investors' bids and to allocate shares to institutional investors on a *pro rata* basis, with a separate tranche that allows retail investors to place orders without specifying a price (i.e. a fixed-price public offer tranche).
Uniform-price auctions	Uniform-price auctions are multi-unit sealed-bid auctions in which all winning bidders pay the same price.
Institutional investors	Institutional investors are organisations or groups of investors that have significant amounts of money to invest in large enough share quantities. In China's IPO market, "institutional investors" refers to the "qualified institutional investors" that have been approved by the CSRC, which include but are not limited to mutual funds, securities companies, insurance companies, financial companies, trust companies and qualified foreign institutional investors.
Sophisticated investors	Sophisticated investors are also known as informed investors, who typically have sufficient capital, experience and net worth to engage in more advanced types of investment opportunities. In the study of corporate finance, institutional investors are conventionally assumed to be sophisticated investors.
Retail investors	Retail investors are non-professional individual investors who trade in the securities market through brokerage companies or their saving accounts. In addition, retail investors invest much smaller amounts than institutional investors.
Unsophisticated investors	Unsophisticated investors are also known as uninformed investors who typically are non-professional individuals and/or private clients. Unsophisticated investors have inferior information-processing capabilities compared with sophisticated investors, thus, they demonstrate inferior performance. In the study of corporate finance, retail investors are conventionally assumed to be unsophisticated investors.
Sponsorship regulatory system	A sponsorship regulatory system is a type of partial private-sector oversight, which partially transfers the oversight of IPO firms to the private sector by entrusting nominated advisors/sponsoring entities to attest to the quality and viability of candidate firms. It also retains a role for the public regulator in implementing governmental regulation.
IPO underpricing	Underpricing, also known as initial returns, is measured by the change from an IPO firm's initial offer price to the closing price of the first trading day.
ST tag	Listed firms that suffer losses for more than two consecutive years are labelled with a special treatment tag (i.e. ST tag).
*ST tag	Listed firms that suffer losses for three consecutive years or more are labelled with a *ST tag. These two tags are a kind of risk caution or admonition to investors that informs of the potential risk of delisting for those stocks, in which the listed firm with a *ST tag is more close to the delisting risk.

Going public via an initial public offering (IPO) is a watershed moment in the life of any firm. This process involves various parties – including investors, intermediaries, issuers and regulators – and it only takes place once for most firms. As such, the efficiency of the IPO process and the performance of the companies that have gone public this way has become one of the most important topics in academic research. Over the past few decades, researchers have been intrigued by the process of IPOs' price formation, and the puzzles of IPOs' short-run underpricing and long-run underperformance. There has been a broad set of academic literature that attempts to address these issues from different perspectives, such as the information environment / information production during the offering phase, the role of the financial intermediaries and the institutional structure of the IPO market. The central purpose of this thesis is to shed some light on the unanswered questions in these research facets. Table 1.1 presents the definitions of the key terms used in this thesis.

1.1 Motivations for the study

1.1.1 The importance of studying information spillovers in the IPO market

The valuation of IPO shares is particularly challenging due to the scanty information available about new firms at the time of the offering phase. According to an earlier theoretical framework (Benveniste et al., 2002), information spilling over from the transactions or marketing efforts of contemporaneous IPOs that are subject to a common valuation factor is an important ingredient in the price formation of the current offering. Given that information production is costly, observing and garnering some pieces of the valuation jigsaw from the experience of contemporaries will allow the primary market participants to evaluate current IPOs more cheaply. Therefore, it is important to conduct empirical research on the impact of information spillovers in the context of IPO markets.

Most existing empirical studies provide evidence of information spillovers in an IPO market based on a book-building mechanism. Benveniste et al. (2003) show that information regarding the withdrawal rate, proceeds revision and initial performance of contemporaneous IPOs spills over and affects the pricing decision for IPOs in the same industry in the US market. Similar conclusions are drawn by Ljungqvist and Wilhelm (2002), who carried out a country-level analysis and suggest that the valuation efforts of local contemporaneous IPOs play an important role in explaining the price discovery of local IPOs. By analysing the informativeness of the investors' bids contained in a European investment bank's order book, Cornelli and Goldreich (2003) demonstrate that the average limit price submitted by investors is influenced by the volume of contemporaneous IPOs in the industry.

However, there is limited empirical evidence that focuses on information spillovers in an IPO market based on auctions or auction-like mechanisms. It is valuable to investigate the significance of information spillovers in such an auction-based IPO market, because the information environment of auctioned IPOs is quite different from that of book-built IPOs. In particular, IPO markets that use auction-like mechanisms typically make investors' bidding information publicly available after the close of the offering, whereas book-built IPOs keep this information confidential, due to the opaque nature of allocations, and merely reveal the pricing outcomes at the end of the offering. Hence, examining information-spillover effects in the context of the IPO book-building mechanism, as the aforementioned empirical works do, has been unable to elucidate the importance of contemporaneous investors' bidding information for market participants to estimate the value of the current offering. Motivated by this unaddressed issue in the research on information-spillover effects, this thesis examines how information produced by investors in contemporaneous auctioned IPOs affects the investor participation and price discovery of current IPOs.

Although the participation or entry of investors serves a pivotal role in most IPO auction theories (e.g. Biais and Faugeron-Crouzet, 2002; Biais et al., 2002; Sherman, 2005), little evidence has been produced regarding how they make entry decisions based on the various pieces of information disseminated at the time of the offering phase. For example, Degeorge et al. (2010) find that investor participation in US IPO auctions is largely predictable based on the deal size of the current offering. Chiang et al. (2010) show that retail investors enter Taiwan's IPO auctions based on recent auction returns, while the entry of institutional investors is strongly related to firm-specific information uncertainty.

With its analysis of information-spillover effects, this thesis attempts to throw additional light on the determinants of investor participation in IPO auctions.

Moreover, according to behavioural theory (Welch, 1992; Bikhchandani et al., 1998), in a sequential IPO selling procedure, the participation of sophisticated investors in the early stage of an offering will create information externalities that are valuable to unsophisticated investors who engage in the later stage. In other words, IPO selling mechanisms with a sequential hybrid structure are expected to cause cascading demand among investors with different levels of sophistication (Ljungqvist et al., 2003; Derrien and Womack, 2003). Such an expectation is of interest in this thesis, which further investigates the influence of information spillovers on investor participation during the sequential hybrid IPO selling procedure.

Being conditioned on a transparent IPO environment, in which investors can observe the dynamics of each other's participation, existing research studies (e.g. Neupane and Poshakwale, 2012; Khurshed et al., 2014) reveal that the participation of retail investors in the later stage of the offering period is largely driven by the participation of institutional investors in the early stage. Nevertheless, it is difficult to relate their evidence more broadly to the general case, as sealed bidding is a common method for setting an IPO selling mechanism in most markets. Chowdhry and Sherman (1996) claim that the prevalence of information leakage during a sealed-bid IPO selling procedure means retail investors are able to condition their demand on the participation of institutional investors that have submitted orders in the preceding stage. Therefore, it is worth investigating whether the information generated by institutional investors in a sealed-bid IPO environment is able to spill over and affect the participation of retail investors.

Since China's IPO market is one of the few markets that force all firms going public to do so via an auction-like mechanism (referred to as a sealed-bid uniform-price hybrid IPO auction with a public tranche) over the past decade (see Schnitzlein et al., 2016; Chemmanur et al., 2017; Gao et al., 2017), I choose it as the experimental venue in which to pose my research questions. The hybrid approach used in China consists of two offer tranches, where a sealed-bid auction tranche (i.e. a price-setting tranche) is only open to institutional investors, and a fixed-price public-offer tranche allows retail investors to place orders without specifying a price. This special setting provides an opportunity to assess the informativeness of institutional bidding results versus retail subscription results separately. To the best of my knowledge, no previous research on China's IPO market considers the role of information spillovers in explaining investor participation and offer-price formation. From this perspective, the study of information spillovers in this thesis is important as it will help, both in academia and in practice, to provide an understanding of the information environment of firms going public in China.

1.1.2 The importance of studying partial private-sector oversight in the IPO market

Ascertaining which forms of securities regulations or regulatory structures work to strike a balance between investor protection and costs of raising capital has been both a focus of academic researchers in law and economics, and an issue for policy-making for stock market development. The form of public-sector oversight (or centralized governmental oversight), which empowers the main government agency or official authority to take sole charge of supervising the IPO market, is not unambiguously positive in protecting investors from low-quality firms (e.g. Stigler, 1964; Bushee and Leuz, 2005; Cattaneo et al., 2015); in addition, such a centralized regulatory approach can impose burdensome costs on firms going public (especially the cost of regulatory compliance, according to Zingales [2007]). As a leading example of private sector oversight, London's Alternative Investment Market (AIM) entrusts private entities (known as nominated advisors or sponsors) to serve as both gatekeepers of the IPO market (by attesting to the viability of candidate firms) and monitors of regulatory compliance. Although this alternative regulatory approach is arguably a flexible and less expensive way for candidate firms to raise capital (Mendoza, 2008), some recent empirical studies (e.g. Gerakos et al., 2013; Doukas and Hoque, 2016) suggest that the AIM's model has a limited ability to screen out low-quality firms and protect investors in terms of the poor post-IPO performance of new listings.

However, very few studies have investigated the effectiveness and long-run viability of partial private-sector oversight, which transfers oversight to the private sector (by adopting IPO sponsors), but retains a role for the central regulator in taking government regulation. Given the underperformance of AIM firms relative to newly listed firms in centrally regulated markets, Piotroski (2013) suggests that it is important to consider and exploit the institutional differences across global markets to examine the *separable* impact of private oversight and flexible regulation on the performance of IPO firms. Moreover, scholars in law and finance (e.g. La Porta et al., 2006; Jackson and Roe, 2009) cast considerable doubt on both the sufficiency of a purely private-sector solution or the efficiency of strictly public regulatory enforcement, and they suggest that a legal or regulatory framework that mandates disclosure and facilitates private enforcement is beneficial to stock market development. Therefore, these factors provided motivation for this thesis to probe how the partial private-sector form of oversight serves the functions of screening candidate firms, protecting investors and improving the efficiency of the IPO market, in terms of the short-run and long-run performance of IPOs.

As one of the world's largest IPO markets, China's A-share market has moved from being a government-administered system to being a sponsorship regulatory system, as which it has operated for more than a decade.[1] The sponsorship regulatory approach adopted by China's IPO market is a typical form of partial private-sector oversight, in which the sponsoring entities (i.e. the sponsor institutions and sponsor representatives) are entrusted by the China Securities Regulatory Commission (CSRC) to verify the quality of candidate firms, while the centralized governmental regulation and review conducted by the CSRC itself are still in place. As such, China's IPO market provides a unique testing ground for examining the effectiveness and long-run viability of partial private-sector oversight relative to centralized governmental oversight.

By looking into the characteristics of China's sponsorship regulatory model, this thesis also attempts to address four questions that are not fully answered or were difficult to answer in previous research on private-sector oversight. First, it remains inconclusive

[1] A-share refers to the domestic shares that are offered only to domestic investors and traded in Chinese currency (RMB) in mainland stock exchanges. A-share is also the shares of mainland China-based companies. Most research (e.g. Fan et al., 2007; Piotroski and Zhang, 2014; Chen et al., 2015; Feng and Johansson, 2015) on China's IPO market is based on the A-share stocks.

whether certain observable characteristics of sponsoring entities (as measures of their reputations) can explain the variation in the aftermarket performance of IPOs. For example, Gerakos et al. (2013) report mixed evidence after examining some characteristics of the nominated advisor, such as market maker versus prior performance. In order to extend and complement their efforts, this thesis exploits the unique information of sponsoring entities revealed by the CSRC to examine not only a broader set of characteristics but also the contribution of individual sponsors (i.e. sponsor representatives) to the performance of IPOs.

Second, it remains unclear whether the information produced by private-sector entities through their premarket due diligence has predictive power for the aftermarket performance of IPOs. Under the influence of a sponsorship regulatory model, sponsoring entities are subject to mandatory disclosure requirements by the central regulator (or public regulator). Such an institutional feature allows this study to examine the relation between the *ex ante* assessment of candidate firms' quality by sponsoring entities and the *ex post* performance of these IPO firms.

Third, since the method of private-sector oversight has been documented to be less effective in performing the screening function, an important question is whether a centralized regulatory review of candidate firms taken by the public regulator can serve as a backup in controlling the quality of new listings. Since the admission documents of IPO firms prepared by nominated advisors in the AIM do not need to be inspected by the UK listing authority, previous research was unable to examine the extent to which a centralized regulatory review can help to bring down information uncertainty and screen out low-quality firms. Given that the public regulator of China's IPO market (the CSRC) has a role in the review and approval of the candidate firms' admission documents under the sponsorship system, this thesis is able to examine the impact of a centralized regulatory review on the aftermarket performance of IPO firms screened by sponsoring entities.

Fourth, it is far from clear whether the disciplinary actions imposed by the public regulator on private-sector entities have any implications regarding changing the level of oversight given by these entities. Instead of carrying out a rigorous empirical analysis, Gerakos et al. (2013) merely provide descriptive evidence on the disciplinary actions taken against the weak oversight of nominated advisors. This is because the censures of AIM's nominated advisors are typically not publicly available. Taking advantage of the publicly available information on penalties for Chinese sponsoring entities, this thesis investigates the extent to which disciplinary actions taken by the public regulator contribute to improving the quality of private-sector oversight.

Research on the sponsorship regulatory model (i.e. partial private-sector oversight) and related characteristics can help to explain the initial underpricing of IPOs. The initial underpricing of IPOs refers to the shares in firms that go public that are sold at a price below the first-day aftermarket price, which is also considered to be the indirect costs faced by firms when they raise equity finance (i.e. "money left on the table"). According to Chambers and Dimson (2009), a central measure of the efficiency of the IPO market is the extent to which new shares are underpriced. Previous studies, based on the overwhelming evidence of IPO underpricing around the world, offer various explanations and insights into this aftermarket anomaly, including (but not limited to) the winner's curse (Rock, 1986), financial intermediary certification (Titman and Trueman, 1986; Carter and Manaster, 1990; Megginson and Weiss, 1991), information revelation (Benveniste and Spindt, 1989), signalling (Allen and Faulhaber, 1989; Welch, 1989), ownership structure and monitoring (Brennan and Franks, 1997), and investor sentiment (Ljungqvist et al., 2006). This thesis is built upon previous works, but goes further by highlighting the importance of institutional factors in explaining the variation of IPO underpricing.

The long-run stock performance of IPO firms is a reasonable measure for investigating regulatory effectiveness in terms of the screening function and investor protection, because it is difficult to argue that investors have been hurt without observing their losses. Starting with Ritter (1991), and Loughran and Ritter (1995), many studies explain that

IPO firms, on average, underperform the market (or alternative benchmarks) over the one- to five-year period after the initial flotation. This underperformance anomaly implies that investors are unwise to invest IPO stocks in the aftermarket and hold shares for the long term. Existing empirical explanations for the long-run underperformance of IPOs are more abundant than theoretical ones; for example, the acquisition activity of newly public firms (Brau et al., 2012), the involvement of bureaucrats in management and directorships (Fan et al., 2007), the reputation of underwriters (Carter et al., 1998), the over-optimism among investors regarding the earnings potential of IPO firms (Teoh et al., 1998), and the divergence of opinion among investors (Houge et al., 2001). The study in this thesis of the sponsorship regulatory model and related characteristics sheds additional light on the determinants of the long-run performance of IPOs from the perspective of institutional structure.

1.2 Empirical issues and the main findings of this thesis

The first empirical chapter of this thesis, **Chapter 2**, examines whether and how information spillovers influence investor participation and price discovery in the context of China's hybrid IPO auctions. By analysing the bidding (or subscription) information revealed in the announcements of hybrid IPO auction results, I find that information generated by contemporaneous investors spills over and affects the participation (or entry) of investors into current IPOs, and this information-spillover effect varies based on investor sophistication. To be specific, the information produced by institutional investors for the valuation of contemporaneous auctioned IPOs is able to lower the costs (or uncertainty) of estimating current offerings and exerts a significant positive effect on the decisions of institutional investors to enter current IPOs. In particular, this information-spillover effect is stronger among IPOs that are subject to a common valuation factor (i.e. are in the same industry). By contrast, the information produced by retail investors in contemporaneous IPOs conveys the collective mood or sentiment of these unsophisticated investors, and only has a significant positive influence on the participation of retail investors in current IPOs. Moreover, I find a significant and positive association between the price revision of current IPOs and the information produced by contemporaneous institutional investors, which suggests that the announcement of contemporaneous institutional bidding results brings a considerable amount of new information to the price discovery of current IPOs. Furthermore, I show that underwriters incorporate this spillover information into the offer price depending on the reaction (or bids) of the institutional investors in the current auctions, which is consistent with the findings of Cornelli and Goldreich (2003). In addition to information spillovers from contemporaries, I also provide evidence that the information generated by institutional investors in the current sealed-bid auction tranche (or price-setting tranche) can spill over and influence the participation of retail investors in the current public tranche, which confirms that information leakage is prevalent in the sealed-bid hybrid IPO selling procedure. In brief, information spillover is an important factor used by market participants to assess the value of IPO shares at the time of the offering phase.

The empirical study contained in **Chapter 2** focuses on a sample of 1,144 IPO firms that went public in China's stock market through the hybrid auction method during 2006 to 2012. Also, the sample in particular contains investor-specific information for 478 institutional investors who have placed 126,128 bids in total during the sample period. The primary methods used for investigating the effects of information spillovers on investor participation and IPO price revision in this empirical chapter are cross-sectional ordinary least squares (OLS) regressions and logistic regressions, where the information spillovers are mainly measured by contemporaneous investors' bidding and/or subscription results. In order to address the potential endogeneity issues that appear in the OLS regressions, this study has also used the instrumental-variable approach with two-stage least squares regressions (2SLS).

The second empirical chapter of this thesis, **Chapter 3**, investigates whether and how a sponsorship regulatory reform towards private-sector oversight works to improve the efficiency of China's IPO market in terms of mitigating the underpricing of new share issues. By comparing the market-adjusted initial returns between firms under the influence of a sponsorship regulatory model and firms affected by government-dominated regulatory models (i.e. quota and channel regulatory models), I find that IPO firms handled by sponsoring entities are on average underpriced substantially less than IPO firms solely inspected by public enforcers or government agencies. The reputation of both sponsor institutions and sponsor representatives, as measured by their work experience in the relevant industry in particular, does have a role in reducing the underpricing of firms that went public under a sponsorship regulatory model. Furthermore, the analysis of the interaction effects demonstrates that reputable sponsor institutions serve an important function in mitigating the IPO underpricing in any combinations with sponsor representatives. Moreover, I find that the size of the risk factors of the candidate firms revealed by sponsoring entities in their sponsorship letter is informative in predicting the level of IPO underpricing, which suggests that these private entities have fulfilled their role of performing premarket due diligence on their client firms to some extent. In addition, the public regulatory enforcement carried out by the central regulator (the CSRC) exerts a certain degree of influence on the reduction of IPO underpricing under a sponsorship system, but it is achieved by imposing disciplinary actions on sponsor institutions rather than by reviewing the admission documents (or quality) of candidate firms. In a nutshell, by partially transferring oversight to the private sector, the efficiency of China's IPO market has been improved relative to the phases of centralized governmental oversight, which is attributed to the coordination of the reputational incentives of the private entities with the disciplinary mechanism created by the public regulator.

The full sample for **Chapter 3** contains 2,518 IPO firms that went public in China's A-share market between 1992 and 2012, in which there is a subsample of 1,215 IPO firms that went public under the sponsorship regulatory system from 2004 to 2012. The subsample also has sponsor-specific information for 64 sponsor institutions and 1,348 sponsor representatives, which reflects the characteristics of these sponsoring entities in different aspects. The primary method used to examine the ability of the sponsorship regulatory model and related characteristics to explain IPO underpricing is cross-sectional OLS regressions. In addition, as robustness checks, this study also adopts sponsor fixed-effects models, the analysis of interaction effects between sponsor institutions and sponsor representatives and the regressions with bootstrap method.

The final empirical chapter of this thesis, **Chapter 4**, investigates the effectiveness of partial private-sector oversight in screening out low-quality firms, and protecting investors by examining the post-IPO or long-run performance of firms going public under China's sponsorship regulatory model. Using both market-adjusted buy-and-hold returns and Fama and French's (2015) five-factor calendar-time portfolio returns as measures for post-IPO performance, I find that IPO firms screened by a sponsorship regulatory model outperform firms that went public under the government-dominated regulatory models. Relatedly, I find that certain characteristics related to the sponsorship regulatory model contribute to explaining the variability in the post-IPO return performance of firms that went public via a sponsorship system. First, the performance of IPO firms handled by sponsoring entities varies based on the reputation of these private entities, where the work experience in a sponsorship-related industry, when used as a proxy of the reputation, has a strong and positive association with the firms' post-IPO stock performance. Furthermore, the analysis of the sponsor fixed effects shows that certain classes of sponsor institutions are able to differentiate themselves in explaining the variation of post-IPO return performance. Moreover, the analysis of the interaction effects between the sponsor institution and sponsor representative indicates that the reputation of the sponsor institution performs a crucial function in the oversight and screening of candidate firms when the role of IPO oversight is given simultaneously to a sponsor institution and an individual representative. Second, the size of the advantage factors for candidate firms, as revealed by the sponsoring entities in their sponsorship letter, has predictive power for the firms' post-IPO return performance, which indicates that the sponsoring entities can deliver informative signals about the firm's quality to investors through their efforts in premarket due diligence. Third, I find that the deeper the central or public regulator (the CSRC) is involved in the oversight of the IPO candidate firms, as measured by the processing times of the IPO applications or admission document reviews, the worse the market-adjusted returns of the candidate firms will perform after listing. Additionally, a Tobit regression analysis on the relation between the centralized regulatory review and private-sector oversight shows that candidate firms screened by reputable sponsor institutions quickly get approval for their IPO application. Lastly, I find that only a serious disciplinary sanction imposed by the CSRC on sponsor representatives (for the weakness of their oversight) has a positive and significant influence on their subsequent client firms' post-IPO return performance. Collectively, the mosaic of evidence indicates that the form of partial private-sector oversight functions as investor protection in China's A-share IPO market.

The empirical study in **Chapter 4** employs the same sample of IPOs as the study in Chapter 3, while the empirical study in Chapter 4 emphasises the impacts of the sponsorship regulatory model (partial private-sector oversight) and related characteristics on post-IPO long-run stock performance. This study adopts both an event-time approach and a calendar-time approach to measure the long-run performance of IPOs. As for the regression analysis used in this study, several methods were employed to examine the explanatory power of the main characteristics of the sponsorship regulatory system: for example, pooled OLS regressions, 2SLS regressions, Tobit models, sponsor fixed-effects models, least square dummy variable models, interaction effects in regressions, and Fama and French's five-factor regression models.

1.3 The contributions of this thesis

The empirical studies in this thesis contribute to the existing literature in eight ways. First, this thesis is the first examination of the information-spillover effects in the context of an auction-like IPO mechanism. This has allowed the researcher to assess how the information externalities generated by investors in bidding for contemporaneous IPOs exert influence on the valuation of current IPO shares. Previous research, however, mainly focuses on the information externalities generated by firms going public via a book-building mechanism, which shows that the pricing outcomes and/or withdrawal decisions revealed by contemporaneous IPOs have substantial spillover effects on the production decisions of current IPO firms. The findings of this thesis demonstrate that information spilling over from the announcements of contemporaneous bidding results does have a role in explaining the valuation of current IPOs, but the informativeness of contemporaneous bidding results varies based on the level of investor sophistication. In particular, the information contained in the contemporaneous institutional investors' bidding results contributes to lowering the valuation uncertainty of current IPOs, while the bidding or subscription results of the contemporaneous retail investors are less informative. As such, this study widens the evidence and understanding of information-spillover effects in the IPO market, which suggests that different patterns of information externalities need to be taken into consideration under different IPO selling mechanisms.

Second, this thesis extends and complements the existing evidence on the determinants of investor participation in IPO auctions. Although previous research details how the entry of investors into IPO auctions is mainly driven by idiosyncratic factors and market conditions, the results of this thesis demonstrate that information spilling over from contemporaneous auction results is also an important driver of investor participation in current IPOs. In particular, institutional investors and retail investors have different reactions to the information revealed in the announcements of contemporaneous hybrid IPO auction results, which identify that there is a difference in the way these investors use spillover information (or public information) for evaluating current offerings and making entry decisions. To some extent, this also provides additional evidence to support the views of Odean (1998), and Field and Lowry (2009), who suggest that investors with different levels of sophistication have different abilities in the interpretation of readily available public information, and as a result, the ability of evaluating firms' prospects and choosing IPOs varies across these investors. Given the pivotal role that investor participation plays in all the IPO auction theories, the findings in this thesis allow a better understanding of the factors that drive investors engaging in auctioned IPOs.

Third, this thesis contributes to the ongoing debate in the capital-market-regulation literature over the benefits of centralized governmental oversight versus private-sector oversight by demonstrating that a regulatory reform that moves towards private-sector oversight is beneficial to the efficiency of the IPO market. The findings of this thesis indicate that a strictly public regulatory approach, which empowers a government agency to take sole charge of overseeing the IPO market, is less effective in mitigating IPO underpricing (i.e. the indirect costs of raising capital) than partially transferring oversight to the private sector. This is broadly consistent with La Porta et al.'s (2006) international analysis, who cast considerable doubt on the benefits of purely public regulatory solutions for stock market development. In particular, this thesis sheds additional light on the role of public regulatory enforcement in impelling the quality of oversight provided by the private entities, which suggests that a certain degree of sanctions being imposed by the public enforcer is necessary in order to deal with the weak due diligence and will benefit the IPO market. The results of this thesis have an important policy implication for the emerging markets that seek to improve the efficiency of their IPO markets via regulatory reforms.

Fourth, this thesis enriches the existing evidence on the determinants of IPO underpricing, especially for the extreme underpricing of China's A-share IPOs. While many previous studies examine the impact on IPO underpricing of the regulatory reforms that have taken place in China across different periods and/or regions (e.g. Su and Brookfield, 2013; Liu et al., 2014; Chen et al., 2015), the empirical research in this thesis throws new light on the importance of certain characteristics related to the sponsorship regulatory model in explaining the underpricing of Chinese IPOs. Specifically, the findings of this thesis demonstrate that sponsor institutions and sponsor representatives as IPO advisors are concerned with their reputational capital (e.g. their work experience in the sponsorship-related industry), whose reputation and premarket information production have a strong association with the level of their client firms' underpricing. By contrast, a centralized regulatory review carried out by the public enforcer (the CSRC) on candidate firms has little impact on the level of IPO underpricing, but its disciplinary actions on sponsor institutions play a role in reducing the underpricing of subsequent IPOs. These findings are meaningful, not only to academics but also to market participants; for example, for issuers, hiring experienced sponsors and/or punished sponsors as their IPO advisors is a way to lower the indirect costs of going public.

Fifth, this thesis makes one of the first attempts to explore the effectiveness of AIM-like private-sector oversight in the screening function and investor protection under a different institutional environment. Previous studies on the experience of London's AIM had difficulty in separating out the effect of weak rules (i.e. flexible or light-touch regulation) from the effect of weak oversight (i.e. ineffective Nomads or sponsors) when they attempted to interpret the return underperformance of new listings as weak investor protections. The analysis of China's sponsorship regulatory model in this thesis has allowed the researcher to clarify the contribution of the oversight carried out by the sponsoring entities to the performance of IPO firms under mandatory regulation. The findings of this thesis demonstrate that entrusting private entities with taking charge of IPO oversight does serve as an effective way to screen out low-quality firms and protect investors, in terms of post-IPO return performance. Furthermore, this thesis also highlights the role of the public regulator in the practice of private-sector oversight, and posits that reducing the force of its regulatory reviews of IPO candidate firms while intensifying its penalties against the weak oversight of the private entities will help to protect investors from overpaying on low-quality firms. One policy implication drawn from the conclusions of this study is that centralized governmental oversight in the absence of the involvement of private-sector oversight is a less effective regulatory approach in terms of investor protection.

Sixth, given the ongoing controversy in the literature over the measurement of the long-run underperformance of IPOs (e.g. Barber and Lyon, 1997; Brav and Gompers, 1997; Kothari and Warner, 1997; Fama, 1998; Brav et al., 2000; Loughran and Ritter, 2000; Gompers and Lerner, 2003), this thesis has attempted to capture the long-run underperformance of IPOs by measuring event-time buy-and-hold abnormal returns as well as calendar-time portfolio abnormal returns. In examining an up-to-date sample of 2,518 of China's A-share IPOs from 1992 to 2012, this thesis shows evidence of IPOs' long-run underperformance based on both the event-time approach and the calendar-time approach. However, the long-run underperformance assessed on an event-time basis is not persistent and disappears over an 18- to 36-month window. This lends weight to the previous arguments that the detection of long-run abnormal performance is sensitive to the methodologies used for estimating the post-IPO stock returns.

Seventh, by using a unique, manually collected dataset to assess the impact of the characteristics of a sponsorship regulatory system on the long-run returns of China's A-share IPOs, this thesis adds to the literature that examines the IPOs' long-run underperformance anomaly and related determinants. This research documents that the long-run performance of IPO firms under a sponsorship regulatory model varies based on several characteristics of the sponsor institutions and sponsor representatives, such as work experience, age and human capital. To the best of my knowledge, some of the sponsor characteristics that I have considered are the first to be used to test the certification hypothesis, and there are no previous studies that examine the certification hypothesis with respect to individual sponsor representatives. As such, the results of this thesis provide a new perspective on the measurement of sponsor reputation or sponsor quality. Moreover, while some previous work has examined the relationship between information revealed in prospectuses and IPOs' long-run performance, this research sheds further light on the importance of certain classes of information produced by the sponsoring entities in their sponsorship-related documents. Also, the findings of this thesis provide new insight into the contribution of the regulatory process initiated by the CSRC to the long-run performance of IPOs. As far as I know, these special characteristics regarding the sponsorship system have not been scrutinized in previous research on China's IPO market. Therefore, the results of this research are meaningful for both academics and policymakers who seek to understand the long-run viability of a sponsorship regulatory model.

Lastly, this thesis contributes to the understanding of corporate finance theories in several ways. The theoretical studies on the basis of informational cascades (e.g. Bikhchandani et al., 1992; Banerjee, 1992; Welch, 1992) predict that investors (sophisticated investors in particular) who have participated in an IPO earlier will create a positive externality that is informative to investors (unsophisticated investors in particular) who intend to participate in the IPO after some time. By examining information-spillover effects within a sealed-bid hybrid IPO selling procedure, this thesis not only sheds light on the presence of such an information externality when adopting a hybrid IPO selling method but also highlights that investors would still be influenced by this information externality in a sealed-bid IPO procedure. Moreover, one of the important implications drawn from the information-spillover models of Benveniste et al. (2002) and Alti (2005) is that IPO participants benefit from a lower cost of information production by studying contemporaneous investors' valuation efforts on the offerings in the same industry. This thesis makes one of the first attempts to provide the relevant empirical evidence that demonstrates that information produced by contemporaneous institutional investors for the valuation of contemporaneous auctioned IPOs has a positive spillover effect on the participation of institutional investors in current IPOs (i.e. institutional investors who participate in current IPOs enjoy a lower cost of estimating current offerings by observing the information spilling over from contemporaneous institutional investors' bidding results). Furthermore, this thesis also contributes to the understanding of asymmetric information theory as a whole. For example, Jenkinson and Ljungqvist (2001) and Ljungqvist (2007) detail the existing asymmetric information models used for explaining IPO performances, in which they suggest that the reputation of financial intermediaries works to reduce the *ex ante* uncertainty surrounding an IPO and hence mitigate the underpricing of IPOs. By examining the impact of sponsor reputation on IPO underpricing, this thesis not only improves the method of constructing reputation proxies but also extends the understanding of the effectiveness of the reputation of individual sponsor representatives in mitigating IPO underpricing.

1.4 The major limitations of this thesis

The major limitation of the empirical study in **Chapter 2** is its inability to account for the information spillovers with respect to investors' bid prices, which is due to the difficulty of accessing such information from existing data sources. Moreover, although this study has found evidence of information leakages by analysing information-spillover effects in the context of a sealed-bid hybrid IPO selling procedure, it is still unable to determine what the reasons are for the information leakage during the sealed-bid auction. These limitations, therefore, motivate the researcher to carry out relevant studies in the future.

The major limitation of the empirical study in **Chapter 3** is that it is unable to clarify whether the reduction of IPO underpricing following sponsorship regulatory reform is driven by any constitutive features of China's mainland markets, such as its political environment. Hence, in future research, it would be useful to extend the study to markets with different institutional and political environments, such as Hong Kong. Furthermore, due to data limitations, this study is also unable to address the extent to which the information produced by the public regulator (via its communications with IPO candidate firms and sponsoring entities) influences firm valuation and the process of going public. If information about communications between the public regulator and private-sector entities could be obtained in future research, then an analysis of the interactions between the public regulator and private-sector entities by textual analysis would enhance the understanding of the contribution of regulatory processes in IPO markets.

The major limitation of the empirical study in **Chapter 4** is its inability to locate some *ex post* outcomes (e.g. the proportion of IPO firms involved in accounting fraud, financial restatements or allegations of fraud after the screening of sponsoring entities) that could directly capture the *ex ante* firm quality; however, the *ex post* return performance is a reasonable measure for the *ex ante* firm quality. Hence, in order to reinforce the robustness of the empirical results, the researcher expects to be able to obtain and analyse these data regarding some *ex post* outcomes from either China's markets or other markets in future research.

1.5 The plan of study

The remainder of this thesis is organized as follows. Chapter 2 focuses on information spillovers in the context of China's hybrid IPO auctions and examines the effect of information spillovers on investor participation and IPO price discovery at the time of the offering phase. Chapter 3 investigates the role of the partial private-sector form of oversight in mitigating the initial underpricing of IPOs, by focusing on the experience of sponsorship regulatory reform in China's IPO market. In terms of the long-run performance of IPOs, Chapter 4 empirically examines the effectiveness of China's sponsorship regulatory model as a typical form of partial private-sector oversight in screening out low-quality firms and protecting investors. Finally, Chapter 5 summarizes the findings and implications of each chapter, offers conclusions, and proposes recommendations for future research. Each empirical chapter includes a literature review.

Chapter 2: Evidence of information spillovers in the context of China's hybrid IPO auctions

Abstract

In addition to providing a fair rule for share allocations, a pronounced feature of the auction-like IPO mechanism is the announcement of investors' bidding results after the close of the offering procedure, which distinguishes it from the book-building mechanism. As such, the information environment under the auction-like IPO mechanism allows investors and underwriters to learn about the valuation efforts made by contemporaneous investors for contemporaneous IPOs. In this chapter, I examine the impact of information spillovers from contemporaneous hybrid IPO auction results on the investor participation and price discovery of current IPOs. I find that the information produced by contemporaneous investors with different levels of sophistication affects the participation of institutional and retail investors in different ways, which suggests that the informativeness of contemporaneous bidding results varies based on the investors' sophistication. Additionally, although I find that the information spillover from contemporaneous institutional investors has a positive impact on the price revision of current IPOs, it is effected through the current bids of institutional investors rather than through the underwriters' direct adjustment. By contrast, the information spillover from contemporaneous retail investors has little influence on the current IPO's price revision. Furthermore, I also provide evidence that the information generated by institutional investors when they are participating in the current IPO's sealed-bid auction tranche spills over and affects the participation of retail investors in the current IPO's public tranche.

2.1 Introduction

Starting with the Benveniste et al. (2002) model, information spillovers from the marketing efforts or book-building efforts of contemporaneous firms that are attempting public offerings have played an important role in the theoretical and empirical literature on explaining the price formation of IPOs. Alti (2005) highlights the endogeneity of information spillovers, where the pricing outcomes of contemporaneous book-built IPOs convey the participating investors' private information on a common valuation factor, implying that observing such outcomes is able to lower the degree of information asymmetry among investors, and makes the pricing of subsequent IPOs relatively easier. In the context of an IPO market that is dominated by a book-building mechanism, using the pricing results of contemporaneous IPOs as measures for information spillovers, extant empirical research shows evidence on contemporaries' information spillovers affecting the price-discovery process of current IPOs (e.g. Ljungqvist and Wilhelm, 2002; Benveniste et al., 2003; Ljungqvist and Wilhelm, 2003; Edelen and Kadlec, 2005; Zhang, 2012; Ince, 2014; Bakke et al., 2017).

However, to date, very few empirical studies have attempted to probe the consequences of information spillovers in the context of an IPO market dominated by auction or auction-like mechanisms. Unlike the practice of the IPO book-building mechanism, the auction-like mechanisms used in most markets are required to announce investors' bidding results (also known as auction results or auction trends) after the close of the auction. This special feature makes the information spillover, which takes place in the context of auction-based IPO markets, different from that in the context of book-building-based IPO markets. Successors (investors and underwriters) who intend to evaluate and engage in current IPO auctions are able to observe/learn the information produced by their predecessors in recent auctioned IPOs through these announcements. Hence, investigating how the revelation of contemporaneous IPOs' auction results exerts influence on the current investor participation and IPO price discovery is meaningful for bringing to light the role of information spillovers under different IPO selling mechanisms. This is the primary focus of the empirical study in this chapter.

In the past decade, China's IPO market has been one of the few markets that forces candidate issuers to use an auction-like mechanism when going public, where the mechanism is referred to as a uniform-price hybrid IPO auction with a public tranche (e.g. Schnitzlein et al., 2016; Chemmanur et al., 2017; Gao et al., 2017).[2,3] Such a hybrid placement method consists of a sealed-bid auction tranche, in which only institutional investors are allowed to engage in the price-setting process, and a separate public tranche that allows retail investors to place (subscription) orders without specifying a price. More importantly, shortly after the close of the hybrid IPO procedure, the bidding (subscription) results of the two tranches will be made partially publicly available. This practice means the study of information-spillover effects is able to examine the information produced by investors with different levels of sophistication. Given the foregoing characteristics, I decided to analyse the information spillovers in the context of China's hybrid IPO auction mechanism.

Furthermore, behavioural theory (Welch, 1992; Bikhchandani et al., 1998) implies that the participation of sophisticated investors in an IPO's price-setting tranche will generate information externalities that are valuable to unsophisticated investors who intend to engage in the follow-up-offering tranche.[4] In other words, IPO selling mechanisms conducted in a hybrid manner are prone to triggering cascading demand among investors with different levels of sophistication (Derrien and Womack, 2003; Ljungqvist et al., 2003). In an IPO market with a transparent selling mechanism, where investors participating in different offering tranches are able to observe each other's demand, Neupane and Poshakwale (2012), and Khurshed et al. (2014) identify convincing evidence that the participation of retail investors is largely influenced by the participation of institutional investors. Nevertheless, it is an outstanding empirical question as to

[2] To the best of my knowledge, the other two markets that force issuers to use auction methods for IPOs are Vietnam and Taiwan, which are smaller than China's IPO market in terms of market capitalization. In most other countries, going public by using an auction method is an option for candidate issuers, rather than being mandatory, but, in practice, there are few issuers willing to choose auction methods voluntarily (Jagannathan et al., 2015).
[3] To eliminate ambiguity in the nomenclature of China's IPO selling mechanisms, see Section 2.2.
[4] The terms of sophisticated investors and informed investors are interchangeable in this chapter. Likewise, the terms of unsophisticated investors and uninformed investors are also interchangeable in this chapter.

whether the information generated by institutional investors in the current sealed-bid auction tranche is able to spill over and affect the participation of retail investors in the current IPO's public tranche. Thus, the next objective of this empirical study is analysing the information-spillover effects within the sealed-bid hybrid IPO auction mechanism.

Drawing on 1,144 IPOs brought to market through the hybrid auction method in China between June 2006 and October 2012, and using a unique manually collected dataset of investors' bidding (subscription) information from the announcements of the hybrid auction results, I have found considerable evidence of information spillovers influencing investor participation and IPO price discovery in hybrid IPO auctions.

In the empirical study detailed in this chapter, I present five interesting findings. First, I have identified that the information produced by institutional investors for the valuation of contemporaneous auctioned IPOs, especially that generated by large institutional investors, has a positive impact on the participation of institutional investors in current IPOs. This information-spillover effect is stronger among IPOs that are in the same industry. These results are robust to analysing participation decisions at the investor level. By contrast, I have found that the information generated by retail investors in contemporaneous IPO public tranches has little association with the participation of institutional investors in current IPOs. These findings suggest that institutional investors who engage in current IPOs are only influenced by the spillover information that is able to lower the costs of estimating the value for current offerings.

Second, in examining the information-spillover effects from contemporaneous hybrid IPO auction results on the participation of retail investors in current IPOs, I have found that the information produced by retail investors in contemporaneous IPO public tranches has a significantly positive affect on the retail participation in current IPOs. By contrast, the information produced by contemporaneous institutional investors has little influence on the retail participation in current IPOs, unless the information spills over from contemporaneous IPOs in the same industry. These findings suggest that the participation of retail investors appears not to rely on costly information acquisition; instead, their participation is susceptible to the sentiment or collective mood of unsophisticated investors spilling over from contemporaneous IPO public tranches.

Third, I have found evidence that the information produced by contemporaneous institutional investors spills over and has a positive influence on the price revision of current IPOs. As a further consequence, underwriters appear to incorporate such spillover information into the offer price only as a result of it being conveyed through the current bids of institutional investors. This finding suggests that, although the announcement of contemporaneous IPO auction results brings a considerable amount of new information to the current IPO's price setting, underwriters have to see the reaction of the institutional bidders in current IPO auctions to the spillover information in order to assess its significance. In addition, with respect to the information spilling over from contemporaneous IPO public tranches, I have identified that underwriters do not incorporate it into the offer price. This implies that the information generated by contemporaneous retail investors is less useful for estimating the value of current offerings. These empirical results are robust when accounting for information spilling over from contemporaries that are in the same industry.

Fourth, I have recognised that, during a sealed-bid hybrid IPO auction procedure, information generated by institutional investors in the current auction tranche is able to spill over and affect the participation of retail investors in the current IPO's public tranche. This result indicates that learning among investors with different levels of sophistication occurs even when hybrid IPO auctions have adopted a sealed-bid method, which implies that the presence of information leakage during sealed-bid hybrid auctions in China's IPO market. Moreover, I have found that retail investors are unwilling to engage in the current IPO's public tranche when the average level of short-term interest rates rises during the course of the current IPO's auction tranche, which is inconsistent with the prediction of Chowdhry and Sherman (1996). Hence, it appears that retail investors see a rise in short-term interest rates as a signal of increased opportunity costs or transaction costs rather than an information leakage on the aggregate demand of institutional investors from the current auction tranche. Furthermore, as an additional evidence of information leakage/information spillovers within the sealed-bid hybrid IPO auctions, I have also found that the level of retail investors' oversubscription submitted in a current IPO's public tranche increases with an increase in the duration of the current auction tranche.

Lastly, from a mechanism-design perspective, as predicted by recent studies (e.g. Jagannathan et al., 2015; Schnitzlein et al., 2016), I have found that, by adding a separate public tranche, the hybrid IPO auction mechanism can effectively get rid of retail investors' bids (or subscriptions) that influence the price-setting process. Moreover, consistent with the findings reported in previous research (Cornelli and Goldreich, 2003; Chemmanur et al., 2017), I have recognised that the information about oversubscription contained in institutional investors' bids is important for determining the offer price, which, to some extent, demonstrates the role of the hybrid IPO auction (the auction tranche in particular) as an information-extraction mechanism.

The study in this chapter makes four contributions to the literature and has practical implications. First, to the best of my knowledge, this is the first study that examines information-spillover effects in the context of an auction-based IPO market, which has a different information environment as compared to the book-building-based IPO market. This has allowed the researcher to assess the importance of the information externalities generated by investors in bidding for contemporaneous IPOs to the valuation of the current IPO. While many prior studies (e.g. Ljungqvist and Wilhelm, 2002; Benveniste et al., 2003; Ljungqvist and Wilhelm, 2003; Edelen and Kadlec, 2005; Zhang, 2012; Ince, 2014; Bakke et al., 2017) provide evidence that information spillovers from the pricing outcomes of contemporaneous book-built IPOs affect the price formation of current firms attempting IPOs, they did not investigate whether the information produced by investors in contemporaneous IPOs can spill over and affect the investors and underwriters who intend to evaluate and engage in current IPOs. This is because investors' bidding information is kept confidential in the context of the IPO book-building mechanism. By analysing information spillovers from the announcements of China's hybrid IPO auction results, this study is able to demonstrate that the information produced by investors for contemporaneous IPOs plays an important role in explaining the investor participation and price discovery of the current IPO. Also, I highlight the difference in the informativeness of the spillovers from contemporaneous institutional investors versus contemporaneous retail investors, where the information spillover from contemporaneous institutional investors has the ability to reduce the costs or uncertainty of estimating the value for the current IPO while that from contemporaneous retail investors does not. The results obtained in this chapter are meaningful for both academics and market participants, suggesting that information revealed in the announcements of contemporaneous IPO auction results contributes to the valuation of the current IPO firm.

Next, the study in this chapter enriches the existing evidence on the determinants of investor participation in IPO auctions. Although previous research details how the participation of investors in IPO auctions is mainly driven by idiosyncratic factors and market conditions (e.g. Derrien, 2005; Chiang et al., 2010; Degeorge et al., 2010; Neupane et al., 2014; Jagannathan et al., 2015), the results of this study demonstrate that information spilling over from contemporaneous hybrid IPO auction results is also an important driver of investor participation in current IPOs. In particular, institutional investors and retail investors have different reactions to the information revealed in the announcements of contemporaneous hybrid IPO auction results, which identify that there is a difference in the way these investors use spillover information (or public information) for evaluating current offerings and making entry decisions. To some extent, this also provides additional evidence to support the views of Odean (1998), and Field and Lowry (2009), who suggest that investors with different levels of sophistication have different abilities in the interpretation of readily available public information, and as a result, the ability of evaluating firms' prospects and choosing IPOs varies across these investors. Given the pivotal role that investor participation plays in all the IPO auction theories (e.g. Biais and Faugeron-Crouzet, 2002; Biais et al., 2002; Sherman, 2005), the findings in this chapter allow a better understanding of the factors that drive investors engaging in auctioned IPOs.

Then, this study provides empirical evidence for the assertion that an IPO selling mechanism with the sequential hybrid structure is prone to creating cascading demand among investors with different levels of sophistication (see Ljungqvist et al., 2003; Derrien and Womack, 2003). While previous research shows the relevant evidence in a transparent IPO selling environment (e.g. Neupane and Poshakwale, 2012; Khurshed et al., 2014), with my analysis highlighting that the information generated by institutional investors in the current sealed-bid auction tranche is still able to spill over and affect the participation of retail investors in the current IPO's public tranche. This finding also lends support to the hypothesis of Chowdhry and Sherman (1996), who predict that the presence of information leakage in a sealed-bid IPO selling mechanism enables unsophisticated investors to learn from the participation of sophisticated investors. Based on the empirical results in this chapter, an important practical implication for controlling the cascading demand of retail investors caused by the information spillover (or information leakage) is to shorten the duration of the sealed-bid auction tranche (i.e. the price-setting tranche) in the sequential hybrid IPO selling mechanism.

Finally, by demonstrating the role of adding a separate public tranche in preventing unsophisticated retail investors from disrupting the price-setting process, this study contributes to a small but growing amount of literature that examines the efficiency of the hybrid IPO auction mechanism with a public tranche (Cao et al., 2016; Schnitzlein et al. 2016; Chemmanur et al., 2017). The relevant empirical results obtained in this study are meaningful for the market regulators, who are reluctant to use the standard auction mechanism due to the impact of unsophisticated retail entrants on the price-setting process, and attempt to seek a way to fine-tune the standard auction mechanism.

The rest of this chapter is organized as follows. Section 2.2 describes the background of the hybrid IPO auction mechanism used in China. Section 2.3 reviews the related literature, formulates the research objectives and develops hypotheses. Section 2.4 reports the data collection, sample distribution, variable definitions and methodologies. Section 2.5 presents the empirical analyses and results. Section 2.6 concludes this chapter.

2.2 China's hybrid IPO auction mechanism

IPO placement methods (also known as IPO selling mechanisms) in China's primary market have experienced a series of changes since the market began to formally operate in 1990 (see Ma and Faff, 2007; Gao, 2010; Su, 2018; Jia et al., 2016). Broadly speaking, the fixed-price-offering method played a dominant role in China's IPO market before 2005, in which both investors and underwriters had little force to drive the price-discovery process. Over this long period of time, although the CSRC attempted to either relax or tighten its intervention on offer-price setting (or IPO price formation) many times, the rules of pricing and allocations were consistently subject to the authoritarian voice of the CSRC. Moreover, during this period, any information about investor participation (such as their identity and orders) were not be made publicly available after the IPO, except for the odds of winning the subscription.[5]

In 2006, the CSRC promulgated the No. 37 Decree on *Administrative Measures on Securities Issuance and Underwriting*, which signifies that a hybrid IPO auction mechanism has been formally put into practice in China's primary market (Gao et al., 2017).[6] At the same time, the fixed-price method is no longer applicable to any IPOs in principle, unless the CSRC allows some specific candidate firms to do so. According to Ritter (2011) and Jagannathan et al. (2015), the key distinguishing feature of the IPO book-building mechanism is that the underwriter has substantial discretion in allocating the new shares, whereas the main characteristic of the auction-like mechanism is employing fair and transparent rules (that have been determined prior to an IPO) to allocate the new shares. Taking this into account, since the IPO selling mechanism

[5] In order to confirm that there was no essential information about investor participation that was accessible through publicly available sources under the period of the fixed-price offerings, I double-checked this in the *China Securities Journal* and on the CNINFO website, which are the authoritative sources for accessing IPO information disclosure (or release) in China.

[6] Gao et al. (2017, p. 92) state that, although the CSRC switched from the fixed-price method to the hybrid auction mechanism in 2005, the specific auction rules were not implemented until the issue of the CSRC's No. 37 Decree in 2006. Moreover, as Chemmanur et al. (2017, p. 14) observes, "In 2005, the CSRC introduced a hybrid IPO auction mechanism.… This mechanism is in use until now and the basic design has remained unchanged since then". In practice, due to the suspension of China's IPO market in 2005, there were few IPOs in that year. Therefore, my sample period starts in 2006, and it ends in 2012 due to the subsequent long-term suspension of China's IPO market.

introduced by the CSRC does not give underwriters discretion with respect to allocation, I refer to it as a hybrid IPO auction mechanism.

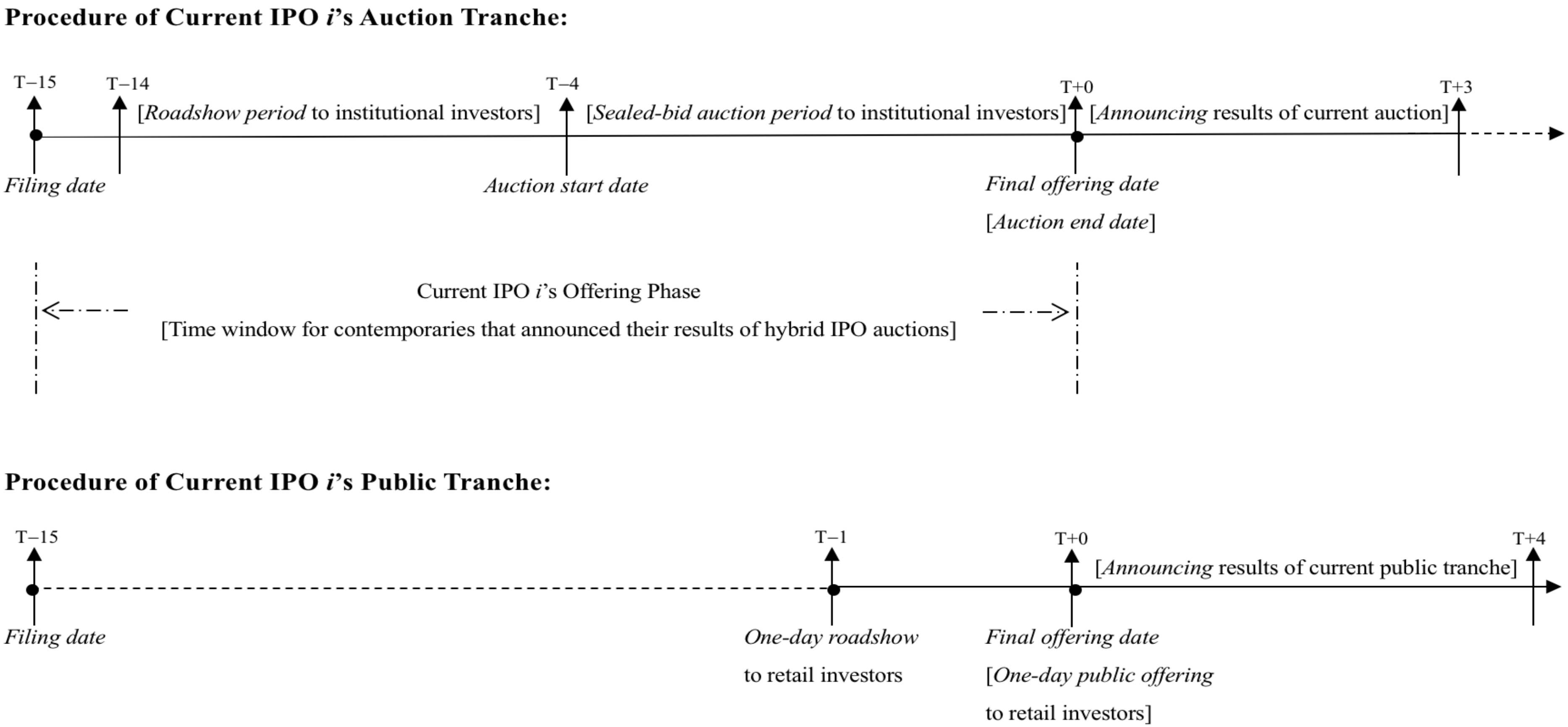

Figure 2.1: The offering procedure of hybrid IPO auctions in China

The time frame is drawn based on the offering schedules of 1144 China's hybrid IPO auctions over 2006 – 2012. Solid lines represent the steps that take place in the relevant tranches. T+0 represents the date of the initial public offering (IPO) or referred to as the final offering date.

Figure 2.1 shows the offering procedure for China's hybrid IPO auctions, where the time frame is drawn based on the offering schedules of 1,144 hybrid IPO auctions over 2006–2012. The hybrid IPO placement method typically consists of an auction tranche and a public tranche. In general, the auction tranche is used to solicit direct feedback from institutional investors and to set the offer price, while the public tranche is mainly reserved for retail investors and adopts a fixed-price offering.[7] According to the distribution rules revealed in the CSRC's (2006) Decree No. 37 '*Administration Measures on Securities Issuance and Underwriting*', if the total issue size exceeds 400 million shares, underwriters are permitted to adjust the proportion of IPO shares sold in the auction tranche from 20% up to 50%, relative to the total issue size.

The starting point of the hybrid IPO selling procedure is from the date when a candidate issuer files its IPO schedule with the regulator and releases its preliminary prospectus (also referred to as the filing date). Shortly afterwards, the underwriter will first organize roadshows and conduct marketing campaigns aimed at institutional investors.[8] During the roadshow sessions, the underwriter will provide institutional investors with a specific valuation report that contains an indicative price range based on the pre-market due diligence.[9] At the same time, through communication in the roadshow sessions, some institutional investors will reveal their preliminary indications of interest to the underwriter (also referred to as the preliminary price-enquiry stage). If the provision of such information facilitates refining the indicative price range, then the underwriter will

[7] Before 2009, if institutional investors did not engage in the current IPO's auction tranche, they were allowed to participate in the current IPO's public tranche. However, Jia et al. (2016) show that, in practice, there are few institutional investors that wish to participate in the public tranche, and more than 80% of the participants in the public tranche are retail investors.
[8] In this study, when I refer to institutional investors, I mean the "qualified institutional investors" that have been approved by the CSRC. In China, any institutions that want to get involved in IPO activities must be reviewed by the regulator and obtain a relevant qualification. These qualified institutional investors typically include mutual funds, securities companies, insurance companies, trust companies, etc. Nevertheless, since 2010, the lead underwriter has been allowed to recommend appropriate institutional investors that have not yet obtained the qualification to engage in the offering procedure.
[9] I was informed by several IPO practitioners that this specific valuation report is not allowed to be made publicly available during the institutional roadshow session. Although this report does not contain any essential disclosure beyond the IPO prospectus, the sell-side analysts from the investment bank will reveal their interpretations of the valuation of the IPO firm in detail in the report.

update the indicative price range. The entire roadshow process is typically completed within 10 days and takes place across three major cities (Beijing, Shanghai and Shenzhen).

Next, the underwriter will organize a sealed-bid, uniform-price auction for institutional investors, where the entrants can submit their orders (or bids) via an electronic tendering system.[10] The types of orders submitted in the sealed-bid auction can be either a "limit bid" or a "step bid". Specifically, in a limit bid, an institutional bidder needs to specify the maximum price that he/she is willing to pay for a given number of shares.[11] A step bid is a combination of limit bids, in which the institutional bidder can place up to three limit bids (as a step function) to form a demand schedule. Thus, the information in the order book mainly contains the quantities demanded by institutional investors and their limit prices. Institutional bidders in China are required to pay for all their bids when they place orders during the auction, which is different to the requirement in developed markets. Only when the allocation ratio has been determined after the auction can these bidders get refunds (without interest) for their preceding overpayments (i.e. the amount paid for the portion of bidders' unsuccessful bids and unallocated bids). An auction is typically closed within four days. During the sealed-bid period, only the underwriter has permission to observe the institutional bidding process (e.g. the bid time, bidder identity, bid price and bid quantity).

Once the auction has closed, the underwriter will build an order book based on all the institutional bids and set an offer price in consultation with the issuer. At this stage, the underwriter has discretion with respect to the offer-price setting. In other words, the offer price is not necessarily set at the market clearing price (i.e. the highest price that allows new shares to be sold); the underwriter is allowed to set it below the clearing price based on his/her own judgement (also known as a "dirty" IPO auction). After the price setting, the underwriter must report the offer price to the CSRC for advice and approval.

[10] Uniform-price auctions are multi-unit (sealed-bid) auctions in which all winning bidders pay the same price, while discriminatory auctions require each winning bidder to pay the price stated in his/her own bid (Jagannathan et al., 2015).
[11] Of note is that, according to the advice of the CSRC, the bid price submitted by institutional investors in the auction should not be able to exceed the indicative price range.

Within three days after the sealed-bid auction closes, the underwriter will determine an allocation ratio for the IPO shares among the institutional bidders, and will announce the auction results or bidding results.[12] In most cases, there is excess demand at the offer price, and the IPO shares need to be allocated on a *pro rata* basis among the eligible institutional orders.[13,14] If the limit price (or bid price) submitted by an institutional bidder is equal to or above the final offer price, then that bidder is eligible to have shares allocated to them (the number of shares this bidder actually receives is equal to the corresponding bid quantity multiplied by the uniform allocation ratio). In the case of a step bid, if the lowest bid price submitted by an institutional bidder is equal to or above the final offer price, then the eligible bid quantity ordered by this bidder is the sum of the bid quantities from each limit bid. It is worth noting that the IPO shares allocated to institutional bidders are typically locked up for three months.[15]

Regarding announcing the auction results, because the regulator did not require the underwriter to reveal the full institutional bidding information until November 2010,[16] the underwriter previously had some flexibility in deciding the contents of the announcements. In terms of the copies of the announcements that I have collected, all underwriters have revealed the share allocation, bid quantity (including multiple bids if there are any) and the identity information for each institutional bidder, while only some of them chose to reveal the information about bid prices and losing bids. After announcing these results, the offering procedure for the auction tranche comes to an end.

In a hybrid procedure, the remaining IPO shares are sold to retail investors through a fixed-price public-offer tranche. Prior to the public offering, the underwriter will organize

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[12] A uniform allocation ratio is used for institutional allocations, which is typically calculated using the number of shares to be auctioned divided by the total number of shares ordered by institutional investors.
[13] In my sample IPOs, there are no auctioned shares that were undersubscribed.
[14] Since November 2010, for most auctioned IPOs, the institutional allocation is determined using lottery draws when there is excess demand.
[15] On 28th April 2010, the CSRC refined the No. 37 Decree (2006) to remove the three-month lock-up period.
[16] On 1st November 2010, the CSRC promulgated *Guiding Opinions on Further Reforming the Mechanism of Issuance of New Shares* to require that underwriters reveal the information on both the bid price and bid quantity submitted by institutional investors after the close of the auction.

a one-day online roadshow for potential retail investors. Then, the public tranche will take place on the last day of the auction or shortly after the auction closes.[17] During this one-day public offering, if any retail investors would like to engage in the public tranche, they need to place orders via an online subscription system and to specify (and to pay for) the number of shares they wish to buy at the fixed price given by the underwriter. Like in a sealed-bid auction, retail investors in the public tranche are also not able to observe other investors' orders. At the same time, they also cannot directly access any information about the auction trends from the publicly available sources. The fixed price faced by retail investors could be either the final offer price or the upper bound of the indicative price range, depending on whether an offer price has been determined by the underwriter at the time of the public offering.

Within four days after the public tranche closes, the underwriter will allocate the IPO shares to retail investors through lottery draws (if there is excess demand in the public tranche) and announce the subscription results of the public tranche. Any retail investors who do not win in the lottery draws will get refunds (without interest) for their preceding subscription payments; for any retail investors who receive share allocations, their shares are not subject to the lock-up period. When announcing the results of the public tranche, other than the information about the total number of retail entrants and the total number of shares demanded by these retail entrants, all underwriters did not reveal the investor-specific information for retail investors.

In summary, China's hybrid IPO auctions have an investor-driven approach, which combines a price-setting tranche (a sealed-bid auction, which is only open to institutional investors) with a separate public tranche that allows retail investors to access equity offerings without specifying a price. This hybrid system is different from the auction-like mechanisms used in other markets, such as the US, France, Taiwan, Israel and Singapore. In these markets, retail investors have not been separated from the auction tranche, which means they are able to bid alongside the institutional investors in auctions. From a

[17] If the price-setting tranche (auction tranche) is completed prior to the public tranche, then this type of hybrid is also known as a sequential hybrid. In addition, the day the public tranche takes place is commonly referred to as the date of the IPO (or the final-offering date).

mechanism-design prospective, China's hybrid auction process is close to the one proposed by Jagannathan et al. (2015) and Schnitzlein et al. (2016), who argue that such a hybrid will be able to prevent unsophisticated retail investors from affecting the IPO's price-setting process. Moreover, compared to the IPO book-building mechanism used in developed markets, China's hybrid IPO auction not only features transparent allocation rules but is also characterized by revealing part of the bidding results after the offering.

2.3 Literature review and hypothesis development

2.3.1 Related literature and research objectives

There is a growing body of literature focusing on the role of information spillovers in the context of the primary equity market. In an early theoretical paper, Benveniste et al. (2002) argue that IPO firms evaluate their new issues by not only relying on their own underwriter's book-building effort but also learning from the book-building experiences of their primary market contemporaries. In other words, when a firm goes public by acquiring information from investors through its own marketing efforts, it produces information that is valuable to its contemporaneous candidate issuers, and thereby influences those candidates' issuing and pricing decisions. This extends the classic line of IPO pricing theory, which begins with Benveniste and Spindt (1989), and Hanley (1993) asserting that IPO price discovery is based mainly on the direct feedback (i.e. information production) from the investor community under the current book-building effort, and includes the possibility that the price discovery also could be conditioned by the information spilling over from contemporaneous marketing efforts.

Evidence on the effects of information spillover to date has been largely documented in an environment of IPO book building (e.g. Ljungqvist and Wilhelm, 2002; Benveniste et al., 2003; Cornelli and Goldreich, 2003; Ljungqvist and Wilhelm, 2003; Edelen and Kadlec, 2005; Dunbar and Foerster, 2008; Zhang, 2012; Ince, 2014; Bakke et al., 2017).[18]

[18] Other empirical studies examine the information-spillover effects surrounding IPO-related corporate events. For instance, Hsu et al. (2010) find that companies experience negative (positive) stock-price reactions when their rivals announce the completion (withdrawal) of IPOs in their industry. Bradley and Yuan (2013) present the fact that information spillovers from a firm's announcements of its seasoned equity offerings of primary (secondary) shares has a positive (negative) impact on the stock price of rival firms.

Specifically, Benveniste et al. (2003) capture information spillovers in the US market by measuring contemporaneous book-building IPOs' initial returns, proceeds revisions and withdrawal rates, and they find that these spillovers from contemporaries that are subject to a common valuation factor (i.e. they are in the same industry) have an influence on the current IPO's pricing and withdrawal decisions. Ljungqvist and Wilhelm (2002) reached similar conclusions by conducting a country-level analysis, in which they show that the valuation-relevant information revealed in local contemporaneous offerings has spilled over into the local IPO price-discovery process. By analysing detailed IPO bidding data from the order book of a major European underwriter, Cornelli and Goldreich (2003) further suggest that information spillovers from monthly IPO activities affect the offer price to the extent that the spillover is reflected in investors' bids. That is, the bookrunner will incorporate the information spillover into the price revision during the book-building period only if the investors react to the spillover through their bids.[19]

Nevertheless, as the contents of the spillovers can vary with the structure of the IPO selling mechanisms, the pattern of information-spillover effects is presumably different in an offering environment other than IPO book building. Unlike the book-building procedure, where underwriter controls the entire information-gathering process and always keeps the bidding information confidential, an IPO auction (or auction-like mechanism) is an investor-driven approach in which the investors play a central role in price discovery, through placing bids without the underwriter being discrete in their allocation of shares (see Jagannathan et al. [2015], for a summary of IPO auctions in global markets). Most importantly, in some countries, due to the auction mechanism no longer giving major discretion to the underwriter, the information on investors' bidding results is made publicly available after the auction. Such information from contemporaneous auctions, as a whole, may spill over into current investors' IPO demands or entry decisions, and, ultimately, may have impact on the current auction pricing. But, as yet, there have been very few studies on this spillover pattern.

[19] It is noteworthy that – except for Cornelli and Goldreich (2003), which is perhaps due to the lack of detailed bidding data available for study – virtually all extant empirical examinations of information-spillover effects in the context of IPO book building hold the view that underwriters (and issuers) directly react to a spillover and incorporate it into the offer price.

To the extent that the bidding information is released particularly within an auction-based market, the spillover content that prevails at the time of the current offering phase should be contemporaneous "auction trends" (i.e. auction results that reflect investor participation and bidding behaviour in recent offerings), rather than contemporaneous underwriters' marketing efforts (i.e. the metrics considered by Benveniste et al. [2003]). In theory, the information spillovers from contemporaneous auction results are able to reduce the information uncertainty faced by investors who are preparing to participate in the current IPO auction. Alti (2005) argues that the outcomes of pioneers' offerings reflect the participating investors' private information on common valuation factors, where learning from these outcomes reduces the degree of information asymmetry among investors.[20] Also, the model of Benveniste et al. (2002) implies that investors benefit from a lower cost of information production by observing contemporaries' valuation results on the offerings in the same industry. Assuming that investors need to spend resources on an IPO evaluation (i.e. acquiring information at a cost) and then make an entry decision, Sherman's (2005) model predicts that auction entry increases with lower information uncertainty or lower costs of information production.[21] Therefore, it is reasonable to relate the investor participation (or entry) in the current offering phase to the spillovers of contemporaneous auction trends.

To summarize, the pattern of information-spillover effects in the context of an auction-based IPO market appears to be different from that in the book-building market, where investors are likely to condition their auction entry (or participation) on information spilling over from contemporaneous auction trends. Therefore, it is worth analysing the information-spillover effect outside the book-building setting. The first objective of this chapter is to examine how information spillovers from contemporaneous auction results exert influence on investor participation and pricing in the current IPO.

[20] The reader may be concerned that IPO flippers (who participate in auctions with the purpose of selling their allocations immediately after listing) may adversely impact the informativeness of the contemporaneous bidding outcomes. However, this concern is eliminated to some extent by the lock-up policy for China's auction tranche (i.e. bidders will face a three-month lock-up period for their IPO shares in the aftermarket).

[21] By contrast, the early information-production models developed by Benveniste and Spindt (1989), and Biais and Faugeron-Crouzet (2002) – for book-building and auction-like mechanisms, respectively – make the assumption that investors are endowed with information.

Jagannathan et al. (2015) argue that the heterogeneity in investors' levels of sophistication and their ability to evaluate IPO firms' prospects makes a difference to their ability to participate in various IPO mechanisms. If this heterogeneity is taken into account, the information-spillover effect also can be interpreted as unsophisticated investors using the information from sophisticated investors to evaluate the offering. In an early theoretical paper, Chowdhry and Sherman (1996) model this pattern of information spillover within a setting where IPOs are sold through a fixed-price method, which suggests that uninformed investors estimate whether the offering at a given price is worth investing in by acquiring information on the informed investors' aggregate demand, from the media rumours and short-term interest-rate levels surrounding the current offering.[22,23] An implication of this is that their model predicts that a higher level of IPO oversubscription arises when the information on the informed investors' demand spills over into the uninformed investors' demand.

Bikhchandani et al. (1998) argue that a positive externality is created by an individual when he/she takes an action that is informative to others. The behavioural theory, therefore, is an alternative interpretation of the pattern of information-spillover effects across investors with different sophistication levels. If investors are assumed to be different with respect to the precision of the information they hold, then information-cascade theory (Bikhchandani et al., 1992) and herding theory (Banerjee, 1992) predict that a low-precision investor will imitate the behaviour of a higher-precision predecessor without regard to his/her own information. In particular, Welch (1992) models the cascade effect in the context of IPO markets where shares are sold sequentially, and he shows that later potential investors not only pay attention to their own information about the new issue but also learn from the purchasing decisions of earlier investors. This is to the extent that a successful initial sales effort implies that if earlier investors hold favourable

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[22] In the setting of Chowdhry and Sherman's (1996) model, investors are not able to directly observe the others' demands, but they are assumed to learn about the aggregate demand indirectly through information leakage.

[23] It is of note that the short-term interest rate at the time of the offering may convey the aggregate demand information only if investors (or bidders) are required to pay for all their share subscriptions in advance, and it is also posited that the funds tied up in the banking system by IPO subscriptions have an impact on the fluctuations of the short-term interest rates.

information about the new issue, then later investors are encouraged to engage in the offering.

As mentioned in the preceding paragraph, there are two main behavioural theories that underpin the analysis of information-spillover effects in this empirical chapter. Specifically, the information-cascading theory proposed by Bikhchandani et al. (1992) suggests that the social equilibrium would radically shift (i.e. individuals rapidly converge on one action) if even a very little new information arrives or if people even slightly suspect that underlying circumstances have changed. In their model, an informational cascade takes place in a scenario in which it is optimal for an individual who has observed either the actions or the signals of those ahead of him/her, to follow the behaviour of the preceding individual without regard to his/her own information. By considering a scenario in which individuals have different signal precisions, the model also demonstrates that the cost of making a decision early is lower for the individual with the higher precision (in other words, higher-precision individuals tend to decide earlier) and a low-precision individual is inclined to imitate a higher-precision predecessor. An important application of the information-cascading theory is to explain the decisions of investors to participate in IPOs. For instance, Welch (1992) uses a cascade model to show that investors who enter an IPO after some time are susceptible to information externality created by investors who have entered the IPO earlier.

Moreover, as another type of informational cascade, Banerjee (1992) uses a sequential decision model to explain the rationale behind herding behaviour, in which an informational cascade results from decision makers ignoring their private information while paying heed to what everyone else is doing (i.e. inferring information from other decision makers) and ultimately trading with the herd/crowd. In particular, the model assumes that decision makers could be either informed or uninformed about the right option. If the second person's behaviour is conditional on the choice of the first person regardless of his/her own signal, then his/her decision provides no new information to the next person in line and inflicts a "herd externality" on the rest of the population. As such, the presence of the herd externality makes each person's decision less responsive to his/her own information and thereby less informative to others, which in equilibrium leads to a severe reduction of informedness with respect to peoples' choices. In the context of an IPO market, if information leakage about the aggregate demand of institutional bidders in a current sealed-bid auction tranche is a signal of the herd externality, then it could be argued that retail investors who participate in a current public tranche will be conditional on information spillovers from a current auction tranche and the participation decisions made by these investors will be less informative.

Therefore, by analysing the information-spillover effects within a hybrid IPO auction procedure, this research is expected to enrich the empirical evidence of those theories on the informational cascade and/or the herd externality. Also, an investigation of the impact of retail participation on IPO price revision in this research would empirically confirm whether there is a reduction of informativeness of the orders submitted by investors who were influenced by the herd externality.

Empirical evidence on the information-spillover pattern from sophisticated investors to unsophisticated investors has been reported for an offering environment where investors are able to observe the others' actions. Neupane and Poshakwale (2012) analyse the investor participation and IPO pricing in the Indian market,[24] and suggest that uninformed retail investors tend to submit their bids at the later stage of the offering, only after learning about the demands of institutional bidders; whereas, informed institutional investors appear to be less interested in the demands of other investors and participate early on the basis of the information they possess. Furthermore, they find that the price revision is largely influenced by the oversubscriptions of retail investors who have determined the aggregate demand information from the institutional investors' bids. Khurshed et al. (2014) document similar learning patterns among investors in the Indian IPO market, while they provide a novel interpretation stating that institutional demand in the early stage of an offering plays an important role in the certification of the IPO quality,

[24] The Indian IPO market is unique in its transparent selling process (for both book-building and auction-like mechanisms), which allows investors to observe the behaviour of other investors during the bidding period.

which attracts retail investors more effectively than other certification mechanisms, such as underwriter reputation and VC affiliation. In examining Taiwan's hybrid IPO auction,[25] Hsu and Shiu (2006) find there is a spillover effect from announcing the current auction results ahead of the public tranche, which has a strong impact on the demands of retail investors who participate in the follow-on public tranche.

It is, nonetheless, far from clear whether the pattern of spillover between two investor communities (which have heterogeneity in the levels of sophistication) is still prevalent in a sealed-bid-offering setting (i.e. any investors in any tranches are not able to access the current bidding or subscription results at the time of the offering phase). As the summary of Jagannathan et al. (2015), most IPO selling processes in the global markets are sealed-bid rather than the above-mentioned transparent selling process. Hence, it is worth to provide the evidence of the spillover effect in a common setting. Following the early research by Chowdhry and Sherman (1996), most of subsequent studies merely provides suggestive evidence that it is possible for the information on the informed demand to spill over into the uninformed demand in a sealed-bid environment. For example, based on the survey results from investors participating in book-building IPOs, Jenkinson and Jones (2009) find, somewhat surprisingly, that nearly half of investors do not have their own valuation model regarding the new issue, and these investors use the roadshow session (i.e. the pre-marketing or pre-book-building phase) to find out what other investors think of the valuation and their aggregate demand, and thereafter submit their bidding orders according to how well subscribed the new issue is perceived to be.

In addition, Purnanandam and Swaminathan (2004) argue that cascading demand can take place in the IPO book building, because investors have the opportunity to infer the

[25] It is noteworthy that there are three remarkable differences between the Taiwan's hybrid auction and the China's hybrid auction. First, the Taiwan's hybrid mechanism requires that the public tranche will take place only after the auction results have been announced, whereas investors in the public tranche of the China's hybrid mechanism will not access the current auction trend information at the time of the offering (i.e. in China, the offering results will not be announced until the end of the entire offering process). Second, the Taiwan's auction tranche allows retail investors to participate, whereas the China's auction tranche prohibits the participation of retail investors. Third, the discriminatory auction (i.e. pay-as-bid) is adopted by the Taiwan's hybrid mechanism, whereas the "dirty" uniform-price auction is used in the China's hybrid mechanism.

indications of interest through discussions with the others during the roadshow period. Furthermore, Derrien and Womack (2003), and Ljungqvist et al. (2003) put forward a structure of sequential hybrid IPO book building (i.e. where the book-building tranche is followed by a retail tranche) is less efficient than pure book-building in terms of controlling the IPO underpricing, where retail investors in such a hybrid structure can condition their demand based on interest revealed in the preceding order book. In examining Israel's sealed-bid uniform-price auctions, Amihud et al. (2003) find that investors either subscribe overwhelmingly to new issues or largely abstain from them. They surmise that investors may obtain rough information about the aggregate demand by talking to other investors and to brokers during the auction days, although there is no roadshow session available for communication ahead of an Israeli auction.

Collectively, besides using the information spillover from contemporaneous IPO auction results as barometers of investment trends, investors (in the public tranche in particular) may also condition their participation decisions on the information spilling over from current auction trends. Although this spillover pattern has been evidenced in a transparent setting in which investors are able to observe the current bidding process, it is still an outstanding empirical question as to whether the spillover pattern is prevalent in a sealed-bid context. The second objective of this chapter is therefore to analyse the spillover effect across two tranches (i.e. two investor communities with heterogeneity in the levels of sophistication) within a sealed-bid hybrid IPO mechanism.

The last strand of literature in this chapter is related to the empirical study of investor participation and information production in IPO auctions. In an early examination of Israeli uniform-price IPO auctions, Kandel et al. (1999) show that investors are more likely to submit high informative bids if the information asymmetry of the offering is lower. Furthermore, they find that, when the information on bidding results is released after an auction, investors will update their assessment of the value of the offering. Liu et al. (2001), Chen et al. (2003), and Lin et al. (2007) examine Taiwan's discriminatory IPO auctions, and find that institutional investors possess more sophisticated bidding strategies and valuable private information than individual investors. Chiang et al. (2010)

offer further evidence on the Taiwan's auctions, arguing that the participation of institutional investors is based on their costs for information production, while individual retail investors are susceptible to behavioural biases. Specifically, they find that individual investors tend to enter an auction if the returns on recent past auctions were high (i.e. return-chasing behaviour). In a similar vein, Jagannathan et al. (2015) document evidence of return-chasing behaviour in the context of Singapore's hybrid uniform-price auctions.

Moreover, Derrien (2005) finds that individual investors in the French auction-like IPO market are likely to base their IPO demand on recent market-return conditions, which leads to high offer prices, a high degree of underpricing and poor long-run return performance. Chiang et al. (2011) provide evidence that suggests individual bidders in Taiwan's auctions are subject to naïve reinforcement learning (i.e. these individuals become more optimistic and less selective in participating in future auctions if they earned high returns in past IPO auctions), whereas institutional bidders' decisions to participate in an auction are unrelated to their past returns. By contrast, in an examination of the US "dirty" uniform-price IPO auctions, Degeorge et al. (2010) maintain that factors in past auction experiences (such as returns, participation ratios and allocations) are important to institutional investors in making the decision to participate in future IPO auctions. Nonetheless, they argue that the deal size of an IPO auction (i.e. the gross proceeds) has a substantial effect on investor participation in the US market, where it explains approximately 60% of the cross-sectional variation in both institutional and individual participations.

Similar to the auction structure that I will examine in this chapter, recent work (e.g. Schnitzlein et al., 2016; Cao et al., 2016; Chemmanur et al., 2017) focuses on the informational properties of the hybrid IPO auction (with a public tranche). Based on the experimental evidence, Schnitzlein et al. (2016) suggest that separating retail investors from the auction tranche (i.e. reducing the number of unexpected influences on the market clearing price caused by retail investors) facilitates institutional investors participating in the auction and producing precise information about the intrinsic value of the offering.

Chemmanur et al. (2017) reach similar conclusions by examining institutional investors' information production in the auction tranche of China's hybrid IPO mechanism, and they further find that the offer price (or price revision) is more sensitive to the bidding of large institutions that are able to produce more precise information than small institutions.

However, the aforementioned empirical studies neither examine how the information produced by contemporaneous auction participants spills over into the current auction participation and pricing, nor address the issue of whether the information production by sophisticated investors in the current sealed-bid auction tranche has a spillover effect on the unsophisticated investors in the current public tranche, which are the primary focuses of this empirical study.

2.3.2 Hypothesis development

Based on the discussions in the preceding subsection, the theoretical setting that I will use to develop my hypotheses is as follows. First, it considers two classes of information spilling over from the announcements of contemporaneous hybrid IPO auction results: institutional investors' bidding results as revealed in the announcement for the auction tranche, and retail investors' subscription results as revealed in the announcement for the public tranche. The institutional bidding results convey information produced by sophisticated investors for contemporaneous auctioned IPOs, which is able to lower the costs or uncertainty of estimating the value for IPOs that are subject to a common valuation factor. By contrast, the retail subscription results reflect the sentiment or collective mood of unsophisticated investors that is prevailing at the time of the contemporaneous offering, which is not able to produce precise information about the intrinsic value of the offerings.

Cornelli and Goldreich (2003), and Chemmanur et al. (2017) provide further insights into the ability of institutional investors to produce information about the intrinsic value of the firm going public, and suggest that large institutional investors are able to produce more precise information than small institutional investors. Taking into account such heterogeneity in institutional investors' levels of ability to produce information, the precision of the spillover information used for estimating the value for an IPO firm should be higher, as more information is generated by contemporaneous large institutional investors relative to small institutional investors. Thus, I have attempted to capture positive information spillovers by measuring the difference between bidding information produced by large institutional investors and small institutional investors.[26]

Second, it considers an IPO market with two types of investor: sophisticated institutional investors and unsophisticated retail investors. In the context of China's hybrid IPO auction mechanism, only institutional investors are eligible to participate in the auction tranche, while retail investors are only allowed to engage in the fixed-price public-offer tranche. For the purposes of this study, I refer to the period between an IPO firm *i*'s filing date and its final offering date as the "offering phase" of the hybrid auction, and then I assume that both types of investors will garner information during the offering phase in order to assess the IPO and make entry decisions. According to Sherman's (2005) information-production model, if the sophisticated investors' auction entry depends on costly information acquisition, then I anticipate that the entry of institutional investors into the auction tranche will increase as information costs or information uncertainty decreases during the offering phase. Since unsophisticated investors are susceptible to behavioural biases, and their entry or participation depends on the sentiment, the crowd and/or market conditions (e.g. Derrien, 2005; Cornelli et al., 2006; Dorn, 2009; Chiang et al., 2010; Neupane et al., 2014), I anticipate that the entry of retail investors into the public tranche will increase with an increase in the sentiment of other investors prevailing at the time of the offering phase.

To examine how the information revealed in the announcements of contemporaneous hybrid IPO auction results exerts influence on investor participation in current IPOs, I have organized the aforementioned discussions into two sets of hypotheses regarding institutional participation and retail participation. If institutional participation depends on costly information acquisition, then I expect that the information produced by

[26] For detailed discussions on information-spillover measures, see Subsection 2.4.3.4.

institutional bidders in contemporaneous IPO auction tranches will have a positive impact on the entry of institutional investors into the current IPO; if institutional participation depends on the sentiment or collective mood that is prevailing at the time of the offering phase, then I anticipate that the information produced by retail investors in contemporaneous IPO public tranches will have a positive impact on the entry of institutional investors into the current IPO. Hence, the first set of hypotheses is as follows:

Hypothesis 1a: The entry of institutional investors into the current IPO's auction tranche is positively related to information spillovers from the announcement of the results of contemporaneous IPO auction tranches.

Hypothesis 1b: The entry of institutional investors into the current IPO's auction tranche is positively related to information spillovers from the announcement of the results of contemporaneous IPO public tranches.

If retail participation depends on costly information acquisition, then I expect that the information produced by institutional bidders in contemporaneous IPO auction tranches will have a positive impact on the entry of retail investors into the current IPO; if retail participation depends on the sentiment or collective mood that is prevailing at the time of the offering phase, then I anticipate that the information produced by retail investors in contemporaneous IPO public tranches will have a positive impact on the entry of retail investors into the current IPO. Hence, the second set of hypotheses is as follows:

Hypothesis 2a: The entry of retail investors into the current IPO's public tranche is positively related to information spillovers from the announcement of the results of contemporaneous IPO auction tranches.

Hypothesis 2b: The entry of retail investors into the current IPO's public tranche is positively related to information spillovers from the announcement of the results of contemporaneous IPO public tranches.

In order to investigate whether the participation of institutional investors in the current IPO's auction tranche of a sealed-bid hybrid IPO procedure is able to create information externalities that affect the participation of retail investors in the current IPO's public tranche, I developed the third set of hypotheses that account for different aspects of information spillovers that may exist in the sealed-bid hybrid IPO auction mechanism.

Following the prediction of Chowdhry and Sherman (1996), I first assume that information about the aggregate demand submitted by institutional investors in the current sealed-bid auction may enter the public domain via short-term interbank interest rates. This can happen in China's IPO market, because institutional bidders need to pay for all their bids at the time of the sealed-bid auction, and such funds will be tied up in the banking system until the end of the share allocations. In examining China's interbank market, Porter and Xu (2009) find that the funds tied up by the IPO event (during the offering period in particular) have a positive impact on short-term interbank interest rates. This implies that a higher level of short-term interbank interest rates during the current auction period may signal that a greater aggregate demand has been submitted by institutional investors in the sealed-bid auction tranche. If retail investors perceive the level of short-term interbank interest rates during the current auction period is a signal of spillover about current institutional investors' aggregate demand, then their entry will increase in line with the interbank interest rate at the time of the current auction:

Hypothesis 3a: The entry of retail investors into the current IPO's public tranche is positively related to the level of short-term interbank interest rates during the current auction period.

Prior studies (e.g. Chowdhry and Sherman, 1996; Amihud et al., 2003; Jenkinson and Jones, 2009; Cao et al., 2016) argue that information leakage about the participation of institutional bidders is prevalent in a sealed-bid IPO environment, where retail investors might be able to get rough information about the trend for institutional investors from various sources, such as stockbrokers, financial gurus and/or other investors.[27] This makes information spillovers from the auction tranche to the public tranche likely to take

[27] For example, Cao et al. (2016) conjecture that, in China, underwriters who can observe the full dynamics of the auction process may leak the information about institutional participation to other clients. Given that underwriters in China also play the role of stockbrokers, they are likely to provide the information about institutional participation as a special financial service to retail clients in order to attract more retail investors to use their brokerage services.

place in the sealed-bid hybrid IPO auction mechanism. If so, then retail investors participating in the current IPO's public tranche should react directly to institutional participation in the current IPO's auction tranche, as indicated by the evidence reported for a transparent IPO environment (e.g. Neupane and Poshakwale, 2012; Khurshed et al., 2014). Hence, if information about the participation of institutional investors in the current IPO's auction tranche spills over and affects the participation of retail investors in the current IPO's public tranche, I expect that the entry of retail investors will increase with an increase in the entry of institutional investors:

Hypothesis 3b: The entry of retail investors into the current IPO's public tranche is positively related to the number of institutional bidders entering the current IPO's auction tranche.

Derrien and Womack (2003), and Ljungqvist et al. (2003) assert that a sequential hybrid IPO placement method is prone to triggering cascading demand among investors with different levels of sophistication, where unsophisticated retail investors in the public tranche can condition their demand based on leaked interest in the preceding price-setting tranche. In addition, Chowdhry and Sherman's (1996) model reveals that the duration of the price-setting process will determine the extent to which information about the sophisticated investors' indications of interest in the current sealed-bid environment will be learned or perceived by unsophisticated investors. Accordingly, their model implies that the level of oversubscription in a sealed-bid IPO setting will increase with an increase in the duration of the price-setting process. Hence, within China's hybrid IPO auction mechanism, if information about the participation of institutional investors in the auction tranche spills over and affects the participation of retail investors in the public tranche, I expect that the oversubscription generated by retail investors in the current public tranche will increase with an increase in the duration of the current auction tranche:

Hypothesis 3c: The level of retail investors' oversubscription in the current IPO's public tranche is positively correlated with the duration of the current IPO's auction tranche.

Lastly, considering that underwriters or auctioneers have discretion regarding the offer-price setting in a uniform-price, hybrid IPO auction and they aim to set it close to the intrinsic value of the firm, they will incorporate the information that is able to improve the precision of estimating the value for the current IPO's firm into the offer price. If the information produced by institutional investors for contemporaneous auctioned IPOs is valuable to the current IPO's price discovery, then information spillovers from contemporaneous IPO auction results will have a positive impact on the current IPO's price revision. By contrast, the subscription information generated by contemporaneous retail investors in IPO public tranches is presumably less useful for estimating the value for the current IPO's firm, so the underwriter will not incorporate such spillover information into the offer price.

When examining how information spillovers from the announcements of contemporaneous hybrid IPO auction results influence the price revision of current IPOs, it is also of interest to assess whether the spillover information affects the price revision directly through the underwriter's adjustment or indirectly through the current investors' reactions. Most of the existing research (e.g. Benveniste et al., 2002; Ljungqvist and Wilhelm, 2002; Benveniste et al., 2003) asserts that underwriters directly react to contemporaneous information spillovers and then update the offer prices; whereas, Cornelli and Goldreich (2003) suggest that underwriters use spillover information only to the extent that it is conveyed through the current bids of institutional investors. Since the China's auction-like IPO mechanism is an investor-driven approach, the interpretation of information spillovers by institutional investors should be important to underwriters in choosing an offer price. Hence, I further expect that the impact of information spillovers from contemporaneous IPO auction results on the current IPO's price revision is effected indirectly through the current bids of institutional investors. The final set of hypotheses is as follows:

Hypothesis 4a: Information spillovers from contemporaneous IPO auction results have a positive impact on the current IPO's price revision.

Hypothesis 4b: Information produced by institutional investors in the current IPO's auction tranche is positively related to the price revision of the current IPO.

2.4 Data, methodology and descriptive statistics

In this section, the composition of the IPO sample and the method of data collection (or source) will be described first. Then, all the measures (or variables) used in this empirical study will be constructed in detail, and the relevant regression models will be built. Finally, I will discuss the descriptive statistics of the main variables, and I will assess the univariate relationships among the variables of interest.

2.4.1 IPO sample and data collection

The sample consists of 1,144 firms that completed A-share IPOs in China's Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) using the sealed-bid, uniform-price, hybrid auction approach between June 2006 and October 2012. The China Security Market and Accounting Research (CSMAR) database lists 1,153 A-share IPO firms during the period from 2006 to 2012, from which I excluded 7 pure fixed-price offerings and 2 firms with missing data due to the suspension of their IPOs. The sample ends in 2012 because the CSRC suspended A-share IPO activity in November 2012.

The data with respect to the announcements of hybrid IPO auction results (including the results from both the auction tranche and the public tranche) were collected from the CNINFO website[28], which is one of the largest IPO information-disclosure platforms in China and is a website authorized by the CSRC, SSE and SZSE to release the latest IPO information. [29] For the subsequent construction of variables, from each of the announcements, I manually collected the following information:

- The specific dates of the announcements for the results of each IPO's auction tranche and public tranche.

[28] The CNINFO website can be accessed on *http://www.cninfo.com.cn/new/index*.
[29] On the CNINFO website, the announcement of the results of IPO auction tranches is called "*Announcement of A-share IPO Pricing, Offline Bidding and Allocation Results*"; the announcement of the results of IPO public tranches is called "*Announcement of A-share IPO Online Fixed-price Subscription and Lottery Results*".

- The number of shares bid for by each institutional investor above the final offer price (i.e. the eligible bid quantity requested by each institutional investor in the auction tranche).
- The identity information of each institutional investor who participated in the auction tranche (e.g. their name and type, such as mutual funds, securities companies, insurance companies, financial companies, trust companies and Qualified Foreign Institutional Investors [QFII]).
- The total number of eligible institutional investors in the auction tranche, the aggregate demand (i.e. the total bid quantity) of the eligible institutional investors that has been received by underwriters in the auction tranche and the total number of shares offered by the issuers in the auction tranche.
- The total number of retail investors in the public tranche, the aggregate demand (i.e. the total number of subscribed shares) of retail investors that has been received by the underwriters in the public tranche and the total number of shares offered by the issuers in the public tranche.

Regarding the investor-specific information for institutional investors that I collected from the announcements, a total of 478 institutional investors participated in the sample of IPO auctions from 2006 to 2012, and a total of 126,128 bids were placed by these institutional investors.

In addition, from the CNINFO website, I also obtained the schedule data for the detailed procedures of the 1,144 hybrid IPO auctions. Several specific dates, such as the filing date and the auction date shown in each of schedules, are used to define the window of contemporaries. Moreover, I also manually collected the indicative price range (i.e. the initial filing range) for each IPO.

The other data used to construct the variables were manually collected from a variety of sources. Specifically, to measure the size of institutional investors, the registered capital of each securities, insurance, financial and trust company was collected from the National Enterprise Credit Information Publicity System (NECIPS); the investment quota of each

QFII institution was obtained from the CSRC; the scale of the portfolio management of each mutual fund was collected from the Asset Management Association of China (AMAC); the annual income ranking of the IPO underwriters was obtained from the Securities Association of China (SAC); and the short-term interbank interest rate was collected from the China Foreign Exchange Trade System (CFETS).

Stock market data (including offer prices, aftermarket prices and market indices) and financial data about IPO firms was taken from the CSMAR database. I double-checked and manually filled several missing items of financial data from IPO prospectuses. The industry classification used is the one from the CSRC's (2012) *Guidelines for Industry Classification of Listed Companies*.

2.4.2 Sample description

Table 2.1 presents the distribution of the IPO sample from 2006 to 2012, in terms of the number of hybrid IPO auctions, the gross proceeds of the hybrid IPO auctions and the pattern of investor participation. The gross proceeds and investors' bid (or subscription) amounts were adjusted using China's gross domestic product (GDP) deflator (purchasing power in 2006 = 100).[30] Panel A of Table 2.1 reveals the distribution of the sample by the offering year.[31] As shown in this panel, the sample IPOs are unevenly distributed across the sample period, in which the number of IPOs drops to a low of 76 during the period of the financial crisis in 2008 and then this number increases to a high of 345 at the time of launching the Growth Enterprise Market (GEM) in 2010. Likewise, the annual gross proceeds of the hybrid IPO auctions fluctuate year on year over the sample period, especially the gross proceeds raised in 2010 (¥681.44 billion, which is approximately $103.41 billion), which are higher than in other periods and account for 28.32% of the aggregate gross proceeds of the sample (¥2,406.30 billion, which is approximately

[30] The China's GDP Deflator data are collected from the World Bank.
[31] Of note is that an issuer's offering year is different from its listing year, where the offering year is the year of the issuer completed its auctioned IPO while the listing year is the year of the issuer's IPO stock eventually listed on the stock exchange. Since this empirical charter focuses more on the participation and pricing decisions made by primary market investors and underwriters during the hybrid IPO auction process, I choose to sort the sample distribution by offering year.

$365.14 billion).[32] Moreover, since the CSRC limits the fraction of auctioned shares to between 20% and 50% of the total number of IPO shares, the gross proceeds raised from IPO public tranches consistently exceed the gross proceeds raised from auction tranches over the sample period. The aggregate gross proceeds raised from the public tranche (¥1,779.66 billion, which is approximately $270.06 billion) are around three times more than those raised from the auction tranche (¥626.64 billion, which is approximately $95.09 billion), which indicates that Chinese issuers and underwriters have assigned a large proportion of IPO shares to retail investors who participate in the public tranche.

Panel A of Table 2.1 further shows the distribution of institutional and retail investors participating in hybrid IPO auctions across the sample period. As illustrated by the average number of investors participating in an IPO each year, both institutional and retail investors participated actively in hybrid IPO auctions during the three years from 2007 to 2009, and since then the average number of participants has shrunk year on year from highs of 291.51 (for institutional bidders in the auction tranche) and 1,038,223.81 (for retail investors in the public tranche) to lows of 32.60 (for institutional bidders) and 198,008.54 (for retail investors). Intuitively, this trend is inconsistent with the findings of Degeorge et al. (2010) for the investor participation in the US IPO auction market, who document that investors are more willing to participate in IPO auctions that have a greater deal size (i.e. higher gross proceeds). Apparently, in my sample, both types of investor did not become more active in the periods of high gross proceeds for IPOs. Also, in terms of investors' bid (or subscription) amounts, there is no clear pattern that indicates institutional and retail investors will demand more during the periods of high gross proceeds. Nevertheless, by comparing investors' bidding amounts to the hybrid IPO auction proceeds year on year, excess demand is consistently present in both the auction and public tranches in China's IPO market.

Panel B of Table 2.1 breaks down the sample by industry sector. Of the 1,144 IPO firms, 829 firms are in the manufacturing sector, which accounts for 72.47% of the sample IPO firms. Thus, it is not surprising that around half of the gross proceeds in my sample

[32] 1 USD($) was approximately 6.59 RMB(¥) on 31 December 2010.

(44.11%) were raised by the IPO firms in the manufacturing sector. Also, both the institutional bid amounts and retail subscription amounts reached highs of ¥12,852.47 billion (approximately $1,950.30 billion) and ¥163,918.34 billion (approximately $24,873.80 billion), respectively, in this industry sector. However, in terms of the average number of IPO participants, the institutional investors are mainly involved in the auctioned IPOs in the lodging-and-catering sector (308.00 bidders per IPO), the leasing-and-commercial-services sector (237.40 bidders per IPO) and the finance sector (204.91 bidders per IPO); the retail investors are mainly engaged in the IPOs in the finance sector (1,035,193.04 persons per IPO), the lodging-and-catering sector (871,300.00 persons per IPO) and the construction sector (833,354.78 persons per IPO).

Panel C of Table 2.1 reports the distribution of the sample by the listing markets. More than half of the sample IPO firms (650 firms) chose the small-and-medium-enterprises (SME) market as the venue for going public, which reflects a strong financing demand from Chinese SME firms in my sample. Although there are not many firms (139 firms) listed on the SSE's and SZSE's main markets, the gross proceeds raised in the main markets are higher than in other markets. Interestingly, in terms of investor participation, both institutional and retail investors appear to be less enthusiastic about participating in the IPO auctions in the GEM.

Lastly, since the participation of institutional and retail investors in hybrid IPO auctions varies across the sample's years, industry sectors and listing markets, it is necessary to account for these factors in the subsequent empirical analysis by including an array of relevant indicator variables.

Table 2.1: Sample distribution: Hybrid IPO auctions with a public tranche, 2006 – 2012

This table presents the distribution of IPO sample by the offering year (Panel A), the industry sector (Panel B) and the listing market (Panel C) over the sample period 2006 – 2012, in terms of the number of hybrid IPOs, the gross proceeds of hybrid IPO auctions, and the pattern of investor participation. The industry classification is based on CSRC's Guidelines for Industry Classification of Listed Companies (2012 Revision). The average number (*N*) of investors participating in an IPO is the number of investors divided by the number of IPOs in the relevant year, industry sector and listing market. The gross proceeds and investors' bidding (or subscription) amounts are adjusted using the China's GDP Deflator (Purchasing Power in 2006 = 100). 1 USD($) was approximately 6.59 RMB(¥) on 31 December 2010. [a] reports the sample average for investor participation.

	Sample IPOs		Hybrid auction proceeds (billions of RMB)		Investor participation (Institutional investors in the auction tranche; Retail investors in the public tranche)			
	N	%	Auction tranche	Public tranche	Avg. *N* of Institutional bidders participating in an IPO	Institutional bidding amounts (bn RMB)	Avg. *N* of retail investors participating in an IPO	Retail subscription amounts (bn RMB)
Panel A: By IPO year								
2006	70	6.12	41.13	102.33	107.71	1,612.72	435,221.10	13,951.93
2007	117	10.23	152.30	391.15	238.04	10,676.57	754,570.46	70,848.02
2008	76	6.64	31.46	114.64	291.51	4,048.31	465,714.01	68,839.94
2009	111	9.70	92.31	192.99	197.41	7,440.21	1,038,223.81	30,905.95
2010	345	30.16	166.31	515.13	91.47	7,063.93	385,310.70	59,095.76
2011	276	24.13	100.56	343.26	33.51	1,302.23	217,646.45	27,636.24
2012	149	13.02	42.57	120.15	32.60	803.42	198,008.54	9,935.64
Total	1144	100	626.64	1779.66	110.25 [a]	32,947.38	431,485.30 [a]	281,213.49
Panel B: By industry								
Agriculture, Forestry, Farming & Fishery (A)	19	1.66	6.56	16.58	125.00	373.42	427,141.32	3,709.94
Mining (B)	23	2.01	73.42	210.16	203.26	4,281.38	808,587.35	24,168.31
Manufacturing (C)	829	72.47	234.78	826.65	99.27	12,852.47	386,969.89	163,918.34
Energy (D)	8	0.70	5.05	10.83	153.63	313.28	617,644.38	3,014.78
Construction (E)	36	3.15	82.44	147.73	148.78	3,894.14	833,354.78	17,319.36
Wholesale & Retail (F)	27	2.36	10.44	40.74	129.52	664.84	377,096.37	7,304.11
Transportation (G)	23	2.01	31.67	63.98	132.65	1,859.18	689,418.83	10,087.04
Lodging & Catering (H)	3	0.26	0.50	1.99	308.00	124.92	871,300.00	2,512.33
Information Technology (I)	96	8.39	17.43	67.37	97.00	1,151.54	328,501.20	15,247.80
Finance (J)	23	2.01	146.25	333.24	204.91	5,989.72	1,035,193.04	21,472.43
Real Estate (K)	10	0.87	2.44	9.60	204.50	354.42	667,345.80	4,112.23

Leasing & Commercial Services (L)	10	0.87	2.31	9.23	237.40	471.56	581,582.80	3,171.69
Scientific Research & Technical Services (M)	10	0.87	2.00	6.91	109.80	125.74	301,630.30	1,138.00
Environment & Utilities (N)	10	0.87	2.74	11.00	51.70	122.33	269,690.90	1,158.82
Social Services & Health Care (Q)	3	0.26	0.70	1.96	141.67	84.85	258,466.67	283.78
Culture, Entertainment & Sport (R)	14	1.22	7.92	21.70	88.29	283.60	461,747.64	2,594.52
Total	1144	100	626.64	1779.66	110.25 [a]	32,947.38	431,485.30 [a]	281,213.49
Panel C: By market								
SSE & SZSE Main Markets	139	12.15	406.42	937.30	139.64	18,259.67	703,947.43	81,064.36
Small & Medium Enterprises (SME)	650	56.82	144.60	557.09	131.69	11,520.83	472,667.71	165,545.08
Growth Enterprise Market (GEM)	355	31.03	75.62	285.27	56.65	3,166.87	244,536.65	34,604.05
Total	1144	100	626.64	1779.66	110.25 [a]	32,947.38	431,485.30 [a]	281,213.49

2.4.3 Methodology and construction of variables

The construction of all the dependent and independent variables used in my empirical analysis will be given in this subsection. Appendix 1 presents a summary of the definitions of these variables. In the last part of the subsection, I will discuss the empirical models.

2.4.3.1 Definition of contemporaries

In this study, I defined the contemporaries (also known as contemporaneous offerings or contemporaneous hybrid IPO auctions) for the current hybrid IPO auctions in two ways. First, as shown in Figure 2.1, contemporaries are defined as all IPO firms that announced their hybrid IPO auction results (including the results from both the auction tranche and public tranche) between the current IPO firm *i*'s filing date and its final offering date.[33] In particular, I refer to this time window as the "offering phase" of the current hybrid IPO auction. From the perspective of the IPO participants (investors and underwriters) who intend to enter or evaluate the current offering, learning about the information revealed in the announcements of contemporaneous hybrid IPO auction results will take place during the offering phase.

Second, the previous theoretical work (e.g. Benveniste et al., 2002; Alti, 2005) indicates that the information-spillover effects will be more pronounced among IPO firms that are subject to a common valuation factor. In practice, it is difficult to observe the common valuation factor directly, so I have followed the method adopted by Benveniste et al. (2003), which conjectures that IPO firms in the same industry are more likely to share a common valuation factor. Hence, as an alternative way of defining contemporaries, according to the CSRC's industry classification, I further assigned contemporaneous offerings to the same industry to which the current IPO firm *i* belongs in. As such, I narrowed down the original definition of contemporaries, and only assume investors and

[33] If the current IPO firm *i*'s auction tranche and public tranche do not end on the same day, then I define contemporaries using the end date of the auction tranche and the end date of public tranche separately.

underwriters that learn information spillovers from contemporaries that are subject to a common valuation factor (i.e. they are in the same industry).[34]

The major reason for the use of the CSRC industry classifications in this study, rather than the Standard Industrial Classification (SIC) or Industry Classification Benchmark (ICB) codes, is that the latter two codes were launched by the U.S. exchanges or government agencies to guide investors for participating in the U.S. markets. In other words, these two codes in practice would not be the reference for investors who have participated in China's stock markets. As the CSRC industry classifications are made for investors in China's stock markets, investors who engage in Chinese IPO activities are presumably trying to capture a common valuation factor from IPO firms subject to the CSRC industry classifications. Therefore, when analysing the effects of information spillovers from contemporaries that are subject to a common valuation factor, I prefer to use the CSRC industry classifications.

2.4.3.2 Measures of investor participation

To date, the vast majority of existing studies on investor participation in IPO auctions (e.g. Amihud et al., 2003; Derrien, 2005; Chiang et al., 2010; Degeorge et al., 2010; Neupane and Poshakwale, 2012; Khurshed et al., 2014; Jagannathan et al., 2015) employ either the number of investors or the overall level of investors' oversubscription to measure the entry of investors into an auction (or the participation of investors in an auction). Chiang et al. (2010) argue that using the subscription ratio for each investor is a noisier indicator for measuring the auction-entry decisions because it may reflect investors' own factors, such as their portfolio size and liquidity, rather than signals received from the offering. Therefore, following Amihud et al. (2003) and Chiang et al. (2010), I used the natural logarithm of the number of auction bidders (or investors) as the primary measure of investor participation. As an alternative measure, the natural logarithm of the overall level of investors' oversubscription is used for the robustness check.[35]

[34] In empirical analysis, when using this alternative definition of contemporaries, the size of observations is largely reduced due to there being a considerable number of IPOs in the sample that cannot be matched to their contemporaries under the condition of the common factor.

[35] Regarding the log transformation of the measures of investor participation, I examined the distribution of the measures (or variables) related to the number of investors and the overall level

According to my hypotheses, since the willingness and ability of institutional and retail investors to acquire information, and the factors that affect their decision to participate in a hybrid IPO auction may differ, I make a distinction between institutional and retail participation, as follows:

Ln(No. of Institutional Bidders) is used as the primary measure for the participation of institutional investors in an IPO auction tranche, which is the natural logarithm of the number of institutional bidders entering the current IPO's auction tranche.

Ln(Institutional Oversubscription) is used as an alternative measure for the participation of institutional investors in an IPO auction tranche, which is the natural logarithm of the overall level of institutional oversubscription (i.e. the total number of shares ordered by institutional bidders divided by the total number of shares auctioned by the issuer) generated in the current IPO's auction tranche.

In addition to these two measures, following the method adopted by Degeorge et al. (2010), I also measured the institutional participation at the investor level by tracking the auction participation of each institutional investor over time. In this case, any factors that might influence the institutional entry decisions are examined at the investor level rather than at the deal level:[36]

D_Institutional Participation is used to measure whether an institutional investor decides to bid in an IPO auction tranche; this indicator variable is equal to 1 if the institutional investor participated in the current IPO's auction tranche and 0 otherwise.

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of investors' oversubscription. The coefficients of skewness and kurtosis for each of these measures are higher than the acceptable range for univariate normal distribution, which indicates that these participation-related dependent measures are not normally distributed. To ensure that skewness does not drive my results, I have taken the natural logarithm for each of participation-related dependent measures. In practice, using the untransformed participation-related measures as dependent variables produces results that are qualitatively similar to those using the transformed measures.

[36] The other participation measures that I have introduced treat investors as a group at the deal level or auction level.

Ln(No. of Retail Investors) is used as the primary measure for the participation of retail investors in an IPO public tranche, which is the natural logarithm of the number of retail investors entering the current IPO's public tranche.

Ln(Retail Oversubscription) is used as an alternative measure for the participation of retail investors in an IPO public tranche, which is the natural logarithm of the overall level of retail oversubscription generated in the current IPO's public tranche.

2.4.3.3 Measure of IPO price discovery

Prior literature (e.g. Hanley, 1993; Lowry and Schwert, 2001; Ljungqvist and Wilhelm, 2002; Cornelli and Goldreich, 2003; Lowry and Schwert, 2004) interprets price discovery in primary markets as the extent to which the preliminary valuations of the offering reflected in initial filing range (or indicative price range) are revised in response to feedback from investors and the market at large before the offer-price setting. In other words, IPO price discovery is mainly concerned with how underwriters revise their indicative price range to a certain offer price based on the information received during the offering phase.

Following the metric of price revision proposed by Hanley (1993), to measure price discovery in China's IPO market, I normalized the final offer price using the midpoint of indicative price range:[37]

$$Price\ Revision = \frac{P_o - P_m}{P_m} \tag{2.1}$$

[37] Although the metric for price revision proposed by Cornelli and Goldreich (2003), who normalize the final offer price relative to the entire indicative price range is an alternative measure for the price discovery, Ljungqvist and Wilhelm (2002) argue that the consequence of this scaling decision is an increase in standard errors over those obtained using the midpoint normalization. Moreover, to ensure that my results are easily comparable to the relevant evidence on China's IPO market such as Chemmanur et al. (2017), I choose to normalize the final offer price by the midpoint of the price range.

Where P_m is the midpoint of the indicative price range and is defined as $(P_U + P_L)/2$, in which P_U and P_L are the upper and lower bounds of the indicative price range, respectively; P_o is the final offer price.

This measure implies that the expected offer price prior to learning from investors and the market at large in the course of price discovery is the midpoint of the indicative price range. Hence, if no new information has emerged at the time of the offering phase, then the final offer price was set at the expected price, leading to *Price Revision* being equal to 0. If the feedback on an IPO's valuation from investors and the market at large is substantial and informative, then the final offer price will be adjusted upwards relative to the expected price (i.e. *Price Revision* will be greater than 0).

2.4.3.4 Measures of information spillovers

In this study, I mainly focus on two streams of information spillovers: (1) information spillovers from the announcements of the results of contemporaneous hybrid IPO auctions; and (2) information spillovers from the sealed-bid auction tranche of current hybrid IPO auctions. In order to control for the other spillover effects documented by previous literature, I also included contemporaneous-pricing spillover and secondary-market spillover as the spillover-related control variables. In this subsection, I will show the development of the metrics for these information spillovers, in turn.

The measures of information spillovers are not without limitations. For example, a potential limitation for the spillover measures that attempt to capture contemporaneous institutional investors' bidding information is that they are unable to take account of the demand schedule of these contemporaneous institutional investors (i.e. the elasticity of demand), which is due to the lack of data with respect to bid prices. This means that the analysis of the informativeness of contemporaneous institutional investors' bids is based only on the information drawn from their quantities demanded, although the quantity demanded by institutional investors is an acclaimed measure for these investors' indication of interest (see Cornelli and Goldreich, 2003; Kerins et al., 2007). In addition, the information-spillover measure with respect to contemporaneous retail investors' oversubscriptions also has a potential limitation. Specifically, as described by Su (2018), retail investors in China's IPO markets are subject to secondary market proportional offering, which means the amount of IPO shares available to be subscribed by these investors is proportional to market value of shares held by them. To some extent, this restriction means that the aggregate demand information of contemporaneous retail investors is often underestimated. Due to the difficulty to obtaining the investor-specific information for retail investors, the information-spillover measure of contemporaneous retail investors' oversubscriptions is therefore unable to take into account the extent to which retail investors' subscriptions are affected by secondary market proportional offering.

The first stream of information spillovers is concerned with investors' bidding (or subscription) information that is revealed in the announcements of contemporaries' hybrid IPO auction results. From the announcements of the results of contemporaneous IPO auction tranches, I attempted to capture (positive) information spillovers by measuring the contemporaneous institutional investors' bidding information in terms of (1) their oversubscription, (2) the number of institutional bidders, (3) the number of shares ordered, and (4) the number of aggressive institutional bidders.

Contem_ΔInstOversub is my primary information-spillover measure of interest, which is the average difference in oversubscription between large and small institutional investors as revealed in the announcements of the results of contemporaneous IPO auction tranches. The criteria for dividing institutional investors into large and small groups are based on the median value of the size of their asset management. Specifically, the measure of institutional investors' asset management varies by their type: the size of assets managed by mutual funds is measured using the scale of their portfolio management; the size of QFIIs' asset management is measured using their investment quotas in China; and the size of the asset management of other institutional investors (including securities, insurance, financial and trust companies) is measured using their registered capital. An institutional investor will be assigned to the large-institution group if the size of its asset management is greater than the median value of the assets managed by all institutional investors, otherwise it will be assigned to the small-institution group.

The rationale behind the construction of this information-spillover measure is as follows. First, based on Cornelli and Goldreich's (2003) study – who document that institutional bidding information, in terms of oversubscription in an underwriter's order book, is useful for estimating the value of the offering – I used the oversubscription generated by contemporaneous institutional investors to account for the contemporaneous institutional bidding information.[38] Then, motivated by Chemmanur et al. (2017), who analyse the informational properties of China's hybrid IPO auctions and demonstrate that oversubscription by large institutional investors in an auction tranche is able to produce more precise information about the value of the offering compared to oversubscription by small institutional investors, I took the difference in oversubscription between contemporaneous large and small institutional investors to account for different precision of information produced by these two types of investor.[39] This means that the greater the oversubscription generated by large institutional investors in contemporaneous offerings, the higher the precision of learning about the value of contemporaneous offerings (i.e. the stronger the ability of contemporaneous information spillovers to reduce information uncertainty or information costs among IPOs). Finally, if the information produced by contemporaneous institutional investors (in terms of their oversubscriptions) is able to contribute to estimating the value of contemporaneous offerings, then it could be argued that this information will also be valuable to other participants who may engage in current offerings (see Benveniste et al. [2002] and Alti [2005]). Therefore, I anticipated that the information-spillover measure of the *Contem_ΔInstOversub* is closely related to the entry and pricing decisions being made for the currently auctioned IPOs.

[38] In examining Japan's hybrid IPO auctions, Kerins et al. (2007) also use the oversubscription ratio to account for the investors' indications of interest.
[39] In the empirical results of Chemmanur et al. (2017), they find that small institutional investors' bidding information (in terms of oversubscription) has a negative impact on IPO price discovery. To some extent, this implies that bids submitted by small institutional investors will bring noise and reduce the precision of learning about the valuation of an offering.

Contem_ΔInstBidders is the first alternative information-spillover measure, which is the average difference between the number of large and small institutional bidders as revealed in the announcements of the results of contemporaneous IPO auction tranches. The approach used for grouping large and small institutional investors coincides with the method used for my primary information-spillover measure of *Contem_ΔInstOversub*.

Because Sherman (2005) and Chiang et al. (2010) both argue that the valuation uncertainty of an auctioned IPO will decrease as the number of sophisticated bidders (or entrants) increases, I chose to use the number of institutional bidders revealed in the contemporaries' announcements as an alternative measure of contemporaneous institutional bidding information. In other words, accessing information about the number of institutional bidders who participated in contemporaneous IPO auctions will be able to lower uncertainty in estimating the value of currently auctioned IPOs. Moreover, given that there is heterogeneity in institutional investors' levels of sophistication (Jenkinson and Jones, 2009; Neupane and Poshakwale, 2012), the auction-entry decisions made by more sophisticated institutional investors should be better informed than those made by less sophisticated institutional investors. As confirmed by Chemmanur et al. (2017), I assumed that large institutional investors are more sophisticated (or informed) than small institutional investors. Therefore, it could be argued that the higher the number of large institutional investors participating in contemporaneous IPO auctions, the lower the uncertainty faced by the participants who may engage in current IPO auctions. Taking this into account, I took the difference between the number of large and small institutional investors who participated in contemporaries' auctions, and then built an alternative information-spillover measure in the form of *Contem_ΔInstBidders*.

Contem_ΔInstShares is the second alternative information-spillover measure, which is the average difference between the number of shares ordered by large and small institutional investors as revealed in the announcements of the results of contemporaneous IPO auction tranches. Similar to the oversubscription information produced by institutional investors in an underwriter's order book, the number of shares ordered by institutional investors may also convey their insights about the value of the offering. Thus, revealing information about the quantities demanded by institutional investors in contemporaries' auctions could be valuable to the participants who may enter and/or evaluate current IPO auctions. Also, in the same way as I constructed the other contemporaneous information-spillover measures, I took the difference between the number of shares ordered by contemporaneous large and small institutional investors to account for the different levels of precision of the information produced by these two types of investor.

Contem_ΔInstAggressive is the third alternative information-spillover measure, which is the average difference between the number of large and small institutional bidders who submitted aggressive bidding orders in contemporaneous IPO auctions. If the number of shares ordered by an institutional investor (or bidder) is greater than the total number of shares offered by the auction tranche in which this investor participated, then I defined this institutional investor as an aggressive bidder in that auction tranche. Since institutional investors who receive allocations from IPO auctions in China will be subject to a lock-up period, investors who bid aggressively in an auction arguably possess more precise information about the intrinsic value of the offering. Hence, when a large number of aggressive institutional bidders are involved in contemporaries' auctions, it might provide valuable information to the participants who intend to enter and/or evaluate current IPO auctions. In addition, I still admit the possibility that information produced by large institutional investors in contemporaneous offerings is more precise than small institutional investors, and therefore I also determined the difference between the number of contemporaneous large and small aggressive institutional bidders.

From the announcements of the results of contemporaneous IPO public tranches, I attempted to capture information spillover by measuring contemporaneous retail investors' subscription information.

Contem_RetailOversub is the information-spillover measure that accounts for the information produced by retail investors in contemporaneous offerings, which is defined as the average oversubscription of retail investors as revealed in the announcements of the results of contemporaneous IPO public tranches. Derrien (2005) demonstrates that retail investors' oversubscription in IPO auctions depends on the noise trader sentiment that prevails at the time of the offering. In addition, Neupane and Poshakwale (2012) show that retail investors' oversubscription is determined by their herding behaviour. Moreover, other studies (e.g. Lin et al., 2007; Degeorge et al., 2010; Chiang et al., 2010) provide evidence that the bids submitted by retail investors in an IPO auction are less informative than that submitted by institutional investors and can bring noise to the price-discovery process. Therefore, I have deduced that the information-spillover measure of *Contem_RetailOversub* reflects the collective mood (or sentiment) of the unsophisticated investors in the primary market that is prevailing at the time of the offering phase. In other words, unlike the spillover measures related to contemporaneous institutional bidding information, it is expected that the information-spillover measure of *Contem_RetailOversub* is not able to lower uncertainty in estimating the value of currently auctioned IPOs.

The second stream of information spillovers is concerned with information on institutional investors' participation in the current IPO's sealed-bid auction tranche. Motivated by Chowdhry and Sherman (1996), I first attempted to indirectly capture the aggregate demand information generated by institutional investors in the current sealed-bid IPO auction tranche by measuring the level of short-term interbank interest rates during the current IPO's auction period.

Avg. Repo Rate [auction starts, ends] is an indirect measure of institutional aggregate demand information spilling over from the current sealed-bid IPO auction tranche, which is defined as the average of the seven-day interbank repo rates between the start date and end date of the current IPO's auction tranche. Chowdhry and Sherman (1996) argue that, in the context of a sealed-bid offering, if institutional investors are required to pay for all their bids at the time of the offering (i.e. institutional bidding funds are tied up in the banking system during the offering period), then information about institutional investors' aggregate demand can become public knowledge through the short-term interest rates and be observed by individual investors. For this reason, I used the average short-term interbank interest rate during the current IPO's auction period as an indirect information-spillover measure for institutional aggregate demand in the current sealed-bid IPO auction tranche. Furthermore, because Porter and Xu (2009) highlight that the seven-day interbank repo rate is one of the main market-determined rates for short-term interbank funds in China, and demonstrate that the major movements of the rate are closely related to the funds tied up by IPO activities, I chose the seven-day repo rate as a measure of the short-term interbank interest rate, and I expected that the trend for the rate during the current IPO's auction period would convey an overall bidding trend generated by institutional investors (i.e. their aggregate demand information) in the current sealed-bid IPO auction tranche.

Motivated by Neupane and Poshakwale (2012), who study the externalities generated by institutional participation in a transparent IPO setting, I measured information spillovers directly from the current sealed-bid IPO auction tranche using institutional-participation information. According to the perspectives of Chowdhry and Sherman (1996), Amihud et al. (2003), Jenkinson and Jones (2009) and Cao et al. (2016), there are three pieces of information about institutional participation that may leak from the current sealed-bid offering and be perceived by other investors. These are (1) the number of institutional investors (or bidders), (2) the aggregate demand generated by institutional investors (reflected in their bids) and (3) the identity information of institutional investors.

The ***Ln(No. of Institutional Bidders)*** and ***Ln(Institutional Oversubscription)***, which I define in Subsection 2.4.3.2, are used to account for the first two aspects of institutional-participation information spilling over from the current sealed-bid IPO auction. If there is an information-spillover effect between two tranches within a sealed-bid hybrid IPO auction procedure, then I expected that the entry of retail investors into the current IPO's public tranche would be related to these information-spillover measures.

Current_ΔInstBidders is an additional information-spillover measure that accounts for the number of institutional investors entering the current IPO's auction tranche by incorporating their identity information, which is defined as the difference between the number of large and small institutional investors entering the current sealed-bid IPO auction tranche. The approach used for grouping large and small institutional investors coincides with the aforementioned method. Bikhchandani et al. (1998) argue that unsophisticated investors (or uninformed investors) are apt to imitate the actions of those who appear to have more precise information. Thus, if the identity information of institutional investors also spills over from the current IPO's sealed-bid auction tranche, then I posited that retail investors would rely more on the entry decisions made by large institutional investors (who presumably have more precise information), and thereby the entry of retail investors into the current IPO's public tranche will increase with an increase in the spillover measure of the *Current_ΔInstBidders*.

Current_ΔInstOversub, likewise, is the information-spillover measure for the aggregate demand generated by institutional investors in the current IPO's auction tranche that takes into account the institutional-identity information, which is defined as the difference between the oversubscription generated by large and small institutional investors in the current sealed-bid IPO auction tranche. According to the findings of Chemmanur et al. (2017), I theorized that the greater the value of the *Current_ΔInstOversub*, the more precise the information produced by institutional investors on the value of the current offering.

Chowdhry and Sherman's (1996) model implies that the probability that the aggregate demand information generated by institutional investors in a sealed-bid environment is widely known to other investors increases with the time lapse between the start date and end date of the current offering. Therefore, I used the duration of the current IPO auction as a signal of the institutional-participation information spilling over from the current sealed-bid IPO auction tranche.

Auction Duration [in days] is a spillover measure that accounts for the extent to which information about institutional investors' aggregate demand in the current IPO's sealed-bid auction can be learned (or perceived) by other investors, which is defined as the number of days between the start date and end date of the current IPO's auction tranche.

Based on what is stated by Chowdhry and Sherman (1996), I believe that the longer the current auction lasts, the more likely it is that the information produced by institutional investors in the sealed-bid IPO auction will be widely and/or precisely known to retail investors. Thus, if there is information spillover within the sealed-bid hybrid IPO auction procedure, then I expected that retail investors' demand in the current IPO's public tranche would increase with an increase in the *Auction Duration*.

In addition to the aforementioned information-spillover measures, I also included two spillover measures to control for the information-spillover effects documented by the previous literature.

Contem_IR is the first spillover-related control variable that measures underpricing experiences spilling over from contemporaneous offerings, which is defined as the average one-day initial return of contemporaneous offerings. Benveniste et al. (2003) find that the marketing efforts (or book-building efforts) of contemporaneous IPOs reflected in these IPOs' initial returns have a positive effect on the price revision of current IPOs. In other words, contemporaneous IPO-underpricing experiences provide valuable information for current IPO firms to estimate the value of their offerings. This information-spillover effect has also been widely confirmed by subsequent empirical studies, such as Edelen and Kadlec (2005), Zhang (2012), Ince (2014) and Bakke et al. (2017). Therefore, I included this spillover measure in my empirical analysis, and expected that it would exert influence on the current IPO's pricing decision and investor-participation decisions.

Contem_MktRet is the second spillover-related control variable that measures secondary-market conditions at the time of the offering phase, which is defined as the return of the market index to which the IPO firm *i* belongs in between *i*'s filing date and its final offering date. The indices include the SSE Index and SZSE Index. Derrien and Womack (2003) argue that a higher market return during (and/or preceding) the offering period implies a higher valuation level is attainable for the prospective new issue. However, the relevant evidence is inconclusive. Ljungqvist and Wilhelm (2002) do not find strong evidence that contemporaneous secondary-market information (i.e. the market return) spills over and affects the price setting of current IPOs, while Benveniste et al. (2003) show a strong spillover effect of contemporaneous secondary-market conditions on the offer-price setting. Moreover, motivated by Derrien (2005) and Barber et al. (2006), I treated recent market movements as a proxy of the noise trader sentiment prevailing in secondary-market transactions. In other words, the spillover measure of the *Contem_MktRet* is supposed to be reflective of the secondary-market investor sentiment that prevails at the time of the offering phase, rather than being reflective of the arrival of new information that helps to lower the valuation uncertainty of the current offering.

2.4.3.5 Firm- and offer-specific characteristics

Previous work (e.g. Benveniste et al., 2003; Lowry and Schwert, 2004; Field and Lowry, 2009; Chiang et al., 2010; Degeorge et al., 2010; Neupane and Poshakwale, 2012; Eom, 2018) shows that idiosyncratic uncertainty (i.e. firm- and offer-specific information uncertainty) is important for explaining investor participation and underwriters' pricing decisions. Therefore, in order to control for idiosyncratic uncertainty, I included a range of uncertainty proxies concerning the firm- and offer-specific characteristics previously used in the literature.

There are eight variables used to measure the firm-specific information uncertainty or information costs.

Ln(Firm Age) is the natural logarithm of one plus the IPO firm's age, where the age is calculated as the difference between the firm's offering year and founding year. I conjectured that the information uncertainty (or information costs) about the firm would decrease with the growth of its age.

ESP [-3yr, IPO] is the average earnings per share (ESP) of the IPO firm in the most recent three-year period before its filing, where the pre-filing window will be extended accordingly if the firm's IPO prospectus has more than three years of information disclosure about its earnings per share. It is intuitive that an IPO firm with higher earnings per share before going public is a signal of its higher quality, and lower *ex ante* risk or *ex ante* uncertainty.

Leverage [-3yr, IPO] is the average leverage ratio (the total liabilities divided by the total assets) of the IPO firm in the most recent three-year period before its filing, where the pre-filing window will be extended accordingly if the firm's IPO prospectus has more than three years of accounting-information disclosure about its liabilities and assets. Nielsson (2013) argues that highly leveraged IPO firms are generally accompanied by low quality and high *ex ante* risk. Hence, I expected that the information uncertainty about the IPO firm would increase with an increase in the level of its pre-filing leverage ratio.

Largest Ownership is the percentage ownership retained by the largest shareholder of the IPO firm at the time of the offering. Downes and Heinkel (1982), and Ljungqvist (1997) argue that, by retaining more IPO shares, the original owners signal their commitment to the firm's quality, and thus reduce its perceived risk or valuation uncertainty.

D_SOE is an indicator variable that is equal to 1 if the IPO firm is a state-owned enterprise (SOE) and 0 otherwise. Dewenter and Malatesta (1997) argue that there is a greater uncertainty about the intrinsic value of the IPO shares of SOEs in primitive capital markets than in developed markets. The capital market in China is presumably not really a well-developed market, so I conjectured that the information uncertainty surrounding the true value of the SOEs would be higher in China.

D_High-tech is an indicator variable that is equal to 1 if the IPO firm is engaged in high-tech businesses and 0 otherwise. More specifically, I used the classification for high-tech industries given by Ljungqvist and Wilhelm (2003), and Loughran and Ritter (2004) to identify the high-tech firms in China, where these industries are identified by the CSRC's codes C27, C38–40, I63–65 and M73–75. Specifically, C27 is pharmaceutical industry; C38 is electric machinery and equipment manufacturing; C39 is manufacturing of computers, communications and other electronic equipment; C40 is instrument and meter manufacturing; I63 is telecommunications, radio and television and satellite transmission services; I64 is internet and related services; I65 is industry of software and information technology services; M73 is research and experimental development; M74 is professional technical service industry; and M75 is industry of science and technology popularization and application services. Following Chiang et al. (2010) and Eom (2018), I conjectured that information uncertainty would be greater among high-tech firms.

D_Real Estate is an indicator variable that is equal to 1 if the IPO firm is in the real-estate industry (i.e. those identified by the CSRC's classification codes K70 and E47–50) and 0 otherwise. Since the real-estate sector in China was growing rapidly over my sample period, and the information about real-estate enterprises has received extensive media coverage, it might be argued that the IPOs of real-estate enterprises have a lower information uncertainty.

D_Finance is an indicator variable that is equal to 1 if the IPO firm is a financial services company (i.e. it belongs in the finance industries, under the CSRC's classification codes J66–68) and 0 otherwise. According to the listing requirements of the CSRC, financial services companies going public in China face a higher level of information-disclosure rules (especially for their accounting information) than other types of company. Thus, I expected that there would be lower information uncertainty surrounding the value of the financial services companies.

In addition, there are five variables used to measure the offer-specific information uncertainty or information costs.

Ln(Proceeds) is the natural logarithm of the gross proceeds raised by an IPO firm, which reflects its deal size or offering size. Degeorge et al. (2010) argue that an IPO firm with greater deal size is less subject to information asymmetry, and they report that the size of the deal is the main driver of investor participation in US IPO auctions.

Non-tradable is the proportion of the IPO firm's non-tradable shares relative to the total shares outstanding at the time of the offering. Chen et al. (2004) and Liao et al. (2011)

point out that information asymmetry and agency problems are more severe in firms with a higher proportion of non-tradable shares.

Reputation is the reputation ranking of the IPO's lead underwriters, which is constructed on the basis of Carter and Manaster's (1990) ten-tier ranking method. Although the "tombstone announcement" used in Carter and Manaster's (1990) study is not available in China's IPO market, as a replacement, I used the annual income rankings of China's securities companies from 2002 to 2012 (especially for their role as underwriters) published by the SAC.[40] Specifically, following Carter and Manaster's (1990, p.1055) study, I used the 2002 rankings as the first reference point, in which the top-five underwriters are treated the same as Section A in the "tombstone announcement", and were thereby assigned Grade 9; the next five underwriters in this ranking list were treated the same as Section B in the "tombstone announcement" and thereby assigned Grade 8; and so on (Grade 0 is the least reputable group). Next, I reassigned the preceding reference point using the 2003 ranking. If any of the underwriters in the 2003 ranking were listed above any of those in Section B from the first reference point, then these new underwriters were assigned Grade 9 and the original group was moved down to Grade 8 accordingly, and so on. This was done until all rankings from 2002 to 2012 were exhausted. Booth and Smith (1986), Carter and Manaster (1990), Michaely and Shaw (1994), and Carter et al. (1998) all state that information uncertainty is lower among IPO firms managed by reputable underwriters.

Likewise, in terms of the certification role of intermediary agents, ***D_Big4*** is used to capture the reduction in information uncertainty about the IPO firm caused by hiring one of the international Big Four accounting firms as auditors; it is defined as an indicator variable that is equal to 1 if the IPO firm is managed by one of the Big Four auditors and 0 otherwise.

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[40] Considering that investors in China's stock market may be more familiar with (or focus on) the role of stockbrokers played by securities companies, I also used the annual income rankings of China's securities companies from 2002 to 2012 (in terms of their role as stockbrokers) to construct the *Reputation* measure. The relevant empirical results obtained using these two different types of ranking lists are qualitatively similar.

D_Cross-listing is an indicator variable that is equal to 1 if the sample's A-share IPO firm also issued H- and/or B-shares (in Hong Kong and Mainland China, respectively), and 0 otherwise. Since a cross-listing firm is subjected to dual-listing (or disclosure) requirements and will have traded on other stock exchanges before the A-share IPO, it is likely that the information uncertainty (or information costs) about the value of the cross-listing firm is lower than for a domestic, single-listing firm.

2.4.3.6 Empirical models

The primary method used to examine the effect of information spillovers on the investor participation and price discovery of China's hybrid IPO auctions was the cross-sectional ordinary least squares (OLS) regression. The following equations have been used in this study as the baseline regression models:[41]

$$\begin{aligned} Institutional\ Participation = \alpha &+ \beta_1[Measures\ of\ Information\ Spillovers\ from\ Contemporaries] \\ &+\beta_2[Spillover\ Related\ Control\ Variables] \\ &+\beta_3[Proxies\ for\ Idiosyncratic\ Uncertainty] \\ &+\beta_4[Year, Industry\ and\ Market\ Indicator\ Variables] + \varepsilon \end{aligned} \tag{2.2}$$

$$\begin{aligned} Retail\ Participation = \alpha &+ \beta_1[Measures\ of\ Information\ Spillovers\ from\ Contemporaries] \\ &+\beta_2[Measures\ of\ Spillovers\ from\ Current\ Sealed\ Bid\ Auction] \\ &+\beta_3[Spillover\ Related\ Control\ Variables] \\ &+\beta_4[Proxies\ for\ Idiosyncratic\ Uncertainty] \\ &+\beta_5[Year, Industry\ and\ Market\ Indicator\ Variables] + \varepsilon \end{aligned} \tag{2.3}$$

$$\begin{aligned} IPO\ Price\ Revision = \alpha &+ \beta_1[Measures\ of\ Information\ Spillovers\ from\ Contemporaries] \\ &+\beta_2[Information\ Produced\ by\ Investors\ in\ Current\ Hybrid\ Auctions] \\ &+\beta_3[Spillover\ Related\ Control\ Variables] \\ &+\beta_4[Proxies\ for\ Idiosyncratic\ Uncertainty] \\ &+\beta_5[Year, Industry\ and\ Market\ Indicator\ Variables] + \varepsilon \end{aligned} \tag{2.4}$$

The construction of the dependent and independent variables in Eq. (2.2) to Eq. (2.4), is given in detail in Subsections 2.4.3.1 to 2.4.3.5. Moreover, in order to account for the unobserved heterogeneity in the baseline level of investor participation (and IPO price revision) arising from differences in economic conditions, market sentiment at large,

[41] Similar models were used by Benveniste et al. (2003), and Cornelli and Goldreich (2003) to examine the information-spillover effects arising from contemporaneous book-built IPOs in the US and European markets.

regulatory shocks, etc. across the years in the IPO sample, I introduced an array of year-indicator variables into the regression models. Likewise, in order to control for the average differences across the industry sectors and listing markets for any unspecified factors that might affect the left-hand-side variables (i.e. investor participation and price revision), I also included an array of industry and market indicator variables.[42,43]

It is worth noting that endogeneity may exist in the model specifications that treat the measure of institutional and/or retail participation as an independent variable. Thus, before I could determine whether it is necessary to use the instrumental variable approach to address such endogeneity concerns (i.e. whether a set of estimates obtained using OLS are statistically acceptable), I needed to test for the endogeneity by performing a formal Durbin-Wu-Hausman test (Durbin, 1954; Wu, 1973; Hausman, 1978), which is also referred to as an augmented regression test (Davidson and MacKinnon, 1993). In the subsequent empirical analyses, when such endogeneity concerns arose, I carried out the test and will report the relevant results at that point.

In addition, in Eq. (2.2), when the binary measure of institutional participation (*D_Institutional Participation*) is used as a dependent variable, the regression model becomes a logit model. In this case, the model was used to estimate the probability of institutional investors deciding to participate in the current IPO auction based on my explanatory variables of interest. Because the estimated coefficients (or exponentiated coefficients as odd ratios) given by the logit model make it difficult to interpret the marginal effects of the relevant explanatory variables, I carried out a marginal analysis by evaluating the marginal effects at the sample means of explanatory variables.

[42] For those indicator variables, which are equivalent to including the year, industry and market fixed effects, I actually estimated the influence of information spillovers (along with other variables) on investor participation (and price revision), while holding constant any stable within-year, within-industry, and within-market factors.
[43] For brevity, the coefficient estimates for those indicator variables regarding the IPO year, industry and market are not reported in the subsequent empirical results.

2.4.4 Descriptive statistics

Table 2.2 presents the descriptive statistics of the main variables used in the empirical analysis. There are several interesting findings.

Table 2.2: Descriptive Statistics

This table reports the descriptive statistics of the main variables used in the empirical analysis, in terms of the mean, standard deviation, minimum, median and maximum. Variable definitions are detailed in Subsection 2.4.3 and summarised in Appendix 1.

Variable	N	Mean	Std. Dev.	Min.	Median	Max.
Investor participation and price discovery						
No. of Institutional Bidders	1,144	110.25	107.16	2.00	74.00	461.00
Institutional Oversubscription	1,144	81.76	92.51	1.00	49.03	714.00
D_Institutional Participation	546,832	0.10	0.31	0.00	0.00	1.00
No. of Retail Investors	1,140	431,485.30	459,907.32	8,482.00	308,597.50	4,470,871.00
Retail Oversubscription	1,144	372.73	716.75	1.53	155.50	7,727.00
Price Revision [%]	881	-1.19	1.55	-32.93	-3.82	53.51
Information spillovers from contemporaries						
Contem_ΔInstOversub	1,118	39.44	38.81	-0.64	27.35	195.33
Contem_ΔInstBidders	1,118	55.78	47.29	1.25	44.60	393.00
Contem_ΔInstShares [Million]	1,118	846.92	3,124.11	-9.10	223.68	55,255.80
Contem_ΔInstAggressive	1,118	17.94	80.25	-423.00	-7.44	345.00
Contem_RetailOversub	1,118	410.69	699.63	22.00	173.71	4,571.00
Contem_IR [%]	1,095	56.97	67.19	-11.05	38.99	519.51
Contem_MktRet [%]	1,144	0.00	0.75	-2.72	0.02	2.38
No. of Contemporaries	1,144	7.78	3.82	0.00	8.00	21.00
Spillovers from current (sealed-bid) auction tranche						
Current_ΔInstOversub	1,144	38.64	43.19	-8.68	22.50	283.33
Current_ΔInstBidders	1,144	54.04	54.01	-19.00	36.00	393.00
Avg. Repo Rate [%]	1,144	2.89	1.34	1.20	2.64	9.51
Auction Duration [Days]	1,144	1.37	0.63	1.00	1.00	4.00
Firm- and offer-specific characteristics						
Proceeds [Million]	1,144	1,552.03	5,107.61	38.70	600.00	68,529.18
Firm Age [Years]	1,144	9.05	4.96	1.00	9.00	30.00
EPS [-3yr, IPO]	1,095	0.53	0.26	0.07	0.48	2.22
Leverage [-3yr, IPO]	1,144	0.51	0.17	0.04	0.52	1.03
Reputation	1,144	6.31	2.84	0.00	7.00	9.00
Non-tradable [%]	1,144	11.05	22.24	0.00	0.00	92.39
Largest Ownership [%]	1,144	38.81	15.19	0.10	37.54	88.55
D_High-tech	1,144	0.37	0.48	0.00	0.00	1.00
D_Real Estate	1,144	0.04	0.20	0.00	0.00	1.00
D_Finance	1,144	0.02	0.14	0.00	0.00	1.00
D_SOE	1,144	0.15	0.36	0.00	0.00	1.00
D_Big4	1,144	0.06	0.23	0.00	0.00	1.00
D_Cross-listing	1,144	0.03	0.18	0.00	0.00	1.00

The first finding is regarding the participation (or entry) of institutional and retail investors into current hybrid IPO auctions. Consistent with the pattern of investor participation in the auction or auction-like mechanisms in other markets (e.g. Kerins et al., 2007; Chiang et al., 2010; Degeorge et al., 2010), China's hybrid IPO auctions are also dominated by retail participation, as evidenced by the average number of retail investors (431,485.30) relative to the average number of institutional investors (110.25). In terms of the bidding (or subscription) quantity, the level of oversubscription submitted by investors (especially for retail investors in the public tranche, whose oversubscription is on average 372.73 times) in China's hybrid IPO auctions is much higher than in other markets. For example, the average oversubscription submitted by retail investors in the French IPO market is 5.97 times (Derrien, 2005); the average oversubscription in Japan's hybrid IPO auctions is 4.47 times (Kerins et al., 2007); and the average oversubscription submitted by institutional and retail investors in Taiwan's hybrid IPO auctions are 0.69 and 3.01 times, respectively (Chiang et al., 2010). The extreme level of oversubscription submitted by Chinese retail investors in the public tranche is a strong indication of their interest in the new issues, while such a strong indication of interest may be caused by information spillovers or information leakage between the two tranches within China's hybrid IPO auction mechanism. Moreover, investor participation varies considerably across IPOs, as shown by the standard deviation for both the number of investors and the level of their oversubscription. Some hybrid IPO auctions attract a very large demand from investors (equal to up to 714 times and 7,727 times the auctioned fraction of the shares for institutional and retail investors, respectively), while some of them are disregarded by these investors (with the minimum oversubscription by institutional and retail investors being 1 time and 1.53 times, respectively).

Second, the average price revision for sample IPOs is -1.19% (with a slight variability of 1.55%, as shown by the standard deviation), which indicates that the final offer price is, on average, set very close to the midpoint of the indicative price range provided by underwriters. This is consistent with the findings of Chemmanur et al. (2017) with respect to the price revision among China's hybrid IPOs, and it is also comparable to the findings on the US's and Japan's IPO markets (e.g. Hanley, 1993; Benveniste et al., 2003; Cook et al., 2006; Kutsuna et al., 2009). It is of note that the number of observations for the price revision is relatively small due to many IPO firms not making their indicative price range publicly available.

Third, the average value of each information-spillover measure is positive, which suggests that the information production among contemporaneous IPO auctions is mainly driven by large institutional investors rather than by small ones. For example, the average *Contem_ΔInstOversub* is 39.44 times, which indicates that, on average, the demand information (in terms of the oversubscription reflected in bids) generated by large institutional investors exceeds the demand information generated by small institutional investors for contemporaneous offerings. If large institutional investors are able to produce more precise information about the value of the offering than small institutional investors (e.g. Cornelli and Goldreich, 2003; Chemmanur et al. 2017), then these findings imply that announcing the auction results of contemporaneous offerings is informative for evaluating current offerings. Nevertheless, there are substantial variations in those information-spillover measures across IPOs, as evidenced by the standard deviation of the spillover measures. From the minimum value, it appears that some hybrid IPO auctions even experienced negative information spillovers from contemporaries (i.e. the information production of contemporaries is dominated by small institutional investors). In addition, the average number of contemporaries that have announced the auction results during the current offering phase is 7.78 IPO firms.

Finally, for firm- and offer-specific characteristics, I have found that the average and median of the sample IPO firms' ages are 9.05 and 9 years, respectively. This indicates that most of the firms that engaged in IPOs during my sample period are established firms rather than start-ups. The average EPS and leverage ratios are 0.53 and 0.51, respectively, which are comparable with the findings of Liu et al. (2013) and Jia et al. (2016) for Chinese firms' pre-IPO operating performance over a similar sample period. In addition, the average and median of the IPO underwriters' reputation measure are 6.31 and 7, respectively, which suggests that the majority of sample IPOs are managed by reputable underwriters. This is very close to the findings of Su and Bangassa (2011) regarding the measure of Chinese underwriters' reputation, although they use underwriters' registered capital to construct a ten-tier ranking. Furthermore, I have found that 37% of the IPO firms in my sample are high-tech companies and 15% of IPO firms are SOEs.

2.4.5 Correlation analysis

As a preliminary examination of the univariate relationships or correlations among the main variables, Pearson correlation coefficients were estimated and are shown in Table 2.3. Several interesting correlation patterns among the main variables are worth highlighting.

First, as shown in the first four columns, investor participation in current hybrid IPO auctions is positively related to all information-spillover measures of contemporaries, which is consistent with my earlier predictions for the relationship between investor participation and information spillovers. The magnitude of the Pearson correlation coefficient determines the strength of the association between the investor participation and spillover measures. Evidently, there are strong correlations between institutional participation and *Contem_ΔInstOversub* (ρ = 0.68 to 0.69), and between institutional participation and *Contem_ΔInstBidders* (ρ = 0.67 to 0.69), while retail participation has a strong correlation with institutional bidding (or participation) information spilling over from the current auction tranche (ρ = 0.53 to 0.73). These findings imply that announcing the results of contemporaneous hybrid IPO auctions might have a spillover effect on investor participation in current IPOs, and information-spillover effects might also be present between the two tranches within current sealed-bid hybrid IPO auction mechanism. Moreover, I maintain that the strength of the association between investor participation and current firm- and offer-specific characteristics is relatively small in general (approximately, the magnitude of ρ for these coefficients is less than 0.20). Intuitively, this finding goes against the arguments of Chiang et al. (2010) and Degeorge et al. (2010), who suggest that firm- and offer-specific factors, as proxies for the information uncertainty of entering auctions, are the main drivers of investor participation.

Table 2.3: Correlation Matrix

This table presents the estimates of Pearson correlation coefficients for the main variables used in the empirical analysis. Variable definitions are detailed in Subsection 2.4.3 and summarised in Appendix 1. * denotes the statistical significance of correlation coefficients at the 10% level or better, using to test the null hypothesis that there is no relationship between the variables.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	Ln(No. of Institutional Bidders)	1																												
2	Ln(Institutional Oversubscription)	.91*	1																											
3	Ln(No. of Retail Investors)	.63*	.59*	1																										
4	Ln(Retail Oversubscription)	.62*	.73*	.67*	1																									
5	Price Revision	.55*	.53*	.27*	.46*	1																								
6	Contem_ΔInstOversub	.69*	.68*	.46*	.58*	.50*	1																							
7	Contem_ΔInstBidders	.69*	.67*	.50*	.57*	.47*	.92*	1																						
8	Contem_ΔInstShares	.25*	.23*	.24*	.23*	.13*	.18*	.44*	1																					
9	Contem_ΔInstAggressive	.44*	.44*	.22*	.42*	.44*	.76*	.46*	-.24*	1																				
10	Contem_RetailOversub	.47*	.46*	.27*	.51*	.41*	.75*	.63*	.07*	.78*	1																			
11	Contem_IR	.54*	.52*	.43*	.52*	.42*	.58*	.54*	.25*	.43*	.43*	1																		
12	Contem_MktRet	.09*	.09*	.13*	.11*	.10*	-.04	-.04	.01	-.04	-.04	.19*	1																	
13	Current_ΔInstOversub	.76*	.80*	.45*	.71*	.57*	.69*	.67*	.25*	.48*	.53*	.57*	.08*	1																
14	Current_ΔInstBidders	.82*	.71*	.53*	.55*	.49*	.64*	.64*	.28*	.41*	.47*	.53*	.06*	.87*	1															
15	Avg. Repo Rate	-.39*	-.44*	-.35*	-.24*	-.16*	-.23*	-.23*	-.02	-.08*	.01	-.10*	-.12*	-.26*	-.20*	1														
16	Auction Duration	.39*	.29*	.25*	.33*	.30*	.43*	.38*	.16*	.39*	.45*	.39*	.04	.33*	.38*	.01	1													
17	Ln(Proceeds)	.08*	-.22*	.09*	-.49*	-.22*	-.08*	-.07*	-.01	-.11*	-.13*	-.08*	-.06*	-.26*	.10*	.01	.07*	1												
18	Ln(Firm Age)	-.30*	-.25*	-.15*	-.18*	-.18*	-.28*	-.26*	-.07*	-.23*	-.22*	-.22*	.01	-.23*	-.26*	.09*	-.19*	-.06*	1											
19	EPS	-.24*	-.24*	-.36*	-.31*	-.17*	-.21*	-.21*	-.09*	-.16*	-.16*	-.20*	-.04	-.20*	-.22*	.02	-.22*	.14*	.13*	1										
20	Leverage	.13*	.02	.18*	.02	.05	.14*	.13*	.06*	.12*	.14*	.14*	.05*	.02	.11*	.03	.32*	.27*	-.09*	-.10*	1									
21	Reputation	.10*	.02	.03	-.04	.05	.04	.05	.04	.01	.05	.07*	-.00	.06*	.13*	.01	.09*	.22*	-.06*	.04	.04	1								
22	Non-tradable	.26*	.12*	.33*	.07*	.10*	.18*	.17*	.07*	.13*	.13*	.18*	.04	.09*	.26*	-.06*	.39*	.35*	-.09*	-.19*	.22*	.09*	1							
23	Largest Ownership	.10*	.04	.12*	.02	.05	.07*	.05*	.01	.08*	.08*	.06*	-.03	.03	.09*	-.02	.17*	.16*	-.14*	-.05*	.09*	.04	.28*	1						
24	D_High-tech	-.05*	.03	-.07*	.04	-.01	-.04	-.03	.00	-.06*	-.04	-.05*	-.02	.03	-.04	-.05*	-.16*	-.18*	.05*	.03	-.32*	-.05	-.16*	-.11*	1					
25	D_Real Estate	.09*	.05*	.11*	.03	-.01	.07*	.08*	.07*	.04	.04	.08*	.01	.05*	.12*	-.03	.12*	.10*	-.07*	-.05*	.20*	.05*	.09*	.09*	-.16*	1				
26	D_Finance	.13*	-.03	.17*	-.12*	-.01	.04	.04	.03	.03	.02	.09*	.04	-.06*	.15*	.03	.21*	.43*	.08*	-.11*	.33*	.08*	.27*	-.07*	-.11*	-.03	1			
27	D_SOE	.28*	.14*	.33*	.10*	.15*	.22*	.21*	.08*	.15*	.16*	.22*	.04	.12*	.28*	-.09*	.39*	.33*	-.09*	-.16*	.20*	.08*	.83*	.23*	-.15*	.11*	.25*	1		
28	D_Big4	.17*	.01	.22*	-.08*	.01	.11*	.13*	.16*	.06*	.08*	.12*	.00	.00	.21*	.07*	.27*	.45*	-.06*	-.16*	.20*	.10*	.29*	.14*	-.12*	.05	.35*	.30*	1	
29	D_Cross-listing	.15*	-.02	.20*	-.11*	.06*	.11*	.10*	.06*	.10*	.11*	.13*	-.00	-.00	.22*	.12*	.26*	.46*	-.04	-.13*	.15*	.15*	.31*	.09*	-.14*	.09*	.32*	.35*	.60*	1

Second, the IPO price revision made during the offering phase has a positive association with all the information-spillover measures of contemporaries; there is a particularly strong correlation with *Contem_ΔInstOversub* (ρ = 0.50), which implies that there might be arrival of new information on the current IPOs' offer price when announcing the results of contemporaneous hybrid IPO auctions. In addition, the results reveal that the association between the IPO price revision and the information produced by the current institutional investors is also positive and strong (e.g. when measured using *Ln(Institutional Oversubscription)*, ρ = 0.53; and when measured using *Current_ΔInstOversub*, ρ = 0.57). This implies that information contained in the bids of current institutional investors is valuable for price discovery in current IPOs. Furthermore, the strength of the correlation between the IPO price revision and current firm- and offer-specific characteristics is relatively small in general, which suggests that these factors might not be incorporated into the price revision during the offering phase.

Third, it is relevant how close the association between my primary variables of interest and their alternatives is. For the measures of investor participation, I suggest that *Ln(Institutional Oversubscription)* is an ideal alternative for *Ln(No. of Institutional Bidders)* in measuring the participation (or entry) of institutional investors in the current IPO's auction tranche, as evidenced by a very high correlation coefficient (ρ = 0.91). While the correlation between *Ln(Retail Oversubscription)* and *Ln(No. of Retail Investors)* is not as strong as this, its magnitude of 0.67 indicates that the former is still an appropriate alternative measure. In regard to information-spillover measures, both *Contem_ΔInstBidders* and *Contem_ΔInstAggressive*, as alternative measures, have a very high correlation with my primary spillover measure of *Contem_ΔInstOversub* (with ρ = 0.92 and 0.76, respectively). Likewise, the strength of the correlation among the information-spillover measures from the current auction tranche is generally more than 0.80. Although a strong association among those spillover measures indicates that they are appropriate as alternatives for each other, they must still be included selectively into the regression model in order to avoid multicollinearity.

Finally, in order to assess the potential issue of multicollinearity in the regression analysis, I conducted variance inflation factor (VIF) tests. The overall value of the VIFs across all multivariate regressions never exceeded 3.0, and the individual VIFs for the measures included in the regression models never exceeded 10 (in practice, most of the individual VIFs were around 3 or less). Based on the rule-of-thumb cut-off value of 10 proposed by Marquaridt (1970), Hair et al. (1995) and Neter et al. (1996), I judge that multicollinearity does not appear to be a problem in my regression models.

2.5 Empirical results

2.5.1 The effect of information spillovers on institutional participation

In this subsection, I examine how information spillovers from contemporaneous hybrid IPO auction results exert an influence on the participation of institutional investors in the current IPO's auction tranche. According to Hypotheses 1a and 1b, if institutional participation depends on costly information acquisition, then the spillover information that has the ability to reduce the costs or uncertainty of estimating the value for the current IPO will be positively related to the auction entry of institutional investors; if institutional participation is subject to behavioural biases, then the spillover information that conveys the primary-market sentiment or collective mood prevailing at the time of the offering phase will be positively related to the auction entry of institutional investors.

Table 2.4 presents estimates of cross-sectional OLS regressions that analyse the impact of contemporaneous information spillovers on the entry of institutional investors into the current IPO's auction tranche. The univariate regression results in column (1) show that the average oversubscription difference between contemporaneous large and small institutional investors alone explains 47.2% of the cross-sectional variation in the natural logarithm of the number of institutional investors entering the current IPO auction. This implies that institutional participation in the current IPO auction is largely predictable using the institutional bidding information revealed in the announcement of contemporaneous IPO auction results. As predicted, the coefficient of *Contem_ΔInstOversub* is positive and significant, which indicates that information produced by institutional investors for contemporaneous auctioned IPOs (especially that generated by large institutional investors) has a positive spillover effect on the entry of institutional investors into current IPO auctions. Thus, it appears that the information production by contemporaneous sophisticated investors reduces the costs of estimating the value for the current offering, and thereby attracts the entry of institutional investors into the current auction tranche.

In column (2), gives the univariate regression for the other information-spillover variable of interest (*Contem_RetailOversub*). Without controlling for the other relevant factors that may influence institutional participation, the results show that the auction entry of institutional investors is positively and significantly related to the spillover information of the average oversubscription from contemporaneous retail investors. However, the lower adjusted R-squared value for this specification (22.2%) implies that, relative to the spillover information from contemporaneous institutional bidding results, the average oversubscription generated by contemporaneous retail investors has a weak explanatory power regarding the entry of institutional investors into the current auction.

Table 2.4: The effect of contemporaneous information spillovers on institutional participation

This table presents the estimates of cross-sectional OLS regressions that analyze the impact of contemporaneous information spillovers on the entry of institutional investors into the current IPO auction. The dependent variable for each regression is the natural logarithm of the number of institutional bidders in the current IPO's auction tranche. The independent variables of interest are two information-spillover measures: *Contem_ΔInstOversub* is the average difference in oversubscription between large and small institutional investors as revealed in the announcements of the results of contemporaneous IPO auction tranches; *Contem_RetailOversub* is the average oversubscription of retail investors as revealed in the announcements of the results of contemporaneous IPO public tranches. Variable definitions are detailed in Subsection 2.4.3 and summarised in Appendix 1. An array of IPO year, industry, and market indicator variables are included in the regressions (4) and (6) but not reported. The last two columns present regression results that take into account of the contemporaneous offerings that are subject to a common valuation factor (i.e. they are in the same industry with the current IPO firm). The White heteroscedasticity-consistent t-statistics are reported in parenthesis. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Ln(No. of Institutional Bidders)					
					Contemporaries that are subject to a common valuation factor (i.e. they are in the same industry with the current IPO firm)	
	(1)	(2)	(3)	(4)	(5)	(6)
Contem_ΔInstOversub	0.019***			0.004***	0.019***	0.006***
	(24.31)			(3.28)	(27.46)	(4.95)
Contem_RetailOversub		0.001***		-0.000		-0.000
		(14.66)		(-0.13)		(-0.37)
Contem_IR			0.858***	0.214***		0.249***
			(12.72)	(5.82)		(5.62)
Contem_MktRet			-4.197	2.506		1.456
			(-1.20)	(1.08)		(0.54)
Ln(Proceeds)				0.092***		0.098**
				(2.59)		(2.40)
Ln(Firm Age)				0.006		-0.006
				(0.19)		(-0.17)
EPS [-3yr, IPO]				-0.195**		-0.143*
				(-2.57)		(-1.73)

Leverage [-3yr, IPO]				-0.604***		-0.691***
				(-4.35)		(-4.42)
Reputation				0.008		0.008
				(1.23)		(1.12)
Non-tradable				0.216		0.576**
				(1.18)		(2.41)
Largest Ownership				-0.014		0.017
				(-0.11)		(0.11)
D_High-tech				0.048		0.045
				(1.10)		(1.01)
D_Real Estate				0.142		0.756**
				(0.73)		(2.33)
D_Finance				0.335**		0.637**
				(2.08)		(2.31)
D_SOE				-0.057		-0.206
				(-0.55)		(-1.54)
D_Big4				0.107		0.119
				(0.77)		(0.65)
D_Cross-listing				-0.294*		-0.290
				(-1.74)		(-1.19)
Constant	3.455***	3.899***	3.680***	2.686***	3.401***	2.461***
	(93.99)	(116.10)	(84.53)	(4.06)	(94.48)	(3.17)
Year Indicators				Included		Included
Industry Indicators				Included		Included
Market Indicators				Included		Included
Adjusted R-squared	0.472	0.222	0.296	0.689	0.496	0.688
Observations	1,118	1,118	1,095	1,025	857	789

In column (3), to examine how institutional investors react to the information spillovers reported in previous literature, the regression of the natural logarithm of the number of institutional bidders for the two spillover-related control variables of *Contem_IR* and *Contem_MktRet* is presented. Ljungqvist and Wilhelm (2002), and Benveniste et al. (2003) argue that part of the valuation story regarding the current offering can be interpreted using contemporaneous IPO pricing experiences. Consistent with their argument, I conjecture that institutional investors evaluate the current offering through learning about the average underpricing (i.e. the initial return) from the contemporaneous offerings. Specifically, a positive and significant coefficient estimate of *Contem_IR* suggests that more institutional investors enter the current IPO auction when the average underpricing level of the contemporaneous offerings is higher. With respect to the other spillover-related control variable, the coefficient of *Contem_MktRet* is negative but insignificant, which indicates that institutional investors do not condition their auction entry based on contemporaneous secondary-market conditions. This is inconsistent with the findings of Cornelli and Goldreich (2003). Nevertheless, given that noise trader sentiment is implied to exist within recent market conditions (Derrien, 2005), it is reasonable for institutional investors to incorporate the valuation-related spillover information into their entry decision instead of the sentiment-related spillover information.[44] In view of the adjusted R-squared value (29.6%), the information spillovers of *Contem_IR* and *Contem_MktRet* have far less explanatory power regarding the institutional investors' auction participation than *Contem_ΔInstOversub*, although the importance of both spillover patterns in the context of the IPO book-building market has been demonstrated by previous literature.

In column (4), all contemporaneous information-spillover variables are introduced simultaneously into the regression along with the control variables. The adjusted R-squared value indicates that the variables in this multivariate regression explain 68.9% of the cross-sectional variation in the natural logarithm of the number of institutional investors entering the current IPO auction. Most importantly, after controlling for the other relevant factors that have an influence on the entry of institutional investors, the

[44] Alternatively speaking, since the contemporaneous market conditions (i.e. the return on the market index) do not have the ability to lower the costs of estimating the value for the current offering, institutional participation does not depend on such spillover information.

estimated coefficient of *Contem_ΔInstOversub* remains positive and significant at the 1% level. In terms of economic magnitude, if the average oversubscription difference between contemporaneous large and small institutional investors increases 10 times, while holding all other variables constant, then the number of institutional bidders in current IPO's auction tranche is expected to increase by 4.08% (≈100*[$e^{0.004*10}$-1]). This finding is consistent with my Hypothesis 1a, which suggests that information spillovers from contemporaneous IPO auction results have a positive impact on the entry of institutional investors into the current IPO auction. By contrast, after controlling for other potential effects on investor participation, the estimated coefficient of *Contem_RetailOversub* becomes insignificant in terms of both statistical and economic magnitudes, which rejects my Hypothesis 1b. This suggests that the information generated by retail investors in contemporaneous IPOs' public tranches does not have a spillover effect on the participation of institutional investors in the current IPO auction, and also implies that the information production by contemporaneous retail investors is not valuable for institutional investors to evaluate the current offering. Moreover, with respect to the spillover-related control variables, the institutional participation is still significantly positively related to the contemporaneous IPO pricing results (*Contem_IR*) and has little association with the contemporaneous market conditions (*Contem_MktRet*). These results reinforce my inferences that, since sophisticated institutional investors face costly information production, they filter contemporaneous spillover information and react only to the information that is useful for estimating the value of the current offering.

In columns (5) and (6) of Table 2.4, I present a check of the robustness of the preceding results by considering that the contemporaneous offerings are subject to a common valuation factor (i.e. being in the same industry with the current IPO firm). Benveniste et al. (2003) argue that information-spillover effects should be stronger among IPO firms sharing a common valuation factor. Therefore, I expected that institutional investors might react more strongly to the spillover information from contemporaries that share a common valuation factor with the current offering.

As shown in column (5), which considers an alternative definition for contemporaries, the estimated coefficient for my primary spillover variable of interest (*Contem_ΔInstOversub*) remains positive and significant at the 1% level for the univariate regression analysis, and the adjusted *R*-squared value indicates that the spillover information of *Contem_ΔInstOversub* alone explains nearly 50% of the cross-sectional variation in the natural logarithm of the number of institutional investors entering the current IPO auction. This indicates that, when considering the information spillover from the contemporaries in the same industry, contemporaneous auction trends still hold a relatively strong explanatory power regarding the current institutional participation.

Furthermore, in column (6), all of the spillover variables, along with the control variables, are included in the analysis. In comparison with the results in the column (4) specification, the coefficient estimates for the spillover variables in this specification are little changed in terms of signs and significance. This suggests that my results are robust with respect to the alternative definition of contemporaries. More importantly, in terms of the economic magnitude, if the primary spillover measure (*Contem_ΔInstOversub*), which is based on the contemporaneous offerings in the same industry, increases 10 times, while holding all other variables constant, then the number of institutional bidders in current IPO's auction tranche is expected to increase by 6.18% (≈100*[$e^{0.006*10}$-1]). Evidently, compared with the increased percentage in the number of institutional investors (4.08%) given by unconditional contemporaneous information spillovers, institutional investors are more sensitive to contemporaneous spillovers that are subject to a common valuation factor. This implies that, in the same industry, the valuation effort made by institutional investors for contemporaneous IPOs has a greater ability to reduce the costs or uncertainty of estimating the value for the current offering, and therefore attracts more institutional investors to engage in the current IPO auction.

In regard to the significance of the control variables in Table 2.4, the results show that the offering size (*Ln(Proceeds)*) is consistently positive and significant in all regressions. This is in line with the findings of Degeorge et al. (2010) for the US market, which suggests that larger IPOs are less subject to information asymmetry and get more interest from institutional investors. However, the difference between this and my results is that Degeorge et al. (2010) assert that investor participation is largely predictable using the offering size, since *Ln(Proceeds)* alone can explain 40–50% of the cross-sectional variation in US IPO auction participation, whereas the outcome of my study reveals that the offering size (*Ln(Proceeds)*) alone only explains 0.58% of the cross-sectional variation in China's IPO auction participation.[45] This indicates that there is a dramatic difference between the US's and China's institutional investors with respect to their auction-participation behaviour.

Also, the results confirm that three firm-specific variables (*EPS*, *Leverage* and *D_Finance*) are consistently significant in all regressions. The negative sign of *Leverage* indicates that institutional investors tend to avoid engaging in the IPO auctions that have a higher level of leverage before going public. Given that highly leveraged firms are relatively closer to bankruptcy and have a lower quality (Nielsson, 2013), institutional investors obviously need to avoid the IPO auctions that are associated with high leverage ratios. Moreover, the positive coefficient estimate of *D_Finance* suggests that institutional investors are apt to participate in IPO auctions of financial companies. This is because financial companies in China are required to comply with a higher disclosure standard that lowers institutional investors' entry costs. Surprisingly, the estimated coefficient of *EPS* is negative and significant, although this is consistent with the findings of Chiang et al. (2010) for Taiwan's IPO market. This indicates that institutional investors tend to avoid participating in the IPO auctions that have a better profitability history (in terms of pre-IPO earnings per share). The possible interpretation of this result is that, since the previous empirical work (e.g. Yu et al., 2006) documents that earnings manipulation is prevalent and serious in China's IPO market, institutional investors may face higher information costs when they evaluate IPO firms that reveal greater earnings.

[45] The univariate regression for *Ln(Proceeds)* is not documented in the table.

In summary, my empirical findings in this subsection lend strong support to my Hypothesis 1a, which suggests that information spillovers from the announcement of contemporaneous IPO auction results (which convey the wisdom of contemporaneous institutional-investor communities for the valuation of contemporaneous offerings) have a positive impact on the institutional participation in the current IPO auction. Conversely, I did not find evidence supporting Hypothesis 1b. After controlling for other factors that affect the current institutional participation, information spillovers from the results of contemporaneous IPO public tranches (i.e. the information generated by contemporaneous retail investors) have little association with the entry of institutional investors into the current IPO auction.

2.5.1.1 Robustness tests using alternative information-spillover measures

Perhaps the reaction of institutional investors to the spillover information from contemporaneous IPO auction results is selective, and they may be sensitive only to some specific information revealed in the announcements. Hence, it is of interest to know how the other forms of spillover information from contemporaneous auction results exert influence on investor participation. Also, in this subsection, as additional robustness checks for my preceding results, I will replicate the analysis using an alternative measure for institutional participation.

Table 2.5 presents the estimates of the cross-sectional OLS regressions that were used to analyse the effect of contemporaneous information spillovers on the institutional participation in the current IPO auction using a set of alternative spillover measures. Multivariate regressions for the control variables and various combinations of the information-spillover measures are reported in the first five columns, where the dependent variable still uses the natural logarithm of the number of institutional bidders.

As expected, the estimated coefficient of *Contem_ΔInstBidders* is positive and significant at the 1% level in the column (1) specification, in which this information-spillover measure is included separately but with all control variables. This suggests that the spillover information regarding the average difference between the number of contemporaneous large and small institutional bidders that is revealed in the announcement of contemporaneous IPO auction results has a positive impact on the entry of institutional investors into the current IPO's auction tranche.

Also, as indicated in column (2), the estimated coefficient of *Contem_ΔInstShares* is positive and significant at the 1% level, where this spillover measure is included separately but with all control variables. While this demonstrates that the information related to shares demanded by contemporaneous large and small institutional bidders spills over and affects the institutional participation in the current IPO auction, such an information-spillover effect is relatively modest in terms of economic magnitude.

As shown in column (3), the coefficient of *Contem_ΔInstAggressive* is positive but insignificant, which suggests that institutional investors do not react to the spillover information regarding the number of aggressive bidders involved in contemporaneous IPO auctions. In other words, the participation behaviour of contemporaneous aggressive bidders appears not be able to lower the costs or uncertainty of institutional investors entering the current IPO auction.

Table 2.5: The effect of contemporaneous spillovers on institutional participation: robustness tests by alternative spillover measures

This table presents the estimates of cross-sectional OLS regressions that analyze the impact of contemporaneous information spillovers on the entry of institutional investors into the current IPO auction using a set of alternative information-spillover measures. The dependent variable used for regressions in columns (1) to (5), as well as column (10), is the natural logarithm of the number of institutional bidders in the current IPO's auction tranche. As an alternative measure for institutional participation, the dependent variable used for regressions in columns (6) to (9), as well as (11), is the natural logarithm of the level of institutional oversubscription in the current IPO's auction tranche. The independent variables of interest are three alternative information-spillover measures: *Contem_ΔInstBidders* is the average difference between the number of contemporaneous large and small institutional bidders; *Contem_ΔInstShares* is the average difference between the amount of shares demanded by contemporaneous large and small institutional investors; *Contem_ΔInstAggressive* is the average difference between the number of contemporaneous large and small aggressive bidders. Variable definitions are detailed in Subsection 2.4.3 and summarised in Appendix 1. An array of IPO year, industry, and market indicator variables are included but not reported. The last two columns present regression results that take into account of the contemporaneous offerings that are subject to a common valuation factor (i.e. they are in the same industry with the current IPO firm). The White heteroscedasticity-consistent *t*-statistics are reported in parenthesis. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

										In the same industry	
	Ln(No. of Institutional Bidders)					Ln(Institutional Oversubscription)				Ln(#)	Ln(Oversub)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Contem_ΔInstOversub					0.005***			0.005***	0.006***		
					(2.89)			(4.87)	(2.94)		
Contem_ΔInstBidders	0.004***			0.003***		0.004***	0.004***			0.004***	0.005***
	(3.80)			(2.66)		(3.65)	(2.73)			(4.20)	(3.88)
Contem_ΔInstShares		0.000***		0.000	0.000		0.000		0.000	-0.000	-0.000
		(2.63)		(0.05)	(0.75)		(0.12)		(0.77)	(-0.67)	(-0.34)
Contem_ΔInstAggressive			0.000	0.000	-0.001		0.001		-0.001	0.001	0.001**
			(1.23)	(0.45)	(-1.28)		(1.06)		(-0.77)	(1.41)	(2.07)
Contem_RetailOversub				0.000	0.000		-0.000		0.000	-0.000	-0.000
				(0.54)	(0.89)		(-0.20)		(0.07)	(-0.54)	(-1.08)
Contem_IR				0.219***	0.220***		0.230***		0.231***	0.249***	0.270***
				(6.14)	(6.18)		(5.25)		(5.29)	(5.62)	(5.22)
Contem_MktRet				2.684	2.648		0.521		0.490	2.154	-1.875
				(1.15)	(1.13)		(0.18)		(0.17)	(0.80)	(-0.57)
Ln(Proceeds)	0.090**	0.100***	0.101***	0.091**	0.088**	-0.205***	-0.208***	-0.206***	-0.211***	0.098**	-0.205***
	(2.58)	(2.77)	(2.79)	(2.57)	(2.48)	(-4.47)	(-4.41)	(-4.53)	(-4.48)	(2.34)	(-3.71)

Ln(Firm Age)	-0.008	-0.008	-0.005	0.003	0.002	0.049	0.061	0.055	0.060	-0.006	0.042
	(-0.24)	(-0.26)	(-0.17)	(0.11)	(0.07)	(1.22)	(1.49)	(1.35)	(1.46)	(-0.17)	(0.90)
EPS [-3yr, IPO]	-0.201***	-0.220***	-0.223***	-0.192**	-0.190**	-0.223**	-0.215**	-0.224**	-0.213**	-0.140*	-0.191*
	(-2.69)	(-2.89)	(-2.93)	(-2.54)	(-2.52)	(-2.27)	(-2.13)	(-2.28)	(-2.11)	(-1.69)	(-1.71)
Leverage [-3yr, IPO]	-0.555***	-0.565***	-0.565***	-0.603***	-0.608***	-0.598***	-0.658***	-0.601***	-0.663***	-0.679***	-0.788***
	(-4.15)	(-4.14)	(-4.13)	(-4.36)	(-4.39)	(-3.48)	(-3.66)	(-3.48)	(-3.69)	(-4.34)	(-3.92)
Reputation	0.009	0.010	0.010	0.007	0.007	0.002	-0.000	0.003	-0.001	0.008	0.002
	(1.40)	(1.48)	(1.57)	(1.10)	(1.08)	(0.21)	(-0.06)	(0.40)	(-0.07)	(1.14)	(0.24)
Non-tradable	0.091	0.069	0.079	0.217	0.218	0.138	0.275	0.154	0.276	0.575**	0.734**
	(0.51)	(0.38)	(0.44)	(1.17)	(1.19)	(0.64)	(1.19)	(0.72)	(1.20)	(2.38)	(2.50)
Largest Ownership	0.029	0.017	0.004	-0.001	0.002	-0.017	-0.052	-0.043	-0.049	0.014	-0.023
	(0.23)	(0.13)	(0.03)	(-0.01)	(0.01)	(-0.11)	(-0.32)	(-0.27)	(-0.30)	(0.09)	(-0.12)
D_High-tech	0.044	0.044	0.047	0.047	0.044	0.092*	0.103*	0.095*	0.100*	0.047	0.106*
	(1.03)	(1.01)	(1.07)	(1.08)	(1.02)	(1.74)	(1.92)	(1.81)	(1.86)	(1.08)	(1.94)
D_Real Estate	0.070	0.048	0.075	0.124	0.131	0.254	0.318	0.286	0.326	0.773**	0.816***
	(0.33)	(0.23)	(0.38)	(0.61)	(0.66)	(1.01)	(1.31)	(1.23)	(1.38)	(2.50)	(2.85)
D_Finance	0.383**	0.326**	0.316**	0.345**	0.352**	0.095	0.035	0.090	0.043	0.507	0.485
	(2.46)	(2.15)	(2.08)	(2.13)	(2.17)	(0.38)	(0.13)	(0.36)	(0.16)	(1.64)	(1.13)
D_SOE	0.015	0.038	0.032	-0.055	-0.057	-0.067	-0.144	-0.077	-0.147	-0.197	-0.300*
	(0.16)	(0.38)	(0.32)	(-0.53)	(-0.56)	(-0.56)	(-1.11)	(-0.66)	(-1.14)	(-1.46)	(-1.81)
D_Big4	0.063	0.060	0.097	0.076	0.072	0.018	0.014	0.066	0.009	0.125	0.147
	(0.53)	(0.47)	(0.78)	(0.54)	(0.51)	(0.10)	(0.07)	(0.38)	(0.04)	(0.65)	(0.62)
D_Cross-listing	-0.269*	-0.292*	-0.312**	-0.269	-0.266	-0.440*	-0.392	-0.467**	-0.388	-0.293	-0.395
	(-1.81)	(-1.86)	(-1.97)	(-1.58)	(-1.58)	(-1.89)	(-1.47)	(-2.02)	(-1.46)	(-1.18)	(-1.30)
Constant	2.827***	2.918***	2.892***	2.654***	2.731***	8.455***	8.352***	8.490***	8.438***	2.438***	8.198***
	(4.38)	(4.33)	(4.28)	(4.04)	(4.16)	(9.94)	(9.55)	(10.08)	(9.66)	(3.08)	(7.82)
Year Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Market Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Adjusted R-squared	0.691	0.680	0.680	0.690	0.691	0.695	0.691	0.695	0.691	0.687	0.701
Observations	1,069	1,069	1,069	1,025	1,025	1,069	1,025	1,069	1,025	789	789

In the column (4) regression, all information-spillover measures were introduced simultaneously into the regression along with the control variables.[46] Of the three information-spillover alternatives examined, it appears that only the *Contem_ΔInstBidders* measure remains positive and significant at the 1% level. Likewise, in the column (5) specification, after controlling for other relevant factors, only the estimated coefficient for my primary spillover measure (*Contem_ΔInstOversub*) still remains positive and significant at the 1% level. These results indicate that both the *Contem_ΔInstOversub* and *Contem_ΔInstBidders* spillover contents are the most significant in explaining the variability in the natural logarithm of the number of institutional bidders entering the current IPO auction. In other words, institutional investors screen the information revealed in the announcements of contemporaneous IPO auction results, and they only react significantly to the oversubscription- and auction-entry-related spillover information. It therefore appears that these two types of spillover information, which are revealed in the contemporaneous IPO auction results, have a stronger ability to lower the costs of estimating the value of the current offering than the other types.

With respect to the coefficient estimates for the control variables (including the spillover-related controls) in the first five columns, there is little change relative to my previous results in terms of signs and significance.

Other than using the number of institutional entrants as a measure of auction participation, some empirical studies (e.g. Jagannathan et al., 2015; Neupane and Poshakwale, 2012; Degeorge et al., 2010) capture the institutional participation in the current IPO auction by measuring the overall level of institutional oversubscription in the auction tranche. To further evaluate whether my results are driven by the way I have defined institutional participation (or institutional entry), I replicated my regression analyses using the natural logarithm of the level of institutional oversubscription as the dependent variable. For this

[46] Since the alternative spillover metric *Contem_ΔInstBidders* and my primary spillover measure *Contem_ΔInstOversub* are highly correlated ($\rho = 91.5\%$), I have included them in my regressions separately.

specification, the multivariate regressions that included the control variables and various combinations of the information-spillover measures are found in columns (6) to (9).

For the regression shown in column (6), once again, I included the alternative spillover measure (*Contem_ΔInstBidders*) separately but with all control variables. The estimated coefficient of *Contem_ΔInstBidders* remains positive and significant at the 1% level, which suggests that my results are not driven by the alternative definition of institutional participation. As shown in column (7), this conclusion still holds for when I introduced the remaining information-spillover measures into the regression. In terms of the economic magnitude, if the average difference between the number of contemporaneous large and small institutional bidders (*Contem_ΔInstBidders*) increases by 10 entities, while holding all other variables constant, then the level of institutional oversubscription in the current IPO's auction tranche is expected to increase by 4.08% (≈100*[$e^{0.004*10}$-1]).

In the same manner, in columns (8) and (9), I present the results of testing whether my results based on the primary spillover measure are robust with respect to the alternative definition of institutional participation. In both specifications, the coefficient of *Contem_ΔInstOversub* remains positive and significant at the 1% level. Economically, when I controlled for other relevant influences, a 10 times increase in the average oversubscription difference between contemporaneous large and small institutional investors leads to an increase of 6.18% (≈100*[$e^{0.006*10}$-1]) in the level of institutional oversubscription in the current IPO auction. These results suggest that my inferences regarding the information-spillover effect are identical when using the alternative definition of institutional participation.

In regard to the control variables in the regressions in columns (6) to (9), the coefficient estimate of *Ln(Proceeds)* became negative when the alternative definition of institutional participation was employed. This is contrary to my prediction, which indicates that institutional investors tend to bid for fewer shares when the current offering size is larger. Moreover, the coefficient estimate of *D_Finance* becomes insignificant, while the coefficient estimate of *D_High-tech* becomes positive and significant. This implies that institutional investors would like to bid for more shares if the current auctioned offering is in the high-tech industry.

Furthermore, in columns (10) and (11) of Table 2.5, as additional robustness checks, I replicated the regression analyses shown in the specifications for columns (4) and (7) using contemporaneous offerings that are subject to a common valuation factor (i.e. they are in the same industry). As shown in column (10), of all the alternative spillover measures included, only the spillover measure of *Contem_ΔInstBidders* is positively and significantly related to the number of institutional investors entering the current IPO auction. This is consistent with my results in the column (4) specification, which suggests that my preceding inferences are not driven by my alternative definition of contemporaries. Moreover, in terms of economic magnitudes, I found that institutional investors react more strongly to the information spillover from contemporaneous offerings when these contemporaries are subject to a common valuation factor.

Interestingly, in column (11), when considering the contemporaneous offerings that are subject to the common factor, and using the natural logarithm of the level of institutional oversubscription as the dependent variable, the coefficient estimate of *Contem_ΔInstAggressive* becomes positive and significant at the 5% level. This suggests that the alternative spillover measure of *Contem_ΔInstAggressive* provides additional contributions to interpreting the institutional participation (in terms of their oversubscriptions) in the current IPO auction. It therefore appears that the information regarding the number of aggressive bidders involved in contemporaneous offerings will spill over and affect the institutional participation in the current IPO's auction tranche only if the contemporaneous offerings are assigned in the same industry.

Furthermore, consistent with my previous finding that the information generated by contemporaneous retail investors has little effect on the institutional participation in the current IPO auction, none of the coefficient estimates of *Contem_RetailOversub* are significant in all regressions. Also, the coefficient estimates of *Contem_IR* and

Contem_MktRet are little changed relative to my previous results in terms of signs and significance.

In view of the adjusted *R*-squared value across all specifications (68.0–70.1%), a large amount of variation in the auction participation of institutional investors is explained by the publicly available information or factors that I have identified. This implies that institutional participation in China's hybrid IPO auctions is largely predictable using the publicly available information known before the deal.

Taken together, in this subsection, I conclude that my previous results are robust with respect to the alternative methods of capturing information spillovers from contemporaneous auction results, especially when I used the average difference between the number of contemporaneous large and small institutional bidders as an alternative spillover measure. Also, my inferences are identical when using the level of institutional oversubscription in the current auction as an alternative definition of institutional participation. Furthermore, I maintain that the effect of contemporaneous information spillovers on institutional participation is stronger among IPO firms sharing a common valuation factor. These results drawn from the robustness tests lend additional support to Hypothesis 1a, while there is no strong evidence to support Hypothesis 1b.

2.5.1.2 Robustness tests at the investor level

Unlike the previous auction-level tests used to analyse the participation of institutional investors as a group in each deal, the investor-level tests focus on the decision of each institutional investor to participate in the IPO auctions. Hence, it is of interest to assess whether information spillovers from contemporaneous hybrid IPO auction results have an influence on the probability of institutional participation at the investor level.

In these investor-level tests, the unit of observation is an institution–IPO pair. For each institution–IPO pair, participation (or auction choice) is an indicator variable that is equal to 1 if the institutional investor decides to bid in the current IPO auction and 0 otherwise. By tracking institutional investors over time for the 1,144 IPO auctions, I identified 478 institutional investors participating in the IPO auctions from 2006 to 2012. This means the sample consists of 546,832 institution–IPO observations.[47] Regarding the explanatory variables, I used the same set of information-spillover variables and control variables as in the auction-level tests.

Table 2.6 presents the results of logit regressions of institutional participation on explanatory variables, where the dependent variable is the indicator variable for the auction choice of the institutional investors. Moreover, I estimated the marginal effect of each explanatory variable on the auction choice of institutional investors, where the marginal effect (dy/dx) was evaluated at the sample means of explanatory variables, and reported next to the coefficient estimates. Additionally, to take account of the potential error dependence across time within each IPO auction, as well as heteroskedasticity, the *p*-values (reported in parentheses) were adjusted using White's robust standard errors with clustering at the IPO auction level.

In the first three columns, corresponding to the tests at the auction level, various combinations of the information-spillover measures were introduced simultaneously into the regressions, along with the other control variables. As shown in column (1), the coefficient of *Contem_ΔInstOversub* is positive and significant, which suggests that institutional investors are more likely to participate in an IPO auction when there is a higher average oversubscription difference between large and small institutional bidders spilling over from contemporaneous IPO auction results. The marginal effect shows that a 1% increase in *Contem_ΔInstOversub* at the time of the current offering phase will increase the probability of institutional investors entering the current auction tranche by 0.0002%. By contrast, the information generated by retail investors in contemporaneous public tranches (*Contem_RetailOversub*) does not have a significant influence on the probability of institutional investors entering the current IPO auction. Furthermore, the results show a significantly positive link between the spillover-related control variable for contemporaneous pricing results (*Contem_IR*) and the probability of institutional

[47] In multivariate regressions, this sample size will be reduced due to missing values for the variables, especially when I use the alternative definition for contemporaries.

participation, whereas the coefficient for the spillover-related control variable for contemporaneous secondary-market conditions (*Contem_MktRet*) is insignificant. All these results are consistent with my inferences obtained from the auction-level tests, which implies that only contemporaneous information spillovers that have the ability to lower the costs or uncertainty of estimating the value for the current offering will be able to affect the auction choice of institutional investors.

As an additional check, I replicated the regression analysis using the alternative spillover measure. In the column (2) specification, the coefficient estimate of *Contem_ΔInstBidders* is still positive and significant, which suggests that institutional investors are also more likely to participate in an IPO auction when there is a greater number of large institutional investors involved in contemporaneous offerings than the number of small institutional investors. The marginal analysis indicates that the economic magnitude of such a spillover effect on the probability of institutional participation is comparable to the magnitude generated by the spillover information of *Contem_ΔInstOversub*. Also, there is no significant correlation between the spillover information of *Contem_RetailOversub* and the probability of institutional participation after controlling for other relevant factors.

Table 2.6: The effect of spillovers on the probability of institutional participation at the investor level

This table reports the results of logit regressions of institutional participation on explanatory variables, where the dependent variable is an indicator variable equal to 1 if the investor participated in the auction and 0 otherwise. The explanatory variables of interest are information-spillover measures (e.g. the primary spillover measures, *Contem_ΔInstOversub* and *Contem_RetailOversub*; the alternative spillover measures, *Contem_ΔInstBidders*, *Contem_ΔInstShares*, and *Contem_ΔInstAggressive*). Variable definitions are detailed in Subsection 2.4.3 and summarised in Appendix 1. An array of IPO year, industry, and market indicator variables are included but not reported. The last two columns present regression results that take into account of the contemporaneous offerings that are subject to a common valuation factor (i.e. they are in the same industry with the current IPO firm). Marginal effect (dy/dx) is evaluated at the sample means of explanatory variables and reported next to the coefficient estimates. The unit of observation is an Institution – IPO pair. *p*-values, which are in parentheses, are adjusted using White's robust standard errors with clustering at the IPO auction level. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: D_Institutional Participation (== 1 if the investor participated in the auction, and == 0 otherwise)									
							Contemporaries that are subject to a common valuation factor (i.e. they are in the same industry)			
	(1)		(2)		(3)		(4)		(5)	
	Coef.	dy/dx	Coef.	dy/dx	Coef.	dy/dx	Coef.	dy/dx	Coef.	dy/dx
Contem_ΔInstOversub	0.0032***	0.0002***			0.0036***	0.0003***	0.0035***	0.0002***		
	(0.00)	(0.00)			(0.00)	(0.00)	(0.00)	(0.00)		
Contem_ΔInstBidders			0.0022***	0.0002***					0.0028***	0.0002***
			(0.00)	(0.00)					(0.00)	(0.00)
Contem_ΔInstShares					0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000
					(0.58)	(0.58)	(0.58)	(0.58)	(0.22)	(0.22)
Contem_ΔInstAggressive					-0.0003	-0.0000	0.0004	0.0000	0.0008*	0.0001*
					(0.50)	(0.50)	(0.40)	(0.40)	(0.06)	(0.06)
Contem_RetailOversub	-0.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0001	-0.0000	-0.0001	-0.0000
	(0.42)	(0.42)	(0.61)	(0.61)	(0.70)	(0.70)	(0.23)	(0.23)	(0.19)	(0.19)
Contem_MktRet	2.3032	0.1805	1.9509	0.1529	2.4510	0.1921	1.1375	0.0820	1.6922	0.1219
	(0.15)	(0.15)	(0.23)	(0.23)	(0.13)	(0.13)	(0.54)	(0.54)	(0.37)	(0.37)
Contem_IR	0.1382***	0.0108***	0.1511***	0.0118***	0.1403***	0.0110***	0.1503***	0.0108***	0.1514***	0.0109***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ln(Proceeds)	0.0633**	0.0050**	0.0635**	0.0050**	0.0607**	0.0048**	0.0738**	0.0053**	0.0724**	0.0052**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)

Ln(Firm Age)	-0.0047	-0.0004	-0.0091	-0.0007	-0.0071	-0.0006	-0.0202	-0.0015	-0.0203	-0.0015
	(0.84)	(0.84)	(0.70)	(0.70)	(0.76)	(0.76)	(0.47)	(0.47)	(0.46)	(0.46)
EPS [-3yr, IPO]	-0.1042*	-0.0082*	-0.1037*	-0.0081*	-0.1014*	-0.0079*	-0.0763	-0.0055	-0.0732	-0.0053
	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)	(0.09)	(0.27)	(0.27)	(0.29)	(0.29)
Leverage [-3yr, IPO]	-0.3856***	-0.0302***	-0.3891***	-0.0305***	-0.3898***	-0.0305***	-0.3519***	-0.0254***	-0.3395***	-0.0245***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Reputation	0.0072	0.0006	0.0058	0.0005	0.0066	0.0005	0.0071	0.0005	0.0072	0.0005
	(0.13)	(0.13)	(0.22)	(0.22)	(0.17)	(0.17)	(0.18)	(0.18)	(0.17)	(0.17)
Non-tradable	0.1304	0.0102	0.1338	0.0105	0.1289	0.0101	0.3970**	0.0286**	0.3985**	0.0287**
	(0.29)	(0.29)	(0.28)	(0.28)	(0.30)	(0.30)	(0.02)	(0.02)	(0.02)	(0.02)
Largest Ownership	-0.0377	-0.0030	-0.0186	-0.0015	-0.0290	-0.0023	0.0245	0.0018	0.0242	0.0017
	(0.70)	(0.70)	(0.85)	(0.85)	(0.77)	(0.77)	(0.83)	(0.83)	(0.84)	(0.84)
D_High-tech	0.0826**	0.0065**	0.0787**	0.0062**	0.0801**	0.0063**	0.0812**	0.0058**	0.0846**	0.0061**
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
D_Real Estate	-0.1047	-0.0082	-0.1152	-0.0090	-0.1099	-0.0086	-0.2110	-0.0152	-0.2239	-0.0161
	(0.48)	(0.48)	(0.42)	(0.42)	(0.45)	(0.45)	(0.37)	(0.37)	(0.33)	(0.33)
D_Finance	0.1508	0.0118	0.1539	0.0121	0.1600	0.0125	0.4377*	0.0315*	0.3094	0.0223
	(0.30)	(0.30)	(0.28)	(0.28)	(0.27)	(0.27)	(0.08)	(0.08)	(0.23)	(0.24)
D_SOE	-0.0357	-0.0028	-0.0339	-0.0027	-0.0344	-0.0027	-0.1296	-0.0093	-0.1251	-0.0090
	(0.61)	(0.61)	(0.62)	(0.62)	(0.62)	(0.62)	(0.16)	(0.16)	(0.18)	(0.18)
D_Big4	0.0180	0.0014	-0.0188	-0.0015	-0.0033	-0.0003	0.0249	0.0018	0.0275	0.0020
	(0.84)	(0.84)	(0.84)	(0.84)	(0.97)	(0.97)	(0.84)	(0.84)	(0.82)	(0.82)
D_Cross-listing	-0.0271	-0.0021	-0.0017	-0.0001	-0.0093	-0.0007	-0.1538	-0.0111	-0.1606	-0.0116
	(0.81)	(0.81)	(0.99)	(0.99)	(0.93)	(0.93)	(0.40)	(0.40)	(0.38)	(0.38)
Constant	-3.1391***		-3.1587***		-3.1014***		-3.2285***		-3.2048***	
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Year Indicators	Included		Included		Included		Included		Included	
Industry Indicators	Included		Included		Included		Included		Included	
Market Indicators	Included		Included		Included		Included		Included	
Log likelihood	-151180		-151169		-151170		-110508		-110502	
Pseudo R^2	0.0606		0.0607		0.0607		0.0590		0.0590	
Observations	489,950		489,950		489,950		379,532		379,532	

Furthermore, in the column (3) specification, of all the information-spillover measures examined, the information-spillover measure of *Contem_ΔInstOversub* is the most significant measure in explaining the probability of institutional investors entering the current IPO's auction tranche. This is consistent with my conclusions obtained in the auction-level tests, which suggests that institutional investors are unlikely to incorporate the other forms of spillover information into their entry decision if they can learn from the information about institutional oversubscription revealed in contemporaneous IPO auction results.[48]

In the last two columns of Table 2.6, I present an examination of the effect of contemporaneous information spillovers on the probability of institutional participation by taking account of the contemporaneous offerings subject to a common valuation factor. As shown in these two columns, the estimated coefficients of *Contem_ΔInstOversub* and *Contem_ΔInstBidders* remain positive and significant at the 1% level, which are consistent with the results drawn from unconditional contemporaries. Hence, my inferences are identical when using the alternative definition of contemporaries. Interestingly, as shown in column (5), one of the alternative spillover measures (*Contem_ΔInstAggressive*) became positive and significant at the 10% level. This suggests that the spillover information regarding the average difference between the numbers of contemporaneous large and small aggressive bidders has an additional contribution to explaining the probability of institutional participation if institutional investors are assumed to learn from the auction results of contemporaneous offerings in the same industry.

Moreover, the signs and significance of the control variables are consistent with the results obtained in the auction-level tests. This implies that the firm- and offer-specific characteristics, which have been verified to exert influence on the participation of

[48] When using the alternative spillover measure (*Contem_ΔInstBidders*) as a substitute, which is highly correlated with my primary spillover measure (*Contem_ΔInstOversub*), the results are qualitatively the same, although these are not given in the table.

institutional investors at the aggregate level, also have an impact on the auction choice of institutional investors at the individual level.

Overall, in this subsection, through the investor-level tests, I have confirmed my previous conclusion that information spillovers from the announcement of contemporaneous IPO auction results (which have the ability to reduce the valuation uncertainty) facilitate institutional investors entering the current IPO auction, whereas information produced by retail investors in contemporaneous IPOs' public tranches does not have a spillover effect on the entry decision of institutional investors.

2.5.2 The effect of information spillovers on retail participation

Since China's hybrid IPO auction mechanism separates retail investors from the auction tranche and assigns them to a public tranche, it is also of interest to know how these retail investors, as a group in the public tranche, react to the information revealed in the announcements of the contemporaneous hybrid IPO auction results. In this subsection, I conduct examinations of Hypotheses 2a and 2b, which investigate how the information produced by sophisticated and unsophisticated investors for contemporaneous hybrid IPO auctions exerts influence on the participation of retail investors in the current IPO.

As I did with the measurement of institutional participation, I adopted the natural logarithm of the number of retail investors to measure the retail participation in the current IPO (to be precise, in the current IPO's public tranche).[49] In order to make sense of how contemporaneous information spillovers exert influence on the participation of institutional and retail investors differently, all information-spillover measures previously used in the analysis of institutional participation were also introduced into the analysis of retail participation.

Table 2.7 presents the estimates of the cross-sectional OLS regressions that were used to analyse the impact of contemporaneous information spillovers on the entry of retail

[49] Unfortunately, since investor-specific information for retail investors is not available, I could only examine the effect of contemporaneous information spillovers on retail participation at the aggregate level.

investors into the current IPO's public tranche. As shown in column (1), the primary information-spillover measures based on contemporaneous institutional investors (*Contem_ΔInstOversub*) and retail investors (*Contem_RetailOversub*) were introduced simultaneously into the regression, along with all control variables. As expected, the estimated coefficient of *Contem_RetailOversub* is positive and significant at the 1% level, which suggests that more retail investors engage in the current IPO's public tranche when the average oversubscription submitted by contemporaneous retail investors is higher. By contrast, the information produced by contemporaneous institutional investors (*Contem_ΔInstOversub*) has little association with the entry of retail investors into the current IPO. These results imply that retail investors evaluate the current offering by relying on the spillover information that reflects the collective mood or sentiment at the time of the offering phase, rather than the spillover information that has the ability to lower their valuation uncertainty. Consistent with this point of view, the results confirm that retail participation is positively and significantly related to contemporaneous secondary-market conditions (*Contem_MktRet*). If the recent market conditions is a proxy of noise trader sentiment (e.g. Derrien, 2005), then this result shows that the entry of retail investors into the current IPO is also driven by contemporaneous secondary-market investor sentiment. Moreover, the results identify that the average one-day initial return of all contemporaneous offerings (*Contem_IR*) has a significantly positive influence on the current retail participation, which is evidence of the return-chasing behaviour of retail investors, which is consistent with the findings of Chiang et al. (2010) and Jagannathan et al. (2015) for other markets.[50]

To further assess whether retail investors are affected by the other forms of spillover information from the announcement of contemporaneous IPO auction results, I included

[50] Although the spillover-related control variable *Contem_IR* has a significant influence on both retail and institutional participation, the participants' reactions to this spillover information may result from different reasons. Specifically, as retail investors (in the public tranche) are not subject to the lock-up restriction, they are more likely to be IPO flippers (i.e. reselling their allocations immediately on the first aftermarket day). Thus, retail investors might be more inclined to see the spillover information of *Contem_IR* as a signal of flipping activities. By contrast, as institutional investors (in the auction tranche) face the lock-up period, they are presumably long-term investors. Hence, they are more likely to learn about pricing experience from the spillover information of *Contem_IR*.

various combinations of the alternative spillover measures in regressions (2) to (4). After controlling for other factors that affect retail participation, the outcome shows that none of the alternative spillover measures (*Contem_ΔInstBidders*, *Contem_ΔInstShares* and *Contem_ΔInstAggressive*) are significantly related to the entry of retail investors into the current IPO's public tranche. This confirms my prior conclusion that retail investors disregard the valuation efforts made by contemporaneous institutional investors, and thereby rejects my Hypothesis 2a. By contrast, the estimated coefficient of *Contem_RetailOversub* remains positive and significant at the 1% level in all specifications, which lends strong support to my Hypothesis 2b, in that retail participation is susceptible to the information regarding the aggregate demand generated by contemporaneous retail investors in contemporaneous IPOs' public tranches. Nevertheless, the economic magnitude of the spillover effect produced by *Contem_RetailOversub* is relatively small, and a 10 times increase in the average oversubscription by contemporaneous retail investors leads to an increase of only 0.30% ($\approx 100*[e^{0.0003*10}-1]$) for the number of retail investors in the current IPO auction.

Table 2.7: The effect of contemporaneous information spillovers on retail participation

This table presents the estimates of cross-sectional OLS regressions that analyze the impact of contemporaneous information spillovers on the entry of retail investors into the current IPO's public tranche. The dependent variable used for each regression is the natural logarithm of the number of retail investors in the current IPO's public tranche. The independent variables of interest are information-spillover measures (e.g. the primary spillover measures, *Contem_RetailOversub* and *Contem_ΔInstOversub*; the alternative spillover measures, *Contem_ΔInstBidders*, *Contem_ΔInstShares*, and *Contem_ΔInstAggressive*; the spillover-related control variables, *Contem_IR* and *Contem_MktRet*). Variable definitions are detailed in Subsection 2.4.3 and summarised in Appendix 1. An array of IPO year, industry, and market indicator variables are included but not reported. The last four columns present regression results that take into account of the contemporaneous offerings that are subject to a common valuation factor (i.e. they are in the same industry with the current IPO firm). The White heteroscedasticity-consistent *t*-statistics are reported in parenthesis. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Ln(No. of Retail Investors)							
					Contemporaries that are subject to a common valuation factor (i.e. they are in the same industry with the current IPO firm)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Contem_ΔInstOversub	0.0001		0.0014		0.0042***		0.0048***	
	(0.03)		(0.52)		(3.98)		(3.89)	
Contem_ΔInstBidders		0.0024		0.0011		0.0035***		0.0038***
		(1.32)		(0.55)		(4.37)		(4.10)
Contem_RetailOversub	0.0002***	0.0002***	0.0003***	0.0003***	0.0002***	0.0002***	0.0002***	0.0002***
	(3.33)	(3.28)	(4.93)	(4.49)	(2.96)	(3.48)	(3.19)	(2.99)
Contem_ΔInstShares			0.0000	0.0000			-0.0000	-0.0000
			(1.57)	(1.12)			(-0.20)	(-0.99)
Contem_ΔInstAggressive			-0.0011	-0.0008			-0.0008	-0.0001
			(-1.14)	(-1.46)			(-1.32)	(-0.22)
Contem_IR	0.3199***	0.2983***	0.3258***	0.3240***	0.3061***	0.3161***	0.3149***	0.3146***
	(5.66)	(5.46)	(6.38)	(6.32)	(4.80)	(5.03)	(4.90)	(4.91)
Contem_MktRet	5.5233**	6.9825***	6.0621**	6.1586**	7.4898***	8.1293***	7.4989***	8.1372***
	(2.24)	(2.81)	(2.49)	(2.51)	(2.68)	(2.87)	(2.67)	(2.86)
Ln(Proceeds)	-0.0893**	-0.0954***	-0.0974***	-0.0968***	-0.1648***	-0.1737***	-0.1716***	-0.1733***
	(-2.52)	(-2.73)	(-2.80)	(-2.80)	(-3.81)	(-3.98)	(-3.91)	(-3.93)
Ln(Firm Age)	0.0618*	0.0607*	0.0554*	0.0558*	0.0805**	0.0774**	0.0789**	0.0787**
	(1.82)	(1.81)	(1.65)	(1.66)	(2.16)	(2.07)	(2.10)	(2.10)
EPS [-3yr, IPO]	-0.7388***	-0.7277***	-0.7293***	-0.7292***	-0.5946***	-0.5867***	-0.5904***	-0.5875***
	(-7.89)	(-7.77)	(-7.81)	(-7.80)	(-6.02)	(-5.96)	(-5.97)	(-5.95)

Leverage [-3yr, IPO]	0.1178	0.1259	0.1140	0.1160	0.1344	0.1307	0.1228	0.1329
	(0.84)	(0.90)	(0.82)	(0.83)	(0.81)	(0.79)	(0.73)	(0.80)
Reputation	0.0018	0.0014	0.0002	0.0003	-0.0026	-0.0030	-0.0030	-0.0029
	(0.26)	(0.21)	(0.04)	(0.04)	(-0.34)	(-0.39)	(-0.39)	(-0.38)
Non-tradable	0.4456***	0.4397***	0.4478***	0.4472***	0.4450**	0.4634***	0.4620**	0.4628**
	(3.04)	(3.01)	(3.05)	(3.05)	(2.48)	(2.58)	(2.57)	(2.57)
Largest Ownership	0.1361	0.1550	0.1605	0.1605	0.0604	0.0480	0.0567	0.0551
	(1.04)	(1.20)	(1.25)	(1.25)	(0.42)	(0.33)	(0.39)	(0.38)
D_High-tech	0.0567	0.0576	0.0499	0.0508	0.0383	0.0417	0.0386	0.0411
	(1.27)	(1.30)	(1.12)	(1.14)	(0.86)	(0.94)	(0.87)	(0.92)
D_Real Estate	0.1024	0.0895	0.0583	0.0566	0.5905***	0.6170***	0.6005***	0.6182***
	(0.59)	(0.50)	(0.32)	(0.31)	(3.05)	(3.04)	(3.08)	(3.07)
D_Finance	0.5318***	0.5598***	0.5714***	0.5706***	1.6496***	1.3459***	1.4556***	1.3331***
	(3.23)	(3.42)	(3.48)	(3.49)	(5.31)	(4.55)	(4.53)	(4.05)
D_SOE	0.0516	0.0508	0.0507	0.0512	0.0897	0.0905	0.0829	0.0893
	(0.60)	(0.59)	(0.59)	(0.59)	(0.85)	(0.86)	(0.79)	(0.85)
D_Big4	0.2613**	0.2324**	0.1854	0.1866	0.2767*	0.2447	0.2557	0.2611
	(2.24)	(2.03)	(1.59)	(1.60)	(1.75)	(1.53)	(1.53)	(1.57)
D_Cross-listing	0.2846*	0.3193**	0.3445**	0.3446**	0.0910	0.0990	0.0912	0.0890
	(1.78)	(2.07)	(2.17)	(2.18)	(0.46)	(0.50)	(0.47)	(0.46)
Constant	14.0428***	14.0331***	14.1212***	14.0980***	15.1520***	15.3121***	15.2966***	15.2955***
	(20.57)	(20.89)	(21.17)	(21.21)	(18.13)	(18.19)	(18.01)	(17.96)
Year Indicators	Included	Included	Included	Included	Included	Included	Included	Included
Industry Indicators	Included	Included	Included	Included	Included	Included	Included	Included
Market Indicators	Included	Included	Included	Included	Included	Included	Included	Included
Adjusted R-squared	0.545	0.550	0.554	0.554	0.494	0.496	0.494	0.494
Observations	1,027	1,027	1,027	1,027	796	796	796	796

To ensure that my results are robust with respect to the alternative definition of contemporaries, I reran my regression analyses using information spillovers from contemporaneous offerings that are subject to a common valuation factor (i.e. they are in the same industry). As shown in the last four columns of Table 2.7, when retail investors are assumed to be only able to learn about the information spillovers from contemporaneous offerings in the same industry, their participation in the current IPO's public tranche is still positively and significantly related to contemporaneous retail investors' demand (*Contem_RetailOversub*). At the same time, the relationship between the retail participation and the spillover information of *Contem_IR* and *Contem_MktRet* remains positive and significant at the 1% level. Evidently, the reaction of retail investors to contemporaneous sentiment-related spillover information is not driven by the way I have defined contemporaries. However, interestingly, the estimated coefficients of both *Contem_ΔInstOversub* and *Contem_ΔInstBidders* became positive and significant, which suggests that retail investors are also willing to incorporate the information produced by contemporaneous institutional investors into their entry decisions when such information spills over from contemporaneous offerings that are in the same industry as the current IPO firm.

Furthermore, as shown in Table 2.7, the coefficient estimates of the control variables demonstrate how firm- and offer-specific characteristics have an impact on retail participation. Although an IPO firm with a larger offering size (*Ln(Proceeds)*) is less subject to information asymmetry, retail investors are inclined to participate in IPOs with a smaller offering size. As demonstrated by the negative and significant coefficient estimate for *Ln(Proceeds)* across all regression specifications, retail investors tend to participate in smaller offerings that bring them more information uncertainty. This result is consistent with the pattern of retail participation in the Indian IPO market (e.g. Neupane and Poshakwale, 2012), while it is in contrast to the retail participation in the US IPO auctions (e.g. Degeorge et al., 2010). Also, I conclude that retail investors are inclined to engage in the offerings with a high proportion of non-tradable shares (*Non-tradable*), but these types of offerings are associated with greater information uncertainty, higher agency costs and lower liquidity (Chen et al., 2004; Liao et al., 2011). Interestingly, the coefficients of *Ln(Firm Age)* and *D_Finance* are consistently positive and significant in all regressions, which, in turn, suggests that retail investors are willing to invest in the IPOs of established firms and financial companies that are less subject to information asymmetry. Therefore, consistent with Chiang et al.'s (2010) standpoint that unsophisticated investors may do all kinds of strange things, my results indicate that the retail participation in China's hybrid IPO auctions appears to be driven by their odd or contradictory interpretation of publicly available information regarding IPO firms' fundamentals.

Collectively, my empirical results obtained in this subsection lend strong support to my Hypothesis 2b, which suggests that the information regarding the aggregate demand generated by contemporaneous retail investors in contemporaneous IPOs' public tranches spills over and has a positive influence on the entry of retail investors into the current IPO. By contrast, there is no strong evidence lending support to Hypothesis 2a, in that the information regarding the valuation efforts made by institutional investors in contemporaneous IPOs' auction tranches has little association with the retail participation in the current IPO, unless contemporaneous offerings are in the same industry as the current IPO firm.

2.5.2.1 Spillover effects on institutional participation versus retail participation

In this subsection, based on my findings thus far, I will make a concise comparison of how information spillovers from the announcements of contemporaneous hybrid IPO auction results exert influence differently on institutional and retail investors participating in the current IPO.

As Sherman's (2005) model predicts that the auction entry of sophisticated investors depends on costly information acquisition, I have found evidence that only contemporaneous institutional bidding information that has the ability to lower the costs of estimating the value of the current offering will spill over and affect the participation decision of institutional investors in the current IPO auction. Conversely, information spillovers from contemporaneous retail investors' subscription trends that reflect the collective mood of unsophisticated investors prevailing at the time of the current offering phase will not be incorporated into the participation decision by institutional investors. Consistent with this inference, I have further identified that the contemporaneous secondary-market conditions that reflect the secondary-market investor sentiment at the time of the offering phase also has little association with institutional participation.

By contrast, in line with the argument given in previous literature (e.g. Derrien, 2005; Cornelli et al., 2006; Dorn, 2009; Chiang et al., 2010) that retail investors are susceptible to behavioural biases, I have found evidence that contemporaneous retail investors' subscription trends have a significant influence on the participation of retail investors in the current IPO. This implies that retail investors are inclined to incorporate contemporaneous sentiment-related spillover information into their IPO participation decisions. Furthermore, the extant positive and significant link between retail participation and contemporaneous secondary-market conditions reinforces this conclusion. On the other hand, information production by contemporaneous institutional investors affects retail participation to the extent that it must be based on contemporaneous offerings in the same industry.

Evidently, there are considerable differences between institutional and retail investors in the ways they interpret the readily available public information, especially when they process the announcements of contemporaneous hybrid IPO auction results. To some extent, this is consistent with the findings of Odean (1998), and Field and Lowry (2009), who document that institutional investors utilize the readily available public information to their advantage, whereas retail investors misinterpret or disregard such information.[51] Moreover, from the perspective of IPO-mechanism design, my results lend support to the suggestions of Jagannathan et al. (2015) and Schnitzlein et al. (2016) that retail investors,

[51] Odean (1998), and Field and Lowry (2009) mainly focus on institutional investors' versus retail investors' interpretations of the readily available public information regarding firms' fundamentals, while my research extends their findings to including the spillover information known before the deal. By comparing the reaction of institutional investors versus retail investors to the firm- and offer-specific characteristics that I have included in my models, I also have found evidence that institutional and retail investors have different interpretations of IPO firms' fundamentals.

as a group, should be separated from the auction tranche since their participation is subject to sentiment and will bring more uncertainty into the auction process.

2.5.3 Information spillovers within the sealed-bid hybrid IPO auction mechanism

The prior literature (e.g. Ljungqvist et al., 2003; Derrien and Womack, 2003) maintains that an IPO selling mechanism with a hybrid structure is likely to create cascading demand, where retail investors in the public tranche can condition their demand based on the indications of interest revealed in the preceding order book (or price-setting tranche). Although relevant evidence has been found by Neupane and Poshakwale (2012), and Khurshed et al. (2014) in an environment where the IPO selling process is transparent (i.e. the entire bidding process is publicly observable at the time of the offering), it is still far from clear whether the information generated by institutional investors in the current sealed-bid auction can spill over and affect the participation of retail investors in the current IPO's public tranche. Therefore, in this subsection, I will move on to look into patterns of information spillovers between the auction tranche and the public tranche within the sealed-bid hybrid IPO auction mechanism.

According to Hypothesis 3a, if retail investors are able to discern the aggregate demand information of institutional investors in the current IPO's auction tranche indirectly through the level of short-term interbank interest rates at the time of the auction period, then I expected that the entry of retail investors into the current IPO's public tranche would be positively related to the level of short-term interbank interest rates during the current IPO's auction period.

Table 2.8: Information spillovers within the sealed-bid hybrid IPO auction mechanism

This table presents the estimates of cross-sectional OLS regressions that examine the effect of information spillovers from the current IPO's auction tranche on the participation of retail investors in the current IPO's public tranche. Panel A reports the regression results that were used to examine the impact of the trend of short-term interbank interest rates during the current IPO's auction period (as a signal for the information spillover regarding aggregate demand of institutional investors) on the participation of retail investors in the current IPO's public tranche, where the explanatory variable of interest is the average 7-day interbank repo rate between the start date and end date of the current IPO's auction tranche (*Avg. Repo Rate [auction starts, ends]*). Panel B reports the regression results that were used to examine the impact of the institutional participation in the current IPO's auction tranche on the participation of retail investors in the current IPO's public tranche, where the explanatory variables of interest are the natural logarithm of the number of institutional bidders in the current IPO's auction tranche (*Ln(No. of Institutional Bidders)*), the natural logarithm of the overall level of institutional oversubscription in the current IPO's auction tranche (*Ln(Institutional Oversubscription)*), the difference between the number of large institutional bidders and the number of small institutional bidders in the current IPO's auction tranche (*Current_ΔInstBidders*), and the oversubscription difference between large and small institutional bidders in the current IPO's auction tranche (*Current_ΔInstOversub*). Except that the dependent variable used in the regression of column (2) is the natural logarithm of the overall level of retail investors' oversubscription in the current IPO's public tranche, the dependent variable used in the other regressions is the natural logarithm of the number of retail investors in the current IPO's public tranche. Variable definitions are detailed in Subsection 2.4.3 and summarised in Appendix 1. An array of IPO year, industry, and market indicator variables are included but not reported. The White heteroscedasticity-consistent *t*-statistics are reported in parenthesis. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Panel A: Short-term interbank interest rates as a signal for the information spillover regarding aggregate demand of institutional investors		Panel B: Information spillovers from the auction tranche to the public tranche in the current sealed-bid hybrid IPO auction procedure			
	Ln (# Retails)	Ln (Retail Oversub)	Ln (No. of Retail Investors)			
	(1)	(2)	(3)	(4)	(5)	(6)
Information spillovers from the current IPO's auction tranche						
Ln(No. of Institutional Bidders)			0.298***			
			(8.97)			
Ln(Institutional Oversubscription)				0.239***		
				(9.31)		
Current_ΔInstBidders					0.004***	
					(8.65)	
Current_ΔInstOversub						0.003***
						(4.70)
Information spillovers via short-term interbank interest rates						
Avg. Repo Rate [auction start, end date]	-7.969***	-11.218***	-4.373**	-4.227**	-7.166***	-6.959***
	(-4.31)	(-5.74)	(-2.39)	(-2.29)	(-3.96)	(-3.72)
Contemporaneous information-spillover measures						
Contem_ΔInstBidders	0.002	0.001	0.001	0.002	0.001	0.002
	(1.35)	(0.66)	(0.90)	(0.97)	(0.93)	(1.18)

Contem_RetailOversub	0.000***	0.000*	0.000***	0.000***	0.000***	0.000***
	(3.29)	(1.84)	(3.26)	(3.32)	(3.16)	(3.00)
Contem_IR	0.299***	0.279***	0.230***	0.239***	0.245***	0.260***
	(5.25)	(5.34)	(4.39)	(4.55)	(4.60)	(4.67)
Contem_MktRet	5.991**	4.002	5.723**	6.602***	5.680**	6.086**
	(2.43)	(1.46)	(2.49)	(2.84)	(2.41)	(2.53)
Firm- and offer-specific characteristics						
Ln(Proceeds)	-0.098***	-0.569***	-0.123***	-0.046	-0.126***	-0.081**
	(-2.78)	(-15.49)	(-3.68)	(-1.37)	(-3.73)	(-2.27)
Ln(Firm Age)	0.057*	0.078**	0.059*	0.047	0.065**	0.060*
	(1.74)	(2.18)	(1.91)	(1.50)	(2.03)	(1.85)
EPS [-3yr, IPO]	-0.734***	-0.398***	-0.675***	-0.679***	-0.685***	-0.727***
	(-7.81)	(-4.57)	(-7.50)	(-7.41)	(-7.44)	(-7.69)
Leverage [-3yr, IPO]	0.143	-0.079	0.304**	0.281**	0.222	0.190
	(1.03)	(-0.52)	(2.23)	(2.07)	(1.62)	(1.37)
Reputation	0.002	0.006	-0.001	0.002	-0.000	0.000
	(0.26)	(0.79)	(-0.08)	(0.26)	(-0.04)	(0.03)
Non-tradable	0.441***	0.271*	0.378***	0.375**	0.435***	0.427***
	(2.97)	(1.79)	(2.60)	(2.54)	(3.04)	(2.89)
Largest Ownership	0.131	0.097	0.140	0.154	0.145	0.145
	(1.01)	(0.71)	(1.14)	(1.25)	(1.15)	(1.14)
D_High-tech	0.060	0.078	0.044	0.034	0.047	0.051
	(1.36)	(1.60)	(1.05)	(0.80)	(1.10)	(1.16)
D_Real Estate	0.068	0.014	0.044	0.007	0.041	0.040
	(0.38)	(0.06)	(0.31)	(0.04)	(0.27)	(0.25)
D_Finance	0.576***	0.260	0.464***	0.567***	0.525***	0.593***
	(3.46)	(1.49)	(3.13)	(4.18)	(3.37)	(3.48)
D_SOE	0.034	0.079	0.060	0.078	0.020	0.037
	(0.38)	(0.88)	(0.68)	(0.88)	(0.24)	(0.42)
D_Big4	0.238**	0.111	0.211*	0.228**	0.233**	0.248**
	(2.07)	(0.91)	(1.89)	(2.17)	(2.14)	(2.12)
D_Cross-listing	0.381**	-0.032	0.416***	0.421***	0.345**	0.397**
	(2.41)	(-0.22)	(2.77)	(2.83)	(2.34)	(2.44)
Constant	14.291***	16.935***	13.354***	12.140***	14.676***	13.838***
	(20.98)	(23.65)	(20.30)	(17.94)	(22.39)	(19.92)
Year Indicators	Included	Included	Included	Included	Included	Included
Industry Indicators	Included	Included	Included	Included	Included	Included
Market Indicators	Included	Included	Included	Included	Included	Included
Adjusted R-squared	0.558	0.716	0.595	0.595	0.579	0.565
Observations	1,027	1,029	1,027	1,027	1,027	1,027

Panel A of Table 2.8 presents the estimates of the cross-sectional OLS regressions that examine the impact of the trend of short-term interbank interest rates during the current IPO's auction period (as a signal for the information spillover regarding aggregate demand of institutional investors) on the retail participation in the current IPO's public tranche. With respect to the control variables, in addition to the firm- and offer-specific characteristics (as well as an array of year, industry and market indicator variables), a set of contemporaneous information-spillover measures that were previously used to test the impact on retail participation were included in the regression models.

Specifically, column (1) of Panel A reports the multivariate regression results that used the natural logarithm of the number of retail investors as the dependent variable used to measure the retail participation (or retail entry) in the current IPO's public tranche. Surprisingly, the results show that the number of retail investors entering the current IPO's public tranche is against the trend of short-term interbank interest rates during the current IPO's auction period, as shown by the negative and significant coefficient of the spillover variable *Avg. Repo Rate*. This result is clearly inconsistent with my Hypothesis 3a. It appears that retail investors do not perceive the level of short-term interbank interest rates as a signal of institutional aggregate demand spilling over from the current IPO's auction tranche, although their entry decisions are strong related to the trend of short-term interbank interest rates.[52] Hence, my finding is in sharp contrast to the prediction of Chowdhry and Sherman (1996), who conjecture that information about sophisticated investors' aggregate demand will become public knowledge and spill over into unsophisticated investors' demand via short-term interest rates, if investors are required to pay for all their subscriptions at the time of the offering. Apparently, my empirical result implies that retail investors regard an increase in short-term interbank interest rates as an important signal to avoid engaging in the current IPO's public tranche. This is

[52] Assuming that if retail investors perceive the aggregate demand information of institutional investors from the trend of short-term interbank rates, then the significantly negative correlation implies that they are inclined to participate in the offerings that are less interesting to institutional investors. Obviously, this is inconsistent with cascade/herding theory. Moreover, my later empirical analysis shows that retail investors are actually more inclined to engage in the offerings that have more institutional investors involved. Therefore, retail investors seem to not discern the level of short-term interest rates as a signal of the institutional demand spillover.

probably because retail investors interpret a high-interest-rate environment as an increase in their opportunity costs (or transaction costs), as demonstrated by Fung et al. (2004) and Leung and Menyah (2006), who state that IPO investors bear the opportunity cost of lost interest income on their subscription funds in a setting where the subscription funds are tied up without earning interest.[53]

As a robustness check, as shown in column (2) of Table 2.8 Panel A, I replicated the regression analysis using the natural logarithm of the overall level of retail investors' oversubscriptions in the current IPO's public tranche as the dependent variable. The estimated coefficient of the spillover variable *Avg. Repo Rate* remains negative and significant at the 1% level, which indicates that my results are not driven by the way I have defined retail participation.

In addition to the seven-day interbank repo rate, there are two key short-term interbank interest rates in China's interbank market: the China Interbank Offered Rate (CHIBOR) and Shanghai Interbank Offered Rate (SHIBOR). Since Porter and Xu (2009) demonstrate that there are strong co-movements among these three interbank interest rates, it is possible that the type of short-term interbank interest rates utilized by retail investors is different from the one I have selected and tested. To ensure my results were not influenced by the use of the other types of short-term interbank interest rates, I re-estimated regression specifications (1) and (2) using either *Avg. CHIBOR* or *Avg. SHIBOR* to replace the spillover variable *Avg. Repo Rate*.[54] There are few changes in significance and no changes in signs, which does little to affect my conclusion that the information regarding institutional investors' aggregate demand in the current IPO's auction tranche

[53] Like the IPO subscription rules for most Asian markets focused on by Fung et al. (2004), and Leung and Menyah (2006), China's IPO market (during my sample period) also required investors to pay all of their subscription funds at the time of the offering, and the refunds for unsuccessful subscriptions were distributed within a week, but only at face value (without interest). Given the extremely low lottery rate (1.19% on average) over my sample period, retail investors are presumably unwilling to subscribe to IPO shares when the short-term interest rate goes up, because they will face substantial opportunity costs or transaction costs while there is a very low chance of getting IPO allocations.

[54] The definitions of *Avg. CHIBOR* and *Avg. SHIBOR* were determined in the same way as *Avg. Repo Rate*. For brevity, the results of these additional robustness tests are not reported in the table.

is unlikely to influence the participation of retail investors in the current IPO's public tranche indirectly through the short-term interbank interest rates.

Next, given that retail investors may get rough information about institutional participation (or institutional aggregate demand) from stockbrokers, financial gurus and/or other investors (Chowdhry and Sherman, 1996; Amihud et al., 2003; Cao et al., 2016), I investigated whether retail investors in a sealed-bid context react directly to the participation of institutional investors in the current IPO's auction tranche. According to Hypothesis 3b, if the information spillover from the auction tranche to the public tranche takes place within the current sealed-bid hybrid IPO auction mechanism, then I expected that the entry of retail investors into the current IPO's public tranche would be positively related to the number of institutional bidders entering the current IPO's auction tranche.

Panel B of Table 2.8 reports the estimates of the cross-sectional OLS regressions that have been used to examine the impact of the participation of institutional investors in the current IPO's auction tranche on the entry of retail investors into the current IPO's public tranche, where the dependent variable is the natural logarithm of the number of retail investors (*Ln(No. of Retail Investors)*). Specifically, as shown in column (3) of Panel B, the natural logarithm of the number of institutional bidders (*Ln(No. of Institutional Bidders)*), as my primary measure of the information spillover of the participation of institutional investors in the current IPO auction, is introduced simultaneously into the regression analysis along with the control variables. [55] As expected, the estimated coefficient for the *Ln(No. of Institutional Bidders)* is positive and significant at the 1% level, which suggests that retail investors are inclined to learn from and follow the auction participation of institutional investors, even when the relevant information is not publicly available at the time of the current offering phase. Clearly, although IPO placement in China adopts a sealed-bid hybrid selling approach, information about the participation of institutional investors in the current IPO's auction tranche still spills over and directly

[55] The spillover variable of the average short-term interbank rate was retained as a control variable in all regression specifications in Panel B of Table 2.8. Since it remains negative and significant across all the regressions, the relevant conclusions are unchanged.

affects the participation of retail investors in the current IPO's public tranche. This result lends support to the argument of Ljungqvist et al. (2003), and Derrien and Womack (2003) that a hybrid IPO placement method is likely to trigger cascading demand, and it also extends the findings of Neupane and Poshakwale (2012), and Khurshed et al. (2014) to include the evidence that a pattern of learning between sophisticated investors and unsophisticated investors possibly takes place in a sealed-bid IPO selling environment. In terms of the economic magnitude, a 1% change in the number of institutional bidders engaging in the current auction tranche results in a 0.30% ($\approx 100*[1.01^{0.298}-1]$) change in the number of retail investors participating in the current public tranche, while holding all other variables constant. The adjusted R-squared value suggests that the variables included in the column (3) regression explain 59.5% of the cross-sectional variation in the natural logarithm of the number of retail investors entering the current IPO.

As a robustness test, as shown in column (4) of Panel B, I used the natural logarithm of the overall level of institutional oversubscriptions (*Ln(Institutional Oversubscription)*) instead of the natural logarithm of the number of institutional bidders (*Ln(No. of Institutional Bidders)*) to measure the spillover of the participation of institutional investors in the current IPO auction. After controlling for other factors that influence the retail participation, the results show that the estimated coefficient of the alternative spillover measure of *Ln(Institutional oversubscription)* remains positive and significant at the 1% level, which indicates a close relationship between the number of retail investors entering the current IPO's public tranche and the oversubscription submitted by institutional bidders in the current IPO's auction tranche. Thus, although the auction trends (in the underwriter's order book) are confidential at the time of the offering, retail investors still appear to be able to perceive the information about the aggregate demand of institutional investors and make entry decisions based on this spillover information.

It is of note that endogeneity may arise in the regressions shown in columns (3) and (4), because the explanatory variables of the *Ln(No. of Institutional Bidders)* and *Ln(Institutional Oversubscription)* – which were treated as dependent variables in my previous regression analyses – may be endogenously determined by other factors. Hence, before I could decide whether it was necessary to use an instrumental variable approach, I first had to determine if the two explanatory variables of interest are endogenous. To test for this endogeneity concern, I carried out a formal Durbin-Wu-Hausman test (Durbin, 1954; Wu, 1973; Hausman, 1978) on the *Ln(No. of Institutional Bidders)* and *Ln(Institutional Oversubscription)*. The results of the Durbin-Wu-Hausman test on both variables are insignificant (p-value = 0.380 and 0.171, respectively), which fails to reject the null hypothesis that the spillover variables of the *Ln(No. of Institutional Bidders)* and *Ln(Institutional Oversubscription)* are exogenous with respect to the *Ln(No. of Retail Investors)*. Consequently, the OLS results, as shown in columns (3) and (4), are statistically acceptable.

Furthermore, it is also of interest to investigate whether the identity information of institutional bidders spills over from the current IPO's auction tranche and affects the retail participation. Thus, I redefined the spillover variables by accounting for differences in spillover information between large and small institutional bidders from the current IPO's auction tranche (*Current_ΔInstBidders* and *Current_ΔInstOversub*). According to the argument of Bikhchandani et al. (1998), which states that uninformed investors are apt to imitate the actions of those who appear to have more precise information, if retail investors in China's IPO market are able to discern the identity information of institutional bidders spilling over from the current auction tranche, then I anticipated that the entry of retail investors into the current IPO's public tranche would increase with an increase in the extent of large institutional investors' participation in the current IPO's auction tranche.

As shown in column (5) of Table 2.8 Panel B, consistent with my expectation, the number of retail investors entering the current IPO's public tranche is positively and significantly related to the spillover information of the *Current_ΔInstBidders* from the current IPO's auction tranche, after controlling for other factors that influence the retail entry. This implies that retail investors are able to perceive the identity information of institutional bidders at the time of the offering, and tend to engage in the IPOs that involve more large institutional investors. Furthermore, as demonstrated in column (6) of Panel B, I used the

Current_ΔInstOversub spillover variable instead of the *Current_ΔInstBidders* to replicate the regression analysis. Likewise, there is evidence that retail investors incorporate the institutional-identity information into their entry decisions, as shown by the positive and significant coefficient of the *Current_ΔInstOversub* spillover variable. In particular, this result suggests that more retail investors are willing to participate in the current IPO's public tranche when large institutional investors bid for more share quantities than the small institutional investors in the current IPO's auction tranche.

With respect to the other variables in Table 2.8, the results demonstrate that the coefficients of contemporaneous information-spillover variables are little changed in terms of signs and significance relative to the previous results. Thus, my previous conclusions regarding the effect of contemporaneous information spillovers on retail investors' participation remain unchanged, even after accounting for the spillover effects from the current IPO's auction tranche. Interestingly, by comparing retail investors' reactions to the spillover information regarding contemporaneous institutional investors' auction participation (*Contem_ΔInstBidders*) versus current institutional investors' auction participation (*Current_ΔInstBidders*), the results confirm that retail investors disregard the information generated by contemporaneous institutional investors, although this information has been made publicly available and is able to lower their uncertainty in estimating the value for the current offering. In turn, retail participation tends to be conditioned on how well institutional investors' participation is perceived at the time of the current IPO auction, although such information has not been announced at that time. To some extent, this shows that the ability of retail investors to interpret readily publicly available information is limited.[56]

[56] As I have found that institutional participation in the current IPO's auction tranche is largely predictable using the publicly available information, it may be argued that the learning pattern between retail investors and institutional investors within the current sealed-bid hybrid IPO selling mechanism is caused by their coincident interpretations of the publicly available information, rather than the information spillover. This is, however, not the case, because I have shown that retail and institutional investors have clearly different interpretations of the publicly available information that I have examined.

Collectively, my empirical findings in this subsection demonstrate that information spillovers from the auction tranche to the public tranche exist in the sealed-bid hybrid IPO auction procedure, and, as a result, retail investors can condition their demand based on the indications of interest submitted by institutional investors in the current IPO's auction tranche, which can cause cascading demand among investors with different levels of sophistication. These findings lend support to my Hypothesis 3b, which implies that information generated by institutional investors in the current IPO auction spills over and directly affects retail investors' participation in the current IPO's public tranche. By contrast, I did not find strong evidence to support my Hypothesis 3a. Instead, retail investors appear to treat an increase in short-term interest rates during the current IPO's auction period as a signal of rising opportunity costs (or transaction costs), and therefore their participation is against the trend of short-term interest rates.

2.5.3.1 Additional evidence of information spillovers within the sealed-bid hybrid IPO auction procedure

Chowdhry and Sherman (1996) argue that the time lapse of the offering period will determine the extent to which spillover information about the aggregate demand of sophisticated investors will be learned about and screened by unsophisticated investors. If the offering period is shorter, then there is a lower probability that spillover information related to the aggregate demand of sophisticated investors will be precisely and/or widely known to unsophisticated investors. Similarly, a longer offering period will cause a higher probability of the same. Therefore, if there is information leakage in the current sealed-bid IPO selling procedure, Chowdhry and Sherman (1996) predict that the level of IPO oversubscriptions will increase with an increase in the time lapse of the offering period. Likewise, if information spillovers from the auction tranche to the public tranche exist in China's sealed-bid hybrid IPO auction procedure, then I expected that the level of retail investors' oversubscriptions in the current IPO's public tranche would be positively related to the duration of the current IPO's auction tranche.

Table 2.9: Analysis of information spillovers within the sealed-bid IPO selling procedure based on auction duration

This table presents the estimates of cross-sectional OLS regressions that examine the relationship between the retail investors' participation in the current IPO's public tranche and the duration of the current IPO's auction tranche, where the dependent variable used in the column (1) regression is the natural logarithm of the overall level of retail investors' oversubscriptions in the current IPO's public tranche (*Ln(Retail Oversubscriptions)*), and the dependent variable used in the column (2) regression is the natural logarithm of the number of retail investors in the current IPO's public tranche (*Ln(No. of Retail Investors)*). The explanatory variable of interest is the duration of the current IPO's auction tranche (*Auction Duration*). Variable definitions are detailed in Subsection 2.4.3 and summarised in Appendix 1. An array of IPO year, industry, and market indicator variables are included but not reported. The White heteroscedasticity-consistent *t*-statistics are reported in parenthesis. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Ln(Retail Oversubscriptions)		(2) Ln(No. of Retail Investors)	
	Coef.	*t*-stat	Coef.	*t*-stat
Auction Duration	0.1544**	(2.25)	0.0686	(1.19)
Ln(Institutional Oversubscription)	0.3399***	(12.44)	0.2392***	(9.32)
Avg. Repo Rate [auction start, end date]	-5.7820***	(-3.13)	-4.1352**	(-2.24)
Contem_ΔInstBidders	-0.0003	(-0.24)	0.0015	(0.94)
Contem_RetailOversub	0.0001*	(1.78)	0.0001***	(3.29)
Contem_IR	0.1949***	(4.23)	0.2393***	(4.52)
Contem_MktRet	5.0678**	(2.04)	6.7624***	(2.90)
Ln(Proceeds)	-0.4860***	(-14.73)	-0.0421	(-1.23)
Ln(Firm Age)	0.0647**	(1.97)	0.0480	(1.54)
EPS [-3yr, IPO]	-0.3258***	(-3.95)	-0.6814***	(-7.42)
Leverage [-3yr, IPO]	0.1178	(0.83)	0.2767**	(2.04)
Reputation	0.0060	(0.88)	0.0017	(0.26)
Non-tradable	0.1802	(1.28)	0.3766**	(2.54)
Largest Ownership	0.1225	(0.99)	0.1525	(1.24)
D_High-tech	0.0421	(0.93)	0.0339	(0.80)
D_Real Estate	-0.0988	(-0.50)	-0.0017	(-0.01)
D_Finance	0.2010	(1.54)	0.5524***	(4.00)
D_SOE	0.1329	(1.54)	0.0748	(0.84)
D_Big4	0.1188	(1.10)	0.2340**	(2.21)
D_Cross-listing	0.0727	(0.53)	0.4301***	(2.87)
Constant	13.3159***	(18.52)	11.8845***	(16.43)
Year Indicators	Included		Included	
Industry Indicators	Included		Included	
Market Indicators	Included		Included	
Adjusted R-squared	0.759		0.595	
Observations	1,029		1,027	

Table 2.9 presents the estimates of the cross-sectional OLS regressions that examine the relationship between the retail investors' participation in the current IPO's public tranche and the duration of the current IPO's auction tranche. The explanatory variable of interest is the current IPO's auction duration (*Auction Duration*), which is measured using the number of days the current IPO auction lasts. To control for other factors that influence retail investors' participation, all the variables used in my previous analysis for retail participation were introduced into the regressions.

In the column (1) regression, I used the natural logarithm of the overall level of retail investors' oversubscriptions in the current IPO's public tranche (*Ln(Retail Oversubscriptions)*) as the dependent variable to measure the extent of retail participation.[57] As expected, the estimated coefficient of *Auction Duration* is positive and significant at the 5% level, which suggests that retail investors will place subscription orders more aggressively in the current IPO's public tranche when the current IPO's auction tranche lasts longer. This confirms my Hypothesis 3c. In terms of the economic magnitude, if the duration of the current IPO auction increases by 1 day, while holding all other variables constant, then the level of retail investors' oversubscriptions in the current public tranche is expected to increase by 16.70% ($\approx 100*[e^{0.1544}-1]$). According to the argument of Chowdhry and Sherman (1996), the close (and positive) relationship between the retail investors' oversubscriptions and the IPO auction duration implies that information spillovers from the auction tranche to the public tranche are present in China's sealed-bid hybrid IPO auction mechanism. Also, this reinforces the conclusion that an IPO placement method with the sequential hybrid selling procedure is liable to trigger cascading demand, even though investors are required to place orders in a sealed-bid context. Based on my results, a possible solution to alleviate the effect of retail investors' herding or cascading demand caused by information spillovers within the hybrid IPO auction mechanism is to shorten the duration of the auction tranche.

[57] For this specification, a formal Durbin-Wu-Hausman test was carried out to address the potential endogeneity concern regarding the *Ln(Institutional Oversubscription)*. An insignificant value of the Durbin-Wu-Hausman test (*p*-value = 0.177) does not reject the null hypothesis that the *Ln(Institutional Oversubscription)* variable is exogenous with respect to *Ln(Retail Oversubscriptions)*.

In regard to the other variables in the column (1) specification, there are few changes, in terms of signs and significance, relative to the previous results. Hence, the conclusions based on these variables are unchanged.

As shown in column (2), I replicated my regression analysis using the natural logarithm of the number of retail investors in the current IPO's public tranche (*Ln(No. of Retail Investors)*) as dependent variable. However, after changing the way I defined the extent of retail investors' participation in the current IPO's public tranche, the estimated coefficient for *Auction Duration* becomes insignificant. Thus, it appears that, as the auction for institutional investors gets longer, information spillovers from the auction tranche will be precisely learned by retail investors rather than being widely known.

In summary, consistent with the prediction of Hypothesis 3c, the empirical results in this subsection demonstrate that the level of retail investors' oversubscriptions in the current IPO's public tranche increases with the duration of the current IPO's auction tranche, which provides additional evidence for the presence of information spillovers within the sealed-bid hybrid IPO auction mechanism. From the perspective of IPO-mechanism design, the empirical results also suggest that reducing the duration of the auction phase is a possible way to alleviate retail investors' cascading demand caused by information spillovers.

2.5.4 The effect of information spillovers on IPO price discovery

In the previous subsections, I have shown that information revealed in the announcements of contemporaneous hybrid IPO auction results spills over and affects investors' participation in the current IPO, and it affects institutional investors and retail investors in different ways. In this subsection, I will further analyse how this spillover information exerts an influence on the current IPO's price discovery. More specifically, given that Chinese underwriters (or auctioneers) have the discretion to set the offer price for the auctioned IPOs, it is worthwhile investigating whether the spillover information affects the offer price directly through underwriters' revisions (Benveniste et al., 2003) or if it is filtered through the current bids of institutional investors (Cornelli and Goldreich, 2003).

In addition, given that participation decisions made by Chinese retail investors are susceptible to behavioural biases, it is also of interest to investigate whether the hybrid IPO auction mechanism (with a separate public tranche) advocated by Jagannathan et al. (2015) and Schnitzlein et al. (2016) can effectively prevent retail participation from affecting IPO price discovery.

Table 2.10 presents the results of the cross-sectional OLS regressions that were used to analyse the impact of information spillovers from contemporaneous hybrid IPO auction results on the current IPO's price revision, as well as the relationship between the information produced by current investors and the current IPO's price revision. As shown in column (1), I examined the effect of contemporaneous information spillovers on the current IPO's price discovery by regressing the normalized IPO offer price (*Price Revision*) on a set of contemporaneous information-spillover measures, while simultaneously controlling for idiosyncratic uncertainty, and IPO year-, industry- and listing-venue-related fixed effects. As expected, the estimated coefficient for *Contem_ΔInstOversub* is positive and significant, which suggests that the offer price of the currently auctioned IPO will be adjusted higher when the oversubscription generated by contemporaneous large institutional investors is, on average, greater than that generated by contemporaneous small institutional investors. This result implies that information produced by institutional investors for contemporaneous IPO auctions, especially by large institutional investors, is important for setting the offer price for the current IPO. Hence, information spillovers from contemporaneous IPO auction results have a positive impact on the current IPO's price discovery, which is consistent with my Hypothesis 4a.

Because the adjusted *R*-squared value shown in the column (1) specification is based on a regression that includes variables other than information-spillover variables, it is not a direct estimate of the importance of the spillover measure of *Contem_ΔInstOversub* alone. By dropping all non-spillover variables, I obtained an adjusted *R*-squared of 25.3%, which shows the spillover information of *Contem_ΔInstOversub* makes a considerable contribution to the price discovery of the current IPO.

By contrast, as shown in column (1), the coefficient estimate of the spillover measure of *Contem_RetailOversub* is insignificant, which suggests that the information produced by contemporaneous retail investors, as reflected in their oversubscriptions to contemporaneous offerings, does not have an impact on the current IPO's price discovery. Thus, it appears that the oversubscription submitted by retail investors in contemporaneous IPO public tranches does not bring new information to the price setting of the current IPO. In other words, the information spillover from the results of contemporaneous IPOs' public tranches is not useful for estimating the value of the current offering.

With respect to the spillover-related control variables shown in column (1), consistent with the findings of Benveniste et al. (2003) and Zhang (2012), the results reveal that IPO firms' price revisions increase with an increase in the average one-day initial returns of their contemporaries (*Contem_IR*). This result suggests that the underpricing experience of contemporaneous offerings has been incorporated into the offer price of the current IPO. Moreover, the estimated coefficient for *Contem_MktRet* is positive, but not significant at conventional levels, which implies that the information regarding the contemporaneous secondary-market conditions has little influence on the price revision of the current IPO. This is consistent with the findings of Ljungqvist and Wilhelm (2002) at the country level.

Table 2.10: The effect of information spillovers on IPO price discovery

This table presents the results of cross-sectional OLS regressions that analyse the impact of information spillovers from contemporaneous hybrid IPO auction results on the current IPO's price revision, as well as the relationship between the information produced by current investors and the current IPO's price revision. The dependent variable used in column (1) to (10) regressions is the offer price normalized by the midpoint of the IPO firm's initial filing range (*Price Revision*). For the regressions conducted in the last two columns (11) and (12), the dependent variable (*Portion of Price Revision not Explained by the Information Production of Current Institutional Investors*) is the residuals obtained from the column (3) regression. In the column (2), (8), (10) and (12) regression specifications, the information-spillover measures are defined based on the contemporaneous offerings that are subject to a common valuation factor (i.e. they are in the same industry). Variable definitions are detailed in Subsection 2.4.3 and summarised in Appendix 1. An array of IPO year, industry, and market indicator variables are included but not reported. The White heteroscedasticity-consistent t-statistics are reported in parenthesis. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Price Revision (Offer price normalized by the midpoint of the initial filing range)										Portion of Price Revision not Explained by the Information Production of Current Institutional Investors	
	(1)	(2) Same Ind.	(3)	(4)	(5)	(6)	(7)	(8) Same Ind.	(9)	(10) Same Ind.	(11)	(12) Same Ind.
Information production by investors in current auction												
Ln(Institutional Oversub)			0.0243***			0.0288***			0.0174**	0.0118***		
			(2.83)			(3.18)			(2.08)	(2.58)		
Current_ΔInstOversub				0.0011***			0.0008***	0.0006**				
				(4.58)			(2.83)	(2.34)				
Ln(Retail Oversub)					0.0012	-0.0115			-0.0123	-0.0160		
					(0.17)	(-1.64)			(-1.61)	(-1.64)		
Contemporaneous info-spillover measures												
Contem_ΔInstOversub	0.0006*	0.0006*					0.0005	0.0004	0.0006	0.0006	0.0002	0.0002
	(1.81)	(1.78)					(1.34)	(1.20)	(1.59)	(1.63)	(0.97)	(0.95)
Contem_RetailOversub	-0.0000	-0.0000					-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(-1.24)	(-0.81)					(-1.03)	(-0.54)	(-0.97)	(-0.67)	(-0.96)	(-0.64)
Contem_IR	0.0364**	0.0279					0.0228	0.0154	0.0280	0.0219	0.0067	0.0086
	(2.09)	(1.29)					(1.22)	(0.69)	(1.61)	(1.05)	(0.54)	(0.59)
Contem_MktRet	1.0292	2.0710					0.7496	1.9734	1.0444	2.2684	0.9388	1.9655
	(0.72)	(1.19)					(0.51)	(1.12)	(0.69)	(1.21)	(0.71)	(1.25)

Firm- and offer-specific characteristics												
Ln(Proceeds)	-0.0445***	-0.0403***	-0.0433***	-0.0400***	-0.0476***	-0.0484***	-0.0408***	-0.0401***	-0.0480***	-0.0473***		
	(-3.24)	(-4.49)	(-3.39)	(-3.23)	(-3.37)	(-3.63)	(-3.04)	(-4.38)	(-3.66)	(-4.55)		
Ln(Firm Age)	-0.0001	-0.0014	-0.0004	0.0010	0.0005	-0.0001	-0.0000	-0.0010	-0.0003	-0.0004		
	(-0.02)	(-0.19)	(-0.07)	(0.16)	(0.07)	(-0.02)	(-0.01)	(-0.14)	(-0.04)	(-0.06)		
EPS [-3yr, IPO]	0.0287*	0.0468***	0.0307*	0.0251	0.0220	0.0267	0.0307**	0.0514***	0.0291*	0.0441***		
	(1.90)	(3.07)	(1.88)	(1.64)	(1.39)	(1.63)	(2.02)	(3.33)	(1.81)	(2.77)		
Leverage [-3yr, IPO]	-0.0276	0.0023	-0.0140	-0.0203	-0.0293	-0.0135	-0.0203	0.0058	-0.0196	0.0101		
	(-0.83)	(0.06)	(-0.41)	(-0.60)	(-0.86)	(-0.39)	(-0.61)	(0.16)	(-0.60)	(0.28)		
Reputation	0.0026**	0.0031**	0.0030**	0.0022*	0.0029**	0.0031**	0.0023*	0.0028**	0.0029**	0.0033**		
	(1.97)	(2.13)	(2.21)	(1.68)	(2.08)	(2.28)	(1.78)	(2.00)	(2.18)	(2.29)		
Non-tradable	-0.0234	-0.0293	-0.0436	-0.0351	-0.0408	-0.0422	-0.0248	-0.0417	-0.0270	-0.0377		
	(-0.58)	(-0.64)	(-1.21)	(-0.95)	(-1.15)	(-1.16)	(-0.60)	(-0.89)	(-0.64)	(-0.79)		
Largest Ownership	0.0152	0.0418	0.0293	0.0277	0.0328	0.0293	0.0177	0.0437	0.0170	0.0410		
	(0.48)	(1.24)	(0.86)	(0.88)	(0.92)	(0.86)	(0.57)	(1.30)	(0.54)	(1.21)		
D_High-tech	0.0046	0.0048	0.0070	0.0075	0.0077	0.0075	0.0050	0.0047	0.0049	0.0050		
	(0.47)	(0.49)	(0.70)	(0.77)	(0.77)	(0.75)	(0.51)	(0.48)	(0.50)	(0.50)		
D_Real Estate	-0.0507	0.0149	-0.0484*	-0.0452	-0.0448*	-0.0514*	-0.0501	0.0060	-0.0543*	0.0112		
	(-1.62)	(1.13)	(-1.79)	(-1.33)	(-1.81)	(-1.86)	(-1.45)	(0.43)	(-1.68)	(0.70)		
D_Finance	0.0234	0.0962	0.0312	0.0446	0.0349	0.0339	0.0359	0.1403	0.0265	0.1086		
	(0.64)	(1.02)	(0.90)	(1.37)	(0.99)	(0.98)	(0.99)	(1.51)	(0.75)	(1.18)		
D_SOE	0.0326	0.0267	0.0467**	0.0381	0.0441*	0.0501**	0.0297	0.0319	0.0393	0.0370		
	(1.28)	(0.90)	(1.99)	(1.56)	(1.91)	(2.11)	(1.13)	(1.05)	(1.51)	(1.22)		
D_Big4	-0.0390	-0.0571**	-0.0296	-0.0322	-0.0253	-0.0276	-0.0370	-0.0545*	-0.0364	-0.0561**		
	(-1.48)	(-1.98)	(-1.13)	(-1.24)	(-0.94)	(-1.06)	(-1.33)	(-1.82)	(-1.38)	(-1.98)		
D_Cross-listing	0.0615	0.0094	0.1073**	0.1041**	0.0933*	0.1060**	0.0789	0.0110	0.0699	0.0069		
	(1.33)	(0.24)	(2.08)	(2.23)	(1.79)	(2.05)	(1.64)	(0.26)	(1.41)	(0.17)		
Constant	0.8464***	0.7447***	0.7430***	0.7390***	0.9368***	0.8915***	0.7513***	0.7254***	0.9123***	0.9160***	-0.0079	-0.0090
	(3.22)	(4.35)	(3.19)	(3.05)	(3.42)	(3.50)	(2.93)	(4.16)	(3.68)	(4.10)	(-1.40)	(-1.47)
Year Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included		
Industry Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included		
Market Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included		
Adjusted R-squared	0.366	0.419	0.363	0.391	0.350	0.364	0.383	0.427	0.367	0.420	0.001	0.007
Observations	802	603	832	832	832	832	802	603	802	603	802	603

As a robustness check, as shown in column (2), I replicated the regression analysis using information-spillover measures from contemporaneous offerings that are subject to a common valuation factor (i.e. they are in the same industry). My results are robust with respect to this alternative definition of contemporaries, except for the fact that the underpricing experience of contemporaneous offerings (*Contem_IR*) ceases to be significant.[58] This is probably because the spillover of contemporaneous institutional bidding information is more valuable for the current IPO's price discovery than the spillover of contemporaneous underpricing information, when it is considered that contemporaneous IPOs are subject to a common valuation factor.

Before moving on to investigate whether the information spillover from contemporaneous IPO auction results affects the price revision directly or if it is incorporated into the offer price through the current bids of institutional investors, it was necessary to figure out how the information produced by investors in the current hybrid IPO auction is used by the underwriter for setting the offer price. As shown in column (3) of Table 2.10, I examined the impact of information produced by institutional investors in the current IPO's auction tranche on the price discovery, by regressing the normalized IPO offer price (*Price Revision*) on the oversubscription of institutional investors (*Ln(Institutional Oversubscription)*) and a set of control variables. For this model specification, the estimated coefficient for *Ln(Institutional Oversubscription)* is positive and significant at the 1% level, which suggests that underwriters will adjust the offer price higher if institutional investors reveal a stronger demand for the currently auctioned IPO via their bids. This demonstrates that the auction tranche performs the role of information extraction in the hybrid IPO selling mechanism, in which underwriters revise the offer price according to the information produced by institutional investors in the current IPO's auction tranche.

[58] Like Benveniste et al. (2003) and Zhang (2012), I further extended the definition of the time window of the *Contem_IR* spillover measure to 30 days prior to the end date of the IPO auction, but its coefficient remains insignificant. It is of note that extending the time window for defining contemporaries means that IPO firms/underwriters are assumed to start learning from contemporaneous information spillovers before the IPO's filling date.

Since Chemmanur et al. (2017) find that underwriters in China's hybrid IPO auctions rely more on the information contained in the oversubscription of large institutional investors than those of small institutional investors when determining the offer price, I further distinguished the oversubscription generated by large and small institutional investors to allow for the possibility that underwriters screen the information produced by these two types of investors. Thus, as shown in column (4), I replicated the preceding regression analysis using the *Current_ΔInstOversub* to account for the different information precision produced by large and small institutional investors. For this specification, the coefficient of *Current_ΔInstOversub* is positive and significant at the 1% level, which suggests that underwriters will adjust the offer price even higher if large institutional investors reveal a stronger demand than small institutional investors in the current IPO's auction tranche. More importantly, the adjusted *R*-squared value given by this regression specification has been increased by approximately 3% relative to the one given by the column (3) regression specification. This indicates that the *Current_ΔInstOversub*, as a measure of the information production by institutional investors in the current IPO auction, contributes more to explaining the variation of the IPO price revision. If all control variables are dropped from the column (4) regression, the *Current_ΔInstOversub* alone can explain 32.3% of the cross-sectional variation in the sample of IPO price revisions. Collectively, the results shown in columns (3) and (4) lend support to my Hypothesis 4b.

Furthermore, as indicated in column (5), I examined whether the information produced by retail investors in the current IPO's public tranche has an impact on the price discovery, by regressing the normalized IPO offer price (*Price Revision*) on the oversubscription of retail investors (*Ln(Retail oversubscription)*) and a set of control variables. As shown in column (5), the estimated coefficient of *Ln(Retail Oversubscription)* is not significant at conventional levels, which implies that underwriters do not incorporate the information produced by retail investors (i.e. the information regarding their aggregate demand) into the offer price when retail investors are separated from the IPO auction tranche. This is in sharp contrast to the auction-like mechanisms used in other countries, which allow retail investors to participate in the IPO auction tranche (e.g. Derrien [2005], for French

IPO auctions; Neupane and Poshakwale [2012], for Indian IPO auctions; Jagannathan et al. [2015], for Singapore IPO auctions), in which unsophisticated retail investors' demand has a pronounced influence on the offer-price setting. Therefore, although Chinese retail investors are susceptible to return-chasing behaviour, and are also driven by the collective mood and market sentiment that prevailed at the time of the offering phase, adding a separate public tranche within the hybrid IPO selling mechanism prevents the participation of these retail investors from disrupting the price-discovery process.

In the regression given in column (6), the measures of information produced by both types of investor in current hybrid IPO auctions were introduced simultaneously along with the control variables. The estimated coefficient for *Ln(Institutional Oversubscription)* remains positive and significant at the 1% level, which indicates that the information produced by institutional investors in the current IPO's auction tranche affects the price setting of the current offering. As shown by the insignificant coefficient of *Ln(Retail Oversubscription)*, the information produced by retail investors in the current IPO's public tranche still have little influence on the offer-price setting.[59] Therefore, consistent with the prediction of Jagannathan et al. (2015) and Schnitzlein et al. (2016), conducting a hybrid IPO auction with a separate public tranche can improve the auction's performance by wiping out the impact of unsophisticated investors' participation on the price-setting process, and facilitating sophisticated investors to produce information for the price discovery.

Next, as shown in columns (7) to (12) of Table 2.10, I went back to address the issue of whether the information spillover from contemporaneous IPO auction results affects the price revision directly or if it is incorporated into the offer price through the current bids of institutional investors. Specifically, as revealed in column (7), I introduced measures of the information produced by both current and contemporaneous institutional investors into the regression, along with the other variables, where the dependent variable still uses

[59] For the final results, exogeneity tests were carried out on *Ln(Institutional Oversubscription)* and *Ln(Retail Oversubscription)*. The Durbin-Wu-Hausman tests do not reject the null hypothesis of exogeneity of each variable with respect to the *Price Revision*. Consequently, the OLS results are statistically acceptable.

the normalized IPO offer price (*Price Revision*). For this specification, the coefficient of the information-production measure of the current institutional investors (*Current_ΔInstOversub*) remains positive and significant at the 1% level, but the coefficient of the information-spillover measure of contemporaneous institutional investors (*Contem_ΔInstOversub*) becomes insignificant. This suggests that the effect of the information spillover of *Contem_ΔInstOversub* on the price revision is absorbed by the exposure of *Contem_ΔInstOversub* to the bidding information of current institutional investors (*Current_ΔInstOversub*). Thus, the underwriters use the information spillover from contemporaneous IPO auction results only to the extent that it is conveyed through the reaction of the current institutional investors. This conclusion is broadly consistent with the findings of Cornelli and Goldreich (2003), who document that the underwriters incorporate the information spillover from monthly IPO activities into the offer price only after observing the reaction of institutional investors in the current book-building process to such information.

As a robustness check, in column (8), I replicated the preceding regression analysis by accounting for contemporaneous offerings subject to a common valuation factor (i.e. they are in the same industry). Evidently, the estimated coefficient for the information-spillover measure of *Contem_ΔInstOversub* remains insignificant after introducing the information-production measure of *Current_ΔInstOversub* into the regression, and the information produced by institutional investors in the current IPO's auction tranche still has a positive and significant impact on the price revision. Thus, my results are robust with respect to the alternative definition of contemporaries.

Moreover, as indicated in columns (9) and (10), I re-examined whether the information spillover from contemporaneous IPO auction results is incorporated into the offer price through the reaction of institutional investors in the current IPO's auction, by using the overall level of institutional oversubscriptions (*Ln(Institutional Oversubscription)*) as a measure for the information production in the current auction.[60] In either case (i.e.

[60] The Durbin-Wu-Hausman tests were carried out to address the potential endogeneity concerns regarding the *Ln(Institutional Oversubscription)* and *Ln(Retail Oversubscription)*. The

contemporaries are in the same industry or not), the estimated coefficient for the information-spillover measure of *Contem_ΔInstOversub* remains insignificant when including the information-production measure of (*Ln(Institutional Oversubscription)*) in the regression model, and the estimated coefficient for the information produced by current institutional investors (*Ln(Institutional Oversubscription)*) is still positive and significant. It appears that the information-spillover effect of *Contem_ΔInstOversub* on the price revision is also absorbed by the exposure of *Contem_ΔInstOversub* to the current institutional bidding information of *Ln(Institutional Oversubscription)*. Therefore, my conclusion remains unchanged.

Following Cornelli and Goldreich's (2003) approach, I further checked the robustness of my conclusion, the results of which are presented in column (11). Specifically, I first obtained the residuals from the column (3) regression, which are the components of the IPO price revision that are not due to the information conveyed through the current bids of institutional investors. If information spillovers from contemporaneous IPO auction results are incorporated directly into the offer price by underwriters, then I would expect to see a statistically significant relationship between these residuals and the information-spillover measures. However, as shown in column (11), by regressing these residuals on the contemporaneous information-spillover measures, the results identify that none of the coefficient estimates of the spillover measures are significant at conventional levels.[61] This confirms my conclusion that the spillover information affects the IPO price revision only as it is filtered through the current bids of institutional investors.

Again, as shown in column (12), I replicated the preceding analysis using the information spillovers from contemporaneous offerings that are subject to a common valuation factor. Likewise, I used the residuals from the column (3) regression as the dependent variable to capture the portion of the price revision that is not explained by the bidding information

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insignificant values of the Durbin-Wu-Hausman tests (*p*-value = 0.367 and -0.366) do not reject the null hypothesis that the measures of institutional and retail participation are exogenous with respect to the *Price Revision*.

[61] Using the residuals from either the column (4) or (6) regression as dependent variable led to identical results.

of current institutional investors. The results show that there is no statistically significant relationship between these residuals and the contemporaneous information-spillover measures. Thus, my conclusion is not driven by the alternative definition of contemporaries.

Regarding the firm- and offer-specific variables in Table 2.10, the results reveal that the coefficient of *Ln(Proceeds)* is consistently negative and significant in all regressions, which indicates that IPO firms that file larger amounts in the preliminary prospectus have smaller subsequent price revisions. This evidence is in agreement with the findings of Benveniste et al. (2003), Lowry and Schwert (2004), and Jia et al. (2016), who identify that larger offerings are less risky and have fewer price updates. Moreover, the positive and significant coefficient estimated for the *Reputation* measure indicates that more prestigious underwriters are associated with greater positive revisions in the offer price. This is consistent with the findings of Benveniste et al. (2003), Cook et al. (2006), and Loughran and McDonald (2013) for the US IPO market, and Jia et al. (2016) for China's IPO market. In addition, the coefficient of *EPS* is positive and significant in most regressions, which suggests that firms with higher pre-IPO EPSs have greater subsequent price revisions. This is consistent with the evidence of Willenborg et al. (2015), who show that pre-IPO operating performance (i.e. net income) is positively associated with the price revision.

To summarize this subsection, although the results demonstrate that the information revealed in the announcements of contemporaneous IPO auction results (i.e. the information produced by contemporaneous institutional investors) spills over and affects the price-setting process in the current IPO auction, it arrives through the current bids of institutional investors and not directly via underwriters. According to Cornelli and Goldreich (2003), a possible interpretation of this empirical finding is that underwriters must see the reaction of the current institutional bidders to the spillover information in order to assess its significance. Furthermore, in agreement with the suggestion of Jagannathan et al. (2015) and Schnitzlein et al. (2016) regarding the design approach for the optimal IPO auction mechanism, I concur that the hybrid IPO auction structure, which is created by adding a separate public tranche, can efficiently prevent the participation of unsophisticated retail investors from disrupting the price-setting process and facilitate the information production of institutional investors.

2.5.5 Robustness tests for potential endogeneity concerns using two-stage least squares regressions (2SLS)

Although the results of the Durbin-Wu-Hausman tests indicate that the measures of institutional participation are exogenous with respect to the measures of retail participation used in the regression analyses that are described in Subsection 2.5.3 (i.e. Table 2.8) and Subsection 2.5.3.1 (i.e. Table 2.9), and the measures of investor participation are exogenous with respect to IPO price revision in the regression analyses that are described in Subsection 2.5.4 (i.e. Table 2.10), I also used the instrumental-variable approach with two-stage least squares regressions (2SLS) to address the potential endogeneity concerns and confirm the validity of my conclusions.

The geographic proximity, namely the place where the investors are located close to or proximate to the firm's headquarters, is commonly used in the empirical studies as an exogenous instrument to address any potential residual endogeneity (e.g. Gasper and Massa, 2007; Ayers et al., 2011). There are two reasons for the close connection between the geographic proximity and investor participation in a firm's IPO. First, there is one stream of literature that focuses on geographic proximity and information advantage (e.g. Pirinsky and Wang, 2010; Baik et al., 2010; Anand et al., 2011; O'Brien and Tan, 2015), in which the researchers argue that local investors (i.e. those in the same city as the firm) have more information advantages and face lower information costs than non-local investors when estimating the value of the firm. Since the participation of institutional investors in an IPO depends on the cost of information production (Sherman, 2005), it could be argued that an institutional investor located in the same city as the IPO firm is more likely to engage in this firm's IPO. Second, there is another stream of literature that focuses on geographic proximity and information sharing among investors (e.g. Hong et al., 2005; Pool et al., 2015), in which the researchers show that mutual fund managers are more likely to make similar investment decisions if they are located in the same city and/or reside in the same neighbourhood. Hence, the more institutional investors that are gathered in the same city as the IPO firm, the more they are expected to enter this firm's IPO. Collectively, it could be argued that there should be a significant positive relationship between the number of geographically proximate institutions in an IPO and the institutional participation. Therefore, I constructed an instrumental variable, *IV* (geographic proximity), for institutional participation by measuring the number of institutional investors that are located in the same city as the IPO firm.[62]

Panel A in Table 2.11 presents the results of the 2SLS regressions that were used to address the potential endogeneity concerns for the measures of institutional participation in the regression analyses in Subsection 2.5.3 (i.e. Table 2.8) and Subsection 2.5.3.1 (i.e. Table 2.9). Specifically, in the first-stage regression, I estimated the institutional participation using either *Ln(No. of Institutional Bidders)* or *Ln(Institutional Oversubscription)* as a dependent variable, and introduced the *IV* into the regression, along with control variables as other independent variables. Then, in the second-stage regression, I examined how the predicted value of the institutional participation obtained from the first-stage regression influences the participation of retail investors.

[62] I collected the address information of the institutional investors (the financial company, trust company, insurance company, etc.) from the National Enterprise Credit Information Publicity System, and obtained the address information of IPO firms from the SSE and SZSE. Since some institutional investors have changed their company address many times, I tracked these changes to ensure that the address information of the institutional investors used for matching is in the same time period as the firms' IPO.

Table 2.11: Two-stage least squares regressions

This table presents the results of two-stage least squares regressions (2SLS) that were used to address the potential endogeneity concerns for the investor-participation measures in previous regression analyses. Panel A reports the results of 2SLS that were used to address the potential endogeneity concerns for the measures of institutional participation in the regression analyses in Subsection 2.5.3 (i.e. Table 2.8) and Subsection 2.5.3.1 (i.e. Table 2.9). Panel B reports the results of 2SLS that were used to address the potential endogeneity concerns for the measures of both institutional and retail participation in the regression analyses in Subsection 2.5.4 (i.e. Table 2.10). IV [geographic proximity] is an instrumental variable for the measures of institutional participation (i.e. either Ln(No. of Institutional Bidders) or Ln(Institutional Oversubscription)), which refers to the number of institutional investors that are located in the same city as the IPO firm. The measure of retail participation (i.e. Ln(Retail Oversubscription)) is instrumented using the predicted values from the regression model in the column (1) of Table 2.9. $\text{Ln}(\widehat{\text{No. of Institutional Bidders}})$, $\text{Ln}(\widehat{\text{Institutional Oversubscription}})$ and $\text{Ln}(\widehat{\text{Retail Oversubscription}})$ are the predicted values from the first-stage regressions, and are included in the second-stage regressions as the independent variables to replace the original measures of investor participation. Variable definitions are detailed in Subsection 2.4.3 and summarised in Appendix 1. An array of IPO year, industry, and market indicator variables are included but not reported. p-values, based on White heteroscedasticity-consistent standard errors, are reported in parenthesis. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Addressing the potential endogeneity concerns for the measures of institutional participation in the regression analysis of retail participation

	(1)		(2)		(3)		(4)	
	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
	Ln(#Inst.Bidders)	Ln(#Retails)	Ln(Inst.Oversub)	Ln(#Retails)	Ln(Inst.Oversub)	Ln(Ret.Oversub)	Ln(Inst.Oversub)	Ln(#Retails)
Information spillovers from current IPO's auction tranche (Endogenous variables)								
$\text{Ln}(\widehat{\text{No. of Institutional Bidders}})$		0.2502***						
		(0.000)						
$\text{Ln}(\widehat{\text{Institutional Oversubscription}})$				0.2180***		0.4853***		0.2115***
				(0.000)		(0.000)		(0.000)
IV [geographic proximity]	0.0130***		0.0149***		0.0153***		0.0151***	
	(0.000)		(0.000)		(0.000)		(0.000)	
Duration of the current IPO's auction tranche								
Auction Duration					-0.1944***	0.1594**	-0.1508***	0.0690
					(0.003)	(0.014)	(0.006)	(0.224)
Information spillovers via short-term interbank interest rates								
Avg. Repo Rate [auction start, end date]	-5.9641***	-4.9488***	-8.6282***	-4.5602**	-8.4544***	-3.5494*	-8.7342***	-4.5679**
	(0.000)	(0.009)	(0.000)	(0.018)	(0.000)	(0.071)	(0.000)	(0.018)
Contemporaneous information-spillover measures								
Contem_ΔInstBidders	0.0019***	0.0015	0.0018***	0.0016	0.0020***	-0.0008	0.0019***	0.0016
	(0.004)	(0.327)	(0.007)	(0.313)	(0.006)	(0.484)	(0.006)	(0.320)
Contem_RetailOversub	-0.0000	0.0001***	-0.0000	0.0002***	-0.0000	0.0001*	-0.0000	0.0002***
	(0.614)	(0.001)	(0.526)	(0.001)	(0.509)	(0.075)	(0.561)	(0.001)
Contem_IR	0.0496*	0.2415***	0.0435	0.2444***	0.0365	0.1588***	0.0400	0.2462***
	(0.059)	(0.000)	(0.190)	(0.000)	(0.269)	(0.000)	(0.225)	(0.000)

Contem_MktRet	2.0101	5.7662**	-1.2745	6.5470***	-1.2119	5.3711**	-1.6109	6.6926***
	(0.256)	(0.011)	(0.579)	(0.004)	(0.601)	(0.026)	(0.482)	(0.003)
Firm- and offer-specific characteristics								
Ln(Proceeds)	0.2425***	-0.1189***	-0.0336	-0.0510	-0.0417	-0.4544***	-0.0404	-0.0481
	(0.000)	(0.000)	(0.418)	(0.146)	(0.322)	(0.000)	(0.334)	(0.176)
Ln(Firm Age)	-0.0021	0.0590*	0.0501	0.0476	0.0530	0.0574*	0.0472	0.0493
	(0.939)	(0.054)	(0.154)	(0.119)	(0.135)	(0.078)	(0.179)	(0.108)
EPS [-3yr, IPO]	-0.2360***	-0.6844***	-0.2714***	-0.6842***	-0.2633***	-0.2933***	-0.2676***	-0.6877***
	(0.001)	(0.000)	(0.003)	(0.000)	(0.004)	(0.001)	(0.003)	(0.000)
Leverage [-3yr, IPO]	-0.3660***	0.2785**	-0.3738**	0.2684**	-0.3887**	0.2063	-0.3622**	0.2607*
	(0.001)	(0.041)	(0.014)	(0.048)	(0.012)	(0.156)	(0.018)	(0.055)
Reputation	0.0020	-0.0002	-0.0063	0.0017	-0.0073	0.0061	-0.0064	0.0017
	(0.721)	(0.977)	(0.339)	(0.791)	(0.276)	(0.368)	(0.332)	(0.790)
Non-tradable	0.0915	0.3881***	0.1367	0.3812***	0.1304	0.1401	0.1320	0.3843***
	(0.557)	(0.006)	(0.488)	(0.008)	(0.511)	(0.335)	(0.504)	(0.008)
Largest Ownership	-0.0085	0.1383	-0.0723	0.1519	-0.0578	0.1354	-0.0687	0.1498
	(0.936)	(0.251)	(0.597)	(0.208)	(0.674)	(0.273)	(0.614)	(0.215)
D_High-tech	0.0061	0.0467	0.0554	0.0361	0.0503	0.0269	0.0545	0.0369
	(0.861)	(0.259)	(0.206)	(0.386)	(0.253)	(0.552)	(0.214)	(0.375)
D_Real Estate	-0.0177	0.0479	0.1426	0.0123	0.1821	-0.1398	0.1598	0.0054
	(0.869)	(0.742)	(0.291)	(0.936)	(0.230)	(0.443)	(0.258)	(0.973)
D_Finance	0.4177**	0.4818***	0.0865	0.5674***	0.1613	0.1895	0.1183	0.5534***
	(0.012)	(0.001)	(0.758)	(0.000)	(0.567)	(0.119)	(0.674)	(0.000)
D_SOE	-0.0306	0.0556	-0.1199	0.0741	-0.1038	0.1586*	-0.1119	0.0697
	(0.718)	(0.513)	(0.261)	(0.389)	(0.338)	(0.075)	(0.298)	(0.420)
D_Big4	0.0953	0.2151**	0.0455	0.2290**	0.0060	0.1172	0.0328	0.2352**
	(0.471)	(0.049)	(0.818)	(0.026)	(0.976)	(0.296)	(0.868)	(0.023)
D_Cross-listing	-0.0602	0.4102***	-0.1018	0.4173***	-0.2099	0.1118	-0.1211	0.4255***
	(0.700)	(0.005)	(0.687)	(0.004)	(0.400)	(0.454)	(0.628)	(0.004)
Constant	-0.5530	13.5038***	4.7414***	12.3318***	5.3250***	11.9989***	5.2453***	12.1321***
	(0.359)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year Indicators	Included	Included	Included	Included	Included	Included	Included	Included
Industry Indicators	Included	Included	Included	Included	Included	Included	Included	Included
Market Indicators	Included	Included	Included	Included	Included	Included	Included	Included
Adjusted R-squared	0.796	0.594	0.785	0.595	0.781	0.751	0.786	0.595
Observations	1,027	1,027	1,027	1,027	1,029	1,029	1,027	1,027

Panel B: Addressing the potential endogeneity concerns for the measures of institutional and retail participation in the regression analysis of IPO price revision

	Price Revision (Offer price normalized by the midpoint of the initial filing range)							Portion of Price Revision not Explained by the Information Production of Current Institutional Investors	
	(1) OLS	(2) OLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) 2SLS	(8) OLS	(9) OLS
		Same Ind.					Same Ind.		Same Ind.
Information production by investors in current IPO auction (Endogenous variables)									
Ln(Institutional $\widehat{\text{Oversubscription}}$)			0.0859***		0.1063**	0.1078**	0.0913*		
			(0.000)		(0.017)	(0.039)	(0.093)		
Ln(Retail $\widehat{\text{Oversubscription}}$)				0.0296	-0.0577	-0.0621	-0.0815		
				(0.311)	(0.330)	(0.414)	(0.352)		
Contemporaneous information-spillover measures									
Contem_ΔInstOversub	0.0006*	0.0006*				0.0001	0.0003	0.0001	0.0002
	(0.071)	(0.076)				(0.921)	(0.568)	(0.601)	(0.452)
Contem_RetailOversub	-0.0000	-0.0000				-0.0000	-0.0000	-0.0000	-0.0000
	(0.217)	(0.416)				(0.456)	(0.447)	(0.557)	(0.734)
Contem_IR	0.0364**	0.0279				0.0087	0.0168	0.0026	0.0016
	(0.037)	(0.198)				(0.729)	(0.581)	(0.842)	(0.919)
Contem_MktRet	1.0292	2.0710				0.8449	2.5974	0.4581	1.2539
	(0.471)	(0.235)				(0.686)	(0.356)	(0.742)	(0.446)
Firm- and offer-specific characteristics									
Ln(Proceeds)	-0.0445***	-0.0403***	-0.0309***	-0.0265	-0.0570**	-0.0586*	-0.0688*		
	(0.001)	(0.000)	(0.009)	(0.178)	(0.050)	(0.094)	(0.090)		
Ln(Firm Age)	-0.0001	-0.0014	-0.0028	0.0003	-0.0004	0.0003	0.0028		
	(0.985)	(0.852)	(0.693)	(0.971)	(0.955)	(0.972)	(0.761)		
EPS [-3yr, IPO]	0.0287*	0.0468***	0.0539***	0.0452**	0.0439*	0.0416	0.0405		
	(0.058)	(0.002)	(0.004)	(0.037)	(0.077)	(0.158)	(0.195)		
Leverage [-3yr, IPO]	-0.0276	0.0023	0.0253	-0.0260	0.0288	0.0306	0.0638		
	(0.405)	(0.950)	(0.500)	(0.468)	(0.487)	(0.460)	(0.177)		
Reputation	0.0026**	0.0031**	0.0032**	0.0019	0.0029*	0.0030*	0.0033*		
	(0.049)	(0.033)	(0.019)	(0.161)	(0.058)	(0.061)	(0.064)		
Non-tradable	-0.0234	-0.0293	-0.0511	-0.0332	-0.0340	-0.0396	-0.0764		
	(0.564)	(0.524)	(0.196)	(0.379)	(0.462)	(0.442)	(0.192)		

Largest Ownership	0.0152	0.0418	0.0202	0.0186	0.0278	0.0249	0.0411		
	(0.629)	(0.216)	(0.544)	(0.560)	(0.433)	(0.488)	(0.290)		
D_High-tech	0.0046	0.0048	0.0051	0.0054	0.0046	0.0037	0.0018		
	(0.637)	(0.624)	(0.625)	(0.596)	(0.673)	(0.740)	(0.867)		
D_Real Estate	-0.0507	0.0149	-0.0566	-0.0341	-0.0677	-0.0746	-0.0565		
	(0.106)	(0.260)	(0.135)	(0.197)	(0.119)	(0.114)	(0.201)		
D_Finance	0.0234	0.0962	0.0209	0.0216	0.0385	0.0289	0.1115		
	(0.526)	(0.306)	(0.586)	(0.546)	(0.343)	(0.467)	(0.254)		
D_SOE	0.0326	0.0267	0.0525**	0.0255	0.0555	0.0610	0.0736		
	(0.201)	(0.368)	(0.036)	(0.321)	(0.114)	(0.104)	(0.123)		
D_Big4	-0.0390	-0.0571**	-0.0413	-0.0341	-0.0322	-0.0321	-0.0689**		
	(0.140)	(0.048)	(0.146)	(0.230)	(0.364)	(0.385)	(0.048)		
D_Cross-listing	0.0615	0.0094	0.1438***	0.0732	0.1347**	0.1324**	0.0292		
	(0.185)	(0.813)	(0.004)	(0.141)	(0.037)	(0.037)	(0.572)		
Constant	0.8464***	0.7447***	0.2044	0.3656	0.9666	1.0166	1.3467	-0.0028	-0.0040
	(0.001)	(0.000)	(0.414)	(0.491)	(0.180)	(0.259)	(0.196)	(0.663)	(0.566)
Year Indicators	Included	Included	Included	Included	Included	Included	Included		
Industry Indicators	Included	Included	Included	Included	Included	Included	Included		
Market Indicators	Included	Included	Included	Included	Included	Included	Included		
Adjusted R-squared	0.366	0.419	0.281	0.320	0.201	0.192	0.224	0.004	0.003
Observations	802	603	832	776	776	771	582	802	603

As detailed in columns (1) to (4) of Panel A, the first-stage regression results show that the instrumental variable for the geographic proximity of institutional investors has a significant and positive relationship with the measures of institutional participation,[63] which implies that institutional investors are inclined to engage in their local IPOs. More importantly, the second-stage regression results show that the predicted values for institutional participation have a significant and positive effect on the participation of retail investors in the current IPO's public tranche, even after I account for the potential endogeneity concerns using the instrumental-variable approach. This is consistent with my previous results, which suggests that the information generated by institutional investors when participating in the current sealed-bid IPO auction has a spillover effect on the retail participation in the current IPO's public tranche. With respect to the estimated coefficients for the other explanatory variables of interest, my results are also little changed in terms of signs and significance.

Panel B of Table 2.11 presents the results of the 2SLS regressions that were used to address the potential endogeneity concerns for the measures of both institutional and retail participation in the regression analyses detailed in Subsection 2.5.4 (i.e. Table 2.10). To address the endogeneity concern of the measure of institutional participation (*Ln(Institutional Oversubscription)*), I continued to use the preceding instrumental-variable approach with the IV (geographic proximity) to obtain the predicted values for $Ln(\widehat{Institutional\ Oversubscription})$ from the first-stage regression. Since I did not have investor-specific information for the retail investors, it was difficult to construct a similar instrumental variable for the measure of retail participation (*Ln(Retail Oversubscription)*). As an alternative, I instrumented the measure of retail participation using the predicted values from the regression model in column (1) of Table 2.9 (denoted as $Ln(\widehat{Retial\ Oversubscription})$).

[63] Given that a good instrumental variable should be not only strongly correlated with the instrumented regressor but also orthogonal with the residuals, I further examined the correlations between the *IV* and the residuals obtained from the regressions of interest (i.e. the regressions in columns [3] and [4] in Table 2.8, and the regressions in columns [1] and [2] in Table 2.9). The insignificant correlation coefficients of -0.0143, -0.0073, 0.0482 and -0.0095 indicate that the *IV* has little association with the residuals obtained from the regressions of interest.

As shown in columns (3) to (5) of Panel B, without considering the effect of information spillovers from contemporaries, I first examined how the predicted values for the current institutional and retail participation influence the price revision of the current IPO. Consistent with my previous results, the estimated coefficients for $Ln(\widehat{Institutional\ Oversubscription})$ are significant and positive, and the estimated coefficients for $Ln(\widehat{Retial\ Oversubscription})$ are insignificant. These results suggest that the demand information produced by institutional investors in the current IPO's auction tranche contributes to the price discovery of the current IPO, while the demand information generated by retail investors in the current IPO's public tranche is not incorporated into the offer price by the underwriters.

Next, as indicated in columns (6) and (7), when I further introduced the contemporaneous information-spillover measures (which were examined in columns [1] and [2]) into the regression, although the estimated coefficients for $Ln(\widehat{Institutional\ Oversubscription})$ remained significant and positive, the estimated coefficients for the spillover measure of *Contem_ΔInstOversub* became insignificant. This is consistent with my previous findings, which implies that the underwriters do not incorporate the information spillover from contemporaries into the offer price directly; instead, they appear to incorporate such spillover information into the offer price only as a result of it being conveyed through the current bids of institutional investors. As a robustness check, I obtained the residuals from the second-stage regression in column (3), which are the components of the IPO price revision that are not due to the information conveyed through the current bids of institutional investors. By regressing these residuals on the contemporaneous information-spillover measures, I found that none of the estimated coefficients for the spillover measures are significant. This confirms my conclusion that, although the information spillover from contemporaneous institutional investors affects the price revision of the current IPO, it arrives through the current bids of institutional investors rather than through the underwriters' direct adjustment.

In summary, by using an instrumental-variable approach, the results of the 2SLS regressions reported in this subsection confirm that my previous results are robust after accounting for the potential endogeneity issues.

2.6 Conclusions

In this chapter, I have analysed the effect of information spillovers on investor participation and IPO price discovery in the context of China's hybrid IPO auctions. As an auction-like mechanism, one of the most pronounced features of the hybrid approach in China is announcing part of bidding results after the close of the offering, which is quite different from the practice of the book-building mechanism. Hence, by using the investors' bidding information collected manually from the announcements of hybrid IPO auction results, I first investigated how the information produced by investors in contemporaneous IPOs exerts an influence on the investor participation and pricing decision of the current IPO. In addition, given that the sealed-bid hybrid IPO mechanism used in China specifically separates unsophisticated retail investors from sophisticated institutional investors through two isolated offering tranches, I next analysed whether it is possible for the information generated by sophisticated institutional investors in the current IPO's auction tranche to spill over and affect the unsophisticated retail investors who engage in the current IPO's public tranche. Moreover, from a mechanism-design perspective, I also empirical examined the effectiveness of adding a separate public tranche in preventing unsophisticated retail investors from disrupting the price-setting process.

2.6.1 Summary of the main findings

First, I found that the information produced by institutional investors in contemporaneous IPO auctions has a positive spillover effect on the participation (or entry) of institutional investors in the current IPO auction. In particular, this information-spillover effect is stronger among IPOs that share a common valuation factor (i.e. they are in the same industry), which, to some extent, is consistent with the prediction of Benveniste et al.'s (2002) and Alti's (2005) information-spillover models. By contrast, the information generated by retail investors in contemporaneous IPO public tranches does not have a significant influence on institutional participation in the current IPO auction. These results are robust with respect to the tests conducted at the investor level by logit regressions. Consistent with the Sherman's (2005) model implication, who predicts that the auction participation of sophisticated investors depends on costly information production, my findings suggest that institutional investors are inclined to incorporate the spillover information that is able to lower the costs or the uncertainty of estimating the value for the current IPO firm into their auction-entry decisions.

Second, I found that the reaction of retail investors to the announcements of contemporaneous hybrid IPO auction results is very different from that of institutional investors. Specifically, the information generated by contemporaneous retail investors has a significant impact on the entry of retail investors into the current IPOs' public tranche. By contrast, the information spillover from contemporaneous institutional investors has little association with the participation of retail investors in the current IPO, unless such information spills over from contemporaries in the same industry. These results suggest that retail investors are susceptible to the spillover information that conveys the sentiment or collective mood of the contemporaneous unsophisticated investors prevailing at the time of the offering phase.

Third, I found that, even in a sealed-bid environment, the participation of retail investors in the current IPO's public tranche is significantly influenced by the participation of institutional investors in the current IPO's auction tranche. This suggests that there are information spillovers from the auction tranche to the public tranche within the sealed-bid hybrid IPO auction mechanism, which attract more retail investors to the current offerings. Furthermore, by investigating the potential pathways of the information spillovers in the sealed-bid context, I found that assessing the trend of short-term interbank interest rates during the sealed-bid auction is not the method (or signal) that retail investors use to perceive the level of the aggregate demand of current institutional investors, which is inconsistent with the prediction of Chowdhry and Sherman (1996). Interestingly, I found that the entry of retail investors into the current IPO's public tranche is significantly and negatively related to the trend of short-term interest rates during the current IPO's auction period. The possible explanation for this finding is that retail investors see the rise of the short-term interbank rates as causing an increase in their opportunity costs or transaction costs, because IPO subscription funds paid by investors in China will be tied up for a while without earning interest. Moreover, I found that, for a sealed-bid hybrid IPO auction mechanism, reducing the duration of the auction tranche can help to alleviate the excess demand from retail investors caused by the information spillovers.

Fourth, I found that the information produced by institutional investors in contemporaneous IPO auctions spills over and has a positive influence on the price revision of the current IPO. As a further consequence, the underwriters appear to incorporate such spillover information into the offer price only as a result of it being conveyed through the current bids of institutional investors. This suggests that, during the auction or price-setting process, the underwriters have to see the reaction of the (current) institutional investors to the spillover information in order to assess its significance and then incorporate it into the offer price. By contrast, the information generated by retail investors in contemporaneous IPO public tranches appears to be less valuable for assessing the current IPO, and therefore is not incorporated into the offer price of the current offering. These results are robust with respect to the alternative definition of contemporaries (i.e. they are subject to a common valuation factor).

Finally, I found that the bids submitted by institutional investors in the current IPO auction (in terms of their oversubscription) are informative to the underwriter for choosing an offer price. Moreover, as predicted by Jagannathan et al. (2015) and Schnitzlein et al. (2016), by setting up a separate public tranche for retail investors, the hybrid IPO auction mechanism used in China is able to prevent the participation of these unsophisticated investors having an effect on the price-discovery process.

2.6.2 Contributions, implications and limitations of the study

The study in this chapter makes four important contributions. First, this study extends and complements the existing evidence on information-spillover effects (e.g. Ljungqvist and

Wilhelm, 2002; Benveniste et al., 2003; Ljungqvist and Wilhelm, 2003; Edelen and Kadlec, 2005; Zhang, 2012; Ince, 2014; Bakke et al., 2017), by demonstrating the importance of the contemporaneous investors' bidding information to the investor participation and price discovery of the current IPO. In particular, my results imply that the valuation efforts made by sophisticated institutional investors for contemporaneous auctioned IPOs contribute to the assessment of the current offering, while the information generated by unsophisticated retail investors in contemporaneous IPOs' public tranches does not.

Second, this study adds to the literature that examines the determinants of investor participation in IPO auctions. Consistent with the prior empirical evidence (e.g. Degeorge et al., 2010; Chiang et al., 2010; Neupane et al., 2014; Jagannathan et al., 2015), I have found that institutional participation depends on costly information acquisition, whereas retail participation is susceptible to information about market sentiment or collective mood. Those prior studies focus mainly on the impact of idiosyncratic factors and market conditions (as proxies for information costs and market sentiment, respectively) on investor participation, while my study sheds further light on the role of information spillovers in determining investor participation. Moreover, considering that institutional and retail investors have different reactions to the announcements of contemporaneous hybrid IPO auction results, my study lends support to the views of Odean (1998), and Field and Lowry (2009) that the ability of institutional and retail investors to interpret the readily available public information is different.

Third, this study also contributes to the literature that focuses on the information-spillover effect among investors with different levels of sophistication during the IPO selling procedure. As a supplement to the findings of Neupane and Poshakwale (2012), and Khurshed et al. (2014), who document the influence of institutional participation on retail participation in an IPO market with a transparent selling environment, I have provided evidence that information spillovers from institutional investors to retail investors are even present in a sealed-bid IPO selling mechanism. Furthermore, my examination elucidates that – rather than being conveyed by other signals, such as short-term interest rates (see Chowdhry and Sherman, 1996) – information generated by institutional investors in the current sealed-bid IPO's auction tranche exerts a direct influence on the participation of retail investors in the current IPO's public tranche. To some extent, this finding lends support to the hypothesis of Chowdhry and Sherman (1996), who predict that information leakage is prevalent in a sealed-bid IPO selling procedure.

Finally, from the perspective of the design of auction-like IPO mechanisms, this study enriches the existing evidence on the performance of hybrid IPO auctions (those with a separate public tranche). While several recent studies (e.g. Cao et al., 2016; Chemmanur et al., 2017) have examined the informational properties of China's hybrid IPO auctions, this study further investigates the role of adding a separate public tranche in preventing unsophisticated retail investors from affecting the price-discovery process. This attempt, to some extent, provides empirical evidence as an addition to the literature (e.g. Schnitzlein et al. 2016) that takes a mechanism-design approach that characterizes the optimal IPO auction mechanism as a hybrid with a separate public tranche.

There are three implications in this chapter. First, academically, the findings of this study suggest that the information spillover from contemporaneous IPO auction results is an important factor that should be taken into account when analysing the investor participation and price formation in an auction-based IPO market (or in an IPO market that makes investors' bidding information publicly available). Second, by offering evidence on the effectiveness of adding a separate public tranche to prevent unsophisticated investors from disrupting the price-setting process, my results may help to guide the regulator in improving the standard IPO auction mechanism. Third, the findings of this study suggest that, although a sequential hybrid IPO mechanism is prone to causing cascading demand among investors with different levels of sophistication, reducing the duration of the price-setting tranche can help to alleviate such cascading demand. This may favour regulator planning in designing hybrid IPO placement methods.

The major limitation of this study is that it is inability to account for the spillover information with respect to investors' bid prices. With such information, I might provide further insights into information-spillover effects in the context of China’s IPO market. Since my data sources are limited, I have not included such information in my research.

Chapter 3: Does the reduction of state control affect IPO underpricing? Evidence from China's A-share market

Abstract

By partially transferring IPO oversight to the private sector, the main government agency of China's IPO market has relaxed its public regulatory enforcement and has entrusted sponsors with attesting to the viability of candidate firms. In this chapter, I examine the impact of this sponsorship regulatory reform on the underpricing of Chinese A-share IPOs. I find that the level of IPO underpricing significantly drops following the sponsorship reform relative to the pre-reform periods. Through the analysis of several manually collected characteristics related to the sponsorship regulatory system, I find that IPO firms handled by reputable sponsor institutions and reputable sponsor representatives suffer from less underpricing. Relatedly, the greater the size of the risk-factor section revealed by sponsors in the issuance sponsorship letter, the lower the IPO underpricing experienced by the candidate firms. With respect to the public regulatory process under the sponsorship system, while the public enforcement in the form of the IPO admission review has little association with underpricing, it contributes to mitigating the level of IPO underpricing by imposing disciplinary penalties on sponsors.

3.1 Introduction

A country's stock-market development is closely related to the structure of its securities laws (e.g. La Porta et al., 1997, 1998, 2000, 2002). In the context of the IPO market, La Porta et al. (2006) argue that a legal arrangement that mandates specific information disclosures and facilitates private enforcement through liability standards causes the equity market to flourish, whereas securities laws with strictly public enforcement are unlikely to benefit equity markets. Relatedly, there exists a lively debate among researchers in law and economics as to the benefits of centralized governmental oversight *versus* private-sector oversight in regulating the equity market (e.g. Stigler, 1963; Friend and Herman, 1965; Peltzman, 1976; Coates, 2007; Mendoza, 2008; Zingales, 2009), and the extant empirical evidence based on the analysis of post-IPO performance in developed markets is largely mixed (e.g. Jarrell, 1981; Simon, 1989; Bushee and Leuz, 2005; Greenstone et al., 2006; Espenlaub et al., 2012; Gerakos et al., 2013; Nielsson, 2013; Doukas and Hoque, 2016). Despite these studies that have carefully scrutinized the role of regulatory arrangements in protecting investors by examining the long-run performance of IPO stocks, there is little research to probe which forms of legal or regulatory arrangements work to reduce the indirect cost of raising equity finance and improve the efficiency of the IPO market. Also, Leuz and Wysocki (2008) point out that the existing research exhibits a heavy emphasis on regulatory changes in developed markets and has not fully explored the outcomes and implications of major regulatory and enforcement changes in emerging markets and transition economies.

The empirical study in this chapter examines the contribution of legal or regulatory arrangements to the efficiency of China's IPO market, focusing specifically on how a sponsorship regulatory reform that moves towards private-sector oversight does matter with respect to mitigating the extreme underpricing level of Chinese A-share IPOs.[64] Over

[64] Underpricing is a central measure of the efficiency of the IPO market (Chambers and Dimson, 2009), where greater IPO underpricing means issuers "leave more money on the table" and thus increase the indirect costs of new-equity financing. Given that the underpricing level of Chinese IPOs is more severe than firms going public in other markets (for the international evidence, see Loughran et al., 1994; Jenkinson and Ljungqvist, 2001), the underpricing phenomenon in China's IPO market has been received extensive attention from academics (for a summary, see Table 3.1).

the past 25 years, Chinese IPO firms have been mainly governed by two legal frameworks of which the earlier one provided for strictly public regulatory enforcement (through government agencies) and the latter one (i.e. sponsorship regulatory system) specifies the disclosure obligations and the liability standards faced by issuers and private-sector sponsoring entities (i.e. sponsor institutions and sponsor representatives). The primary comparison of interest in this study is identifying any differences in underpricing between those IPO firms affected by the earlier legal arrangement and those impacted by the latter pattern of legal arrangement. Relatedly, since the sponsorship regulatory system is characterized by a series of improvements in the certification role of sponsoring entities, the disclosure of issuance sponsorship letter, the membership-composition change of the Issuance Examination Commission in the China Securities Regulatory Commission (CSRC), and the disciplinary mechanism of sponsoring entities, this study seeks to further understand how these factors contribute to explaining the cross-sectional variation in the underpricing of Chinese IPOs under the sponsorship system.

Based on the signatures of the sponsoring entities on IPO prospectuses, I split the 2,518 Chinese A-share IPOs from 1992 up to and including 2012 into the samples covered by and not covered by the legal environment of sponsorship system. After controlling for other factors that affect IPO underpricing, I find that IPO firms affected by the sponsorship legal arrangement underprice significantly less (by almost 24%) than IPO firms under the influence of strictly public regulatory enforcement. This difference in IPO underpricing becomes particularly noticeable (over 80%) when I drop a sample of IPOs belongs to the regulatory transitional period (i.e. the channel regulatory system, which incorporates strictly public enforcement with a certain degree of private enforcement). As an alternative robustness test, to address the potential influence of China's share issue privatization (SIP) programmes on IPO underpricing (e.g. Perotti, 1995; Jones et al., 1999), I replicate the analysis only taking account of private firms. Consequently, my primary finding is robust to this alternative specification. These results suggest that an legal arrangement based on purely public regulatory approach, which empowers the main government agency to take sole charge of supervising securities markets, is unlikely to benefit the efficiency of the IPO market. Instead, an legal arrangement that facilitates private oversight and enforcement through liability rules lowers the indirect costs of raising equity finance faced by IPO firms.

Next, in order to explore what factors make the sponsorship regulatory model work well in reducing IPO underpricing, I manually collect several characteristics related to sponsorship system and examine the relationship between these characteristics and the market-adjusted initial return of firms that went public under the sponsorship system. If the legal framework with private oversight and enforcement contributes to mitigating IPO underpricing, I anticipate that the sponsoring entities will perform a certification role regarding the quality of their client firms and related information disclosures. More specifically, the greater the reputation of the sponsoring entities, the more effective they are at reducing the impact of information asymmetry and the level of IPO underpricing (Chemmanur and Fulghieri, 1994). By constructing a battery of reputation proxies based on the characteristics of sponsoring entities, I examine the certification hypotheses with respect to both sponsor institutions and sponsor representatives. After controlling for other factors that affect underpricing, I find that sponsor institutions (sponsor representatives) that have longer work experience in a sponsorship-related industry (in the investment-banking division [IBD]), as a measure for their reputation, contribute to making more of a reduction to IPO underpricing. Additionally, a further analysis of the interaction effect of sponsor institutions and sponsor representatives suggests that IPO firms managed by both reputable institutions and reputable representatives outperform other interaction patterns in mitigating underpricing. According to the results of the interaction analysis, there is no evidence that indicates IPO underpricing will be further reduced if the certification role is given to reputable sponsor representatives rather than giving it to reputable sponsor institutions. In other words, when supervising candidate firms, the presence of reputable sponsor institutions is crucial to controlling the degree of IPO underpricing. These results support the certification hypothesis and corroborate the previous finding that the decline in IPO underpricing during the post-sponsorship-reform period is related to the role of the sponsoring entities given by securities laws.

Since the issuance sponsorship letter is material providing additional information disclosure (outside the IPO prospectus) required by securities laws, some information produced by sponsoring entities in this letter would be useful to estimate the value of IPO firms.[65] Then, I turn to investigate whether the information content revealed by sponsoring entities in the issuance sponsorship letter has association with the market-adjusted initial return of their client firms. By focusing on the size of risk-factor section (i.e. a count of the risk factors) in the issuance sponsorship letter, I find that a greater the disclosure of risk factors reduces the level of IPO underpricing. This is consistent with the results of Hanley and Hoberg (2010), who suggest that greater effort in premarket due diligence reveals more information about risk, enriches informative content, improves pricing accuracy and thus reduces underpricing. Hence, my results imply that sponsoring entities are inclined to put more effort into premarket due diligence, and the disclosure of the issuance sponsorship letter required by law improves the efficiency of China's IPO market in terms of underpricing.

While the legal/regulatory environment during the post-sponsorship-reform period facilitates the private entities in charge of IPO oversight, the CSRC also plays a role as a supplement for the insufficient private enforcement in two ways. First, the CSRC (to be precise, its Issuance Examination Commission) inspects all the information-disclosure materials produced by sponsoring entities and issuers, and makes a decision on IPO admission. If the contribution of centralized regulatory review or public sector oversight does matter to the improvement of IPO-market efficiency, I would expect to see a significantly negative connection between the degree of public regulatory enforcement and the level of IPO underpricing. In particular, this public enforcement may become more effective when the composition of the public enforcer has changed to recruit more professional staff (La Porta et al., 2006). However, using the processing time for the IPO admission review as a proxy for the degree of public regulatory enforcement during sponsorship system, I find that the inspection carried out by the public enforcer has a

[65] The nomenclature of "issuance sponsorship letter" is given by the CSRC. In Chinese, it is named as "fa xing bao jian shu". This letter is actually a document with hundred pages of qualitative information revealed by sponsoring entities.

limited impact on mitigating IPO underpricing even though the CSRC (2003b) Decree No. 16 '*Provisional Administrative Measures on China Securities Issuance Examination Commission*' encourages the Issuance Examination Commission to recruit more professional staff. This result corroborates my primary finding that public regulatory enforcement is not helpful for reducing IPO underpricing. In addition, if the degree of initial underpricing can be reflective of information asymmetry during the IPO process to some extent (e.g. Ljungqvist, 2007), then the result also implies that the contribution of public regulatory process in China's IPO market to the improvement of the candidate firm's information environment is limited.

Second, perhaps the most direct public measure (via the CSRC) of insufficient private enforcement is imposing disciplinary penalties on sponsor institutions and sponsor representatives. Since sanctions can be structured to prevent different levels of harmful acts (Polinsky and Shavell, 2000), I split the classes of penalties taken by the CSRC into two dimensions: 1) penalties for weak due diligence, and 2) penalties via suspension and warning. After controlling for other factors that affect underpricing, I find that only the sponsor institutions that were punished for weak due diligence have a significant association with a lower underpricing of their IPO client firms, while the evidence for this for sponsor representatives is weak. Furthermore, other classes of penalties give little incentive to sponsoring entities to better perform due diligence in subsequent IPO sponsorship activities. This may be because sponsor institutions (to be precise, the underlying securities companies) are concerned that the penalty for their weak (sponsorship) due diligence has an influence on their other (non-sponsorship) businesses such as Mergers and Acquisitions (M&A). These results suggest that public enforcement in terms of non-criminal penalties play a certain role at reducing IPO underpricing.

Taken together, and broadly consistent with La Porta et al. (2006), the results obtained in this chapter indicate that, in an emerging economy such as China, the legal arrangement with strictly or purely public enforcement (through government agencies) is unlikely to be beneficial for the efficiency of the IPO market, whereas the provisions in securities laws/regulations that facilitate private enforcement and mandate specific disclosures help to pronouncedly reduce the indirect cost of raising equity finance.

The empirical study of this chapter makes two important contributions to the existing literature. Frist, it adds to the vast capital-market-regulation literature by demonstrating that a regulatory reform that moves towards private-sector oversight is beneficial to the efficiency of the IPO market. There has been a long-running debate among researchers in law and economics over the benefits of private-sector oversight *versus* public-sector enforcement (e.g. Stigler, 1963; Peltzman, 1976; Healy and Palepu, 2001; Mulherin, 2007; Shleifer, 2005; Mendoza, 2008; Zingales, 2009). Several recent studies have examined the effectiveness and long-run viability of private-sector oversight based on the experience of London's Alternative Investment Market (AIM), while their results are inconclusive when using various measures to capture post-IPO performance such as survival rates (Espenlaub et al., 2012), long-run stock returns (Gerakos et al., 2013) and operating performance (Nielsson, 2013; Doukas and Hoque, 2016). The research of this chapter sheds additional light on how a regulatory reform from strictly public enforcement to partial private-sector oversight affects the short-run underpricing of IPOs, which is a material part of the cost of going public as well as a central measure of the efficiency of the IPO market. My results are broadly consistent with La Porta et al.'s (2006) international analysis, who cast considerable doubt on the efficacy of purely public regulatory solutions in benefiting the development of stock markets. Also, closely related to my work is the study of Chambers and Dimson (2009), in which they document that the underpricing of UK IPOs increased along with the improvements in regulation, disclosure and underwriter reputation over a century. By contrast, although the history of China's IPO market is not that long, with the analysis of the regulatory improvements in this emerging economy over past two decades, I find that the underpricing of Chinese IPOs dramatically declined during the time following improvements in investor protection and underwriting. The study of this chapter offers an important policy implication for the emerging markets that seek to improve the efficiency of their IPO markets via legal or regulatory reforms.

Second, the contribution of this study to the extensive literature on IPO underpricing is to assemble and analyse a unique hand-collected dataset of equity IPOs that are affected by China's sponsorship regulatory system and related characteristics. By doing so, this study enriches the existing empirical evidence on the institutional determinants of IPO underpricing. While a number of previous studies have provided insights into the relationship between the institutional features of Chinese A-share market and the level of IPO underpricing, they mainly focus on government interventions in issue prices and issue quantities (Chi and Padgett, 2005; Guo and Brooks, 2008; Zhou and Zhou, 2010; Tian, 2011), political connections (Fan et al., 2007; Francis et al., 2009), deregulations along with the underwriter reputation (Su and Brookfield, 2013), and differences in the development of legal or regulatory environment across provinces (Liu et al., 2014; Chen et al., 2015). As a supplement, the results obtained in this chapter demonstrate that certain characteristics related to the sponsorship regulatory model do play an important role in explaining the underpricing of Chinese IPOs. Specifically, as the private entities entrusted by the CSRC with IPO oversight, sponsor institutions and sponsor representatives are concerned with their reputational capital (e.g. their work experience in the sponsorship-related industry), whose reputation and premarket information production have a strong association with the level of their client firms' underpricing. Furthermore, although a centralized regulatory review carried out by the public enforcer (the CSRC) on candidate firms has little impact on the level of IPO underpricing, its disciplinary actions on sponsor institutions play a role in reducing the underpricing of subsequent IPOs. These findings are meaningful, not only to academics but also to market participants; for example, for issuers, hiring experienced sponsors and/or punished sponsors as their IPO advisors is a way to lower the indirect costs of going public.

The rest of this chapter is organized as follows. Section 3.2 provides institutional setting of China's IPO market. Section 3.3 provides literature review and hypothesis development. Section 3.4 discusses data, sample, methodology, variable definitions, descriptive statistics, and correlations among the variables. Empirical results are reported and discussed in Section 3.5. In the end, Section 3.6 concludes the study in this chapter.

3.2 Institutional setting of China's IPO market

China's regulatory regime for stock issuance has experienced two phases – an *administrative approval regime* and an *approval regime* – since the government established the capital markets in 1990. In the first regime, from 1990 to 2001, under the auspices of a planned economy, the government dominated and directly engaged in the IPO selection process by enforcing the *quota system*. Specifically, every year, the central government[66] distributed a certain number of IPO quotas to each local government (i.e. for each province), and local government officials had to comply with the quotas to identify and recommend the candidate firms within their jurisdiction. In this manner, local government choose the candidate firms, and the IPO applications of these candidate firms needed to be further screened and approved by the regional financial regulator (i.e. an affiliate of the CSRC at the province level), the stock exchange and the central financial regulator. Under this regulatory model, the role of the underwriter was diluted, as they did not have discretion in firm selection, pricing and offering. Chen et al. (2014) point out that most underwriters are controlled by the government under quota system and their service quality is not important because the government controls the IPO process. In summary, the securities law and regulation during the period of the quota system largely empowered the government agency or official authority to take sole charge of supervising the IPO market, including IPO firm selection and oversight.

The next approval regime was a move towards a market-oriented regulatory model, which started with the *channel system* from 2001 to 2003. Under this regulatory system, the government empowered underwriters (which were called IPO supervisors in this period)[67] to oversee IPO candidate firms, but these underwriters were subject to channel quotas for the number of IPO recommendations and the CSRC monitored the process of

[66] In 1992, the CSRC took over the role of financial market regulator from the central government.
[67] The name "IPO supervisory company" was used in the CSRC's (2001) Decree No. 125 '*Administrative Measures on Supervisorship of Initial Public Offering*' to introduce the channel system. In practice, the securities companies or underwriters who received the channel quotas from the CSRC were generally called supervisory companies, and they did not need to register their supervisory qualification with the CSRC. Although it is similar to the future sponsor institution in name (in the CSRC's (2003a) Decree No. 18 '*Provisional Administrative Measures on Sponsorship for Securities Issuance and Listing*'), these two roles actually imply different degrees of responsibility, eligibility requirements, potential disciplinary actions and other regulations for securities companies.

IPO selection. Specifically, as with the previous quota system, the CSRC assigned channel quotas (also called channels) to each lead underwriter in the channel system, and underwriters were not allowed to recommend more than one firm at once (i.e. they could not use more than one channel quota at once) to the central regulator. Thus, the incentive for competition among underwriters was limited during the channel-system period (Liu et al., 2013). In addition, since the CSRC did not formulate clear regulations for IPO supervisors regarding the methods of screening and oversight,[68] the CSRC (2001) also appointed regional regulators to inspect the work of IPO supervisors and these regional officials needed to provide monthly feedback of their inspection to the central regulator. In summary, under the channel system, although the screening, selection and oversight on IPO firms have been partially (and informally) transferred from the government agency to the private sector, the central regulator (CSRC) was still closely involved in the process of IPO screening and oversight via its regional regulators (or regional inspectors). Due to the constraint of channel quotas and the unsound disciplinary measures, it is ambiguous as to what extent the IPO supervisors are concerned with their own reputational capital.

Since early 2004, when the CSRC's (2003a) Decree No. 18 was put into effect, the previous regulatory system has been replaced with a more market-oriented regulatory model – the *sponsorship system*. There are three main features of the sponsorship system. First, the most important feature is that the CSRC entrusts the private entities (also known as sponsoring entities in China, including sponsor institutions and sponsor representatives) to perform the functions of IPO screening, oversight, advice and monitoring. Under this regulatory system, sponsoring entities are no longer subject to quota and channel constraints and are able to select any number of candidate firms to apply for IPO; meanwhile, they are responsible for attesting the quality and viability of IPO candidate firms. The CSRC (2003a) no longer requires regional regulators to guide and closely

[68] For example, CSRC (2001) Decree No.125 '*Administrative Measures on Supervisorship of Initial Public Offering*' Article 36 requires that "Supervisory company should advise the client firm to establish a sound accounting and/or management system that avoids accounting fraud". However, the CSRC does not interpret how to establish such an accounting and/or management system within a client firm in terms of both qualitative and quantitative standards.

monitor the process of IPO oversight. Instead, the CSRC focuses on training and regulating the sponsoring entities; e.g. sponsor representatives are required to regularly attend sponsorship vocational training, and the CSRC has updated a series of regulatory interpretations for the sponsorship duties in the CSRC's (2003a, 2008) Decrees. Nevertheless, the CSRC still holds the power to inspect the IPO admission documents produced by sponsoring entities and makes the decision on IPO approval. In practice, if the CSRC's Issuance Examination Commission questioned the information in IPO admission document during the period of reviewing, sponsoring entities need to give explanations on behalf of client firms. In this regard, it is possible that sophisticated sponsoring entities help to increase the probability of approval or reduce the processing time of each admission review.

According to the CSRC's (2003a, 2008) Decrees, the eligibility requirements for sponsor institutions and sponsor representatives are different; the eligibility criteria of sponsor representatives focus on a competence examination and having two to three years of work experiences in the IBD, while the criteria for sponsor institutions focus on the number of employed representatives (there must be a minimum of four), the number of sponsorship-related personnel (there must be a minimum of 35) and the registered capital of company (this must be a minimum of 100 million RMB).

In practice, sponsor institutions and sponsor representatives fulfil different functions in the IPO process. Specifically, a sponsor institution needs to appoint a sponsorship team (consisting of representatives and related personnel) to conduct IPO oversight. Before submitting the admission documents to the CSRC, the sponsor institution should appoint an internal examiner to examine the quality of the documents. With respect to sponsor representatives, they are mainly in charge of due diligence and producing the admission documents. The responsibility of the sponsor representatives is complicated by the fact that they are employed by the sponsor institution and they are also entrusted by the CSRC. In theory, the CSRC (2008) Decree No. 58, Article 5 states that "a representative shall be independent when fulfilling his/her duties, and shall not be involved in fraudulent activities of the issuer and sponsor institution". However, in practice, it is difficult to judge whether sponsor representatives fulfil their oversight role independently and are not affected by the sponsor institution.

Second, the CSRC clearly describes the potential disciplinary actions for sponsoring entities. For example, CSRC (2008) Decree No. 58 '*Administrative Measures on Sponsorship for Securities Issuance and Listing*', Article 72(2) states that "if a client firm's business profits slid over 50% in the year of issuing relative to the previous year, the representative will be punished for 3–12 months of suspension from sponsorship-related activities". In this manner, most disciplinary actions are clearly related to the aftermarket performance of client firms, which may incentivize sponsoring entities to provide a high level of oversight (or due diligence) over client firms. Moreover, the CSRC also classifies disciplinary actions into three categories (e.g. warning, suspension and withdrawal of sponsorship qualification) based on the degree of violation of the regulations.

Third, besides the IPO prospectus, the CSRC also requires sponsoring entities to produce an issuance sponsorship letter, which mainly contains qualitative information about the comments of sponsoring entities on the quality of their client firms, such as assessments of the firms' potential risk factors. As mandatory information-disclosure files, the sponsorship letter also needs to be reviewed by the CSRC and is thereafter made publicly available. Therefore, investors are able to evaluate the quality of IPO firms by consulting the information revealed in the sponsorship letter.

Taken together, under the sponsorship system, sponsor institutions and sponsor representatives are the primary entities who attest to the quality and viability of the IPO candidate firms; meanwhile, a centralized regulatory review (on IPO admission documents) taken by the public regulator (CSRC) is still in place. The aforementioned features of the sponsorship system make it distinguishable from the previous regulatory systems with respect to the methods of investor protection and IPO oversight.

3.3 Literature review and hypothesis development

Previous literature in law and finance (e.g. La Porta et al., 1997, 1998, 2000, 2002) sheds light on the importance of the quality of the legal environment, enforcement and investor protection to equity-market development. In other words, if investor protection by way of legal or regulatory model improves, investors are willing to pay more for a firm's equity (La Porta et al., 2002), entrepreneurs can raise more funds (Shleifer and Wolfenzon, 2002) and the scale of the equity market becomes larger (La Porta et al., 1997). In the context of the IPO market, this implies that the regulatory reforms towards investor protection are potentially accompanied by the mitigation of underpricing level of new-equity financing.

The first strand of literature in this research is related to those empirical studies concerning the relationship between regulatory improvements and IPO underpricing. Closely related to my work is the study of Chambers and Dimson (2009), in which they examine how the underpricing of UK IPOs changed along with the improvements in regulation, disclosure and underwriting (broadly speaking, an improvement in the regulatory environment for investor protection) over a century. Their finding is somewhat surprising in that the average underpricing level of UK IPOs increased during the period after the improvements in the regulatory environment, and Chambers and Dimson (2009) interpret this puzzle as the deterioration of trust among market participants and the exacerbation of the winner's curse among investors during the period of regulatory improvements. Conversely, under the inherently weak legal environment of the Thai IPO market, Ekkayokkaya and Pengniti (2012) document that the average underpricing level of Thai IPOs significantly declined following the country's governance reform for investor protection. The important implication of Ekkayokkaya and Pengniti's (2012) study is that introducing regulations, rules and/or laws that were formulated by developed markets into emerging markets with weak legal environments can help to reduce the cost of new-equity financing (i.e. the underpricing level). In the US market, Johnston and Madura (2009) suggest the passing of the Sarbanes-Oxley Act (SOX)[69] has had a positive

[69] Sarbanes-Oxley Act enacted following the financial reporting scandals in 2002, which aims at elevating the corporate governance standards and ultimately improving investor protection in the

impact on pricing efficiency in the IPO market, and they find the average underpricing level of US IPOs in the post-SOX period is lower than the IPOs in the pre-SOX period.

Moreover, with the country-level analysis, several capital-market-regulation studies also suggest that the improvements of the regulatory framework contribute to moderate IPO underpricing. Daouk et al. (2006) find that a lower underpricing level is associated with better capital-market governance in the countries with the strong enforcement of insider-trading laws and relaxed short-selling restrictions. Engelen and Van Essen (2010) show that, among 21 countries, the level of underpricing is lower when firms go public in a country with a more developed legal system in terms of investor protection and legal enforcement. By investigating the determinants of IPO underpricing across 24 countries, Hopp and Dreher (2013) document that better law enforcement reduces the level of underpricing. Shi et al. (2013) find a negative connection between the IPO underpricing level and the strength of disclosure regulations required by the securities laws across 34 countries. Akyol et al. (2014) report a significant reduction in the underpricing level of firms listed on 18 European-member-state-regulated markets after the adoptions of SOX-like corporate governance codes in these member states.

The second strand of literature is related to the study on IPO underpricing. The theories and related empirical evidence that help explain IPO underpricing have been systematically reviewed by Ibbotson and Ritter (1995), Jenkinson and Ljungqvist (2001), Ritter and Welch (2002), Ritter (2003), and Ljungqvist (2007). Broadly speaking, according to Jenkinson and Ljungqvist (2001), underpricing can be explained by the informational, institutional, or competitive structure of the market. Hail and Leuz (2006) argue that more effective securities regulation implies a lower cost of equity capital and a lower degree of uncertainty and information asymmetries among market participants. Hence, asymmetric information models (e.g. Ljungqvist, 2007) are more likely to interpret the changes in IPO underpricing as the consequences of regulatory reforms in underwriting quality, disclosure and investor protection.[70] These information-based

US market.

[70] Treating the relation of regulatory improvement and IPO underpricing within an asymmetric

models generally predict that the degree of IPO underpricing has a positive association with the extent of information asymmetries where one type of market participant (i.e. issuers, investment bankers or investors) has better information than others about the firm's value. For example, Rock (1986) argues that, on average, IPO underpricing is required to attract the participation of uninformed investors when investor heterogeneity exists regarding the value of the offer (known as the winner's curse model). Benveniste and Spindt (1989) suggest that IPO underpricing is a reward for those informed investors who truthfully reveal their information about the value of the offer (i.e. the indications of interest) in the underwriter's book-building process (known as the book-building model). Baron and Holmström (1980), and Baron (1982) demonstrate that IPO underpricing is a kind of information rent paid by issuers for the use of the underwriter's superior information about investor demand (known as the principal-agent model). Allen and Faulhaber (1989), Grinblatt and Hwang (1989), and Welch (1989) all postulate that issuers have better information than investors about the value of the offer, and thereby IPO underpricing is used by high-quality issuers as a signal to distinguish themselves from low-quality issuers (known as the signalling model). Collectively, under an asymmetric information framework, the degree of IPO underpricing is an increasing function of *ex ante* uncertainty about the value of the offer (Beatty and Ritter, 1986), and improvements in the regulatory environment should reduce such uncertainty as faced by investors (Engelen and Van Essen, 2010; Ekkayokkaya and Pengniti, 2012).

Although prior empirical studies have provided some insights into the explanations of extreme underpricing in China's IPO market across the various sample periods (see Table 3.1 for an overview of 31 items of relevant literature), there is little research focusing on the relationship between the sponsorship regulatory reform and the underpricing of Chinese IPOs. In these studies, the extreme underpricing of Chinese IPOs is frequently interpreted as being a result of information asymmetries among IPO participants (Mok and Hui, 1998; Su and Fleisher, 1999; Chen et al., 2004; Su, 2004; Yu and Tse, 2006; Deng and Zhou, 2015), government restrictions on IPO pricing and quantities (Chi and

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information framework has a common practice in those of capital-market regulation literature which mentioned in preceding two paragraphs.

Padgett, 2005; Guo and Brooks, 2008; Zhou and Zhou, 2010; Tian, 2011), and the implementation of share issue privatizations (SIPs) on state-owned enterprises (Huyghebaert and Quan, 2009; Chen et al., 2015). Moreover, several studies suggest that the degree of Chinese IPO underpricing is mitigated if firms went public under the management of prestigious investment bank (Su and Brookfield, 2013) or in a region with a developed legal/regulatory environment (Liu et al., 2014; Chen et al., 2015). In particular, Su and Brookfield (2013) find that the deregulation event in China (i.e. replacing the old quota system with a new market-oriented system in 2001) brought the certification role of underwriters into effect, such that IPO firms managed by prestigious underwriters after 2001 suffer from lower underpricing. Nevertheless, by using the IPO sample after 2001, not all the empirical studies that test the certification hypothesis claim a significant connection between underwriter reputation and IPO underpricing, such as Gannon and Zhou (2008), and Su and Bangassa (2011).[71] Given that the legal environment varies across China at province level, Liu et al. (2014) and Chen et al. (2015) – of which Chen et al.'s study is the more extensive one – document that IPO firms from the provinces with a "good" legal/regulatory environment underprice less than firms from the provinces with a "poor" legal/regulatory environment. Even though their results are in line with those of Engelen and Van Essen (2010), and Banerjee et al. (2011), which provide evidence across many countries that the developed legal/regulatory framework is a mitigating factor for IPO underpricing, they neither directly compare the changes to IPO underpricing between the post-sponsorship-reform period and pre-sponsorship-reform period, nor examine the influence of the characteristics of sponsorship regulatory system on IPO underpricing, which are the primary focuses of my research.

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[71] With respect to the examination of the certification role of investment banks, the perspective of this research is different from these empirical studies (i.e. Gannon and Zhou, 2008; Su and Bangassa, 2011; Su and Brookfield, 2013). This is for three reasons: 1) this research focuses on the role of IPO sponsorship/oversight that is entrusted by the CSRC and played by both sponsor institutions and sponsor representatives, whereas the aforementioned empirical studies only concern the role of the underwriter played by the securities company; 2) this research attempts to use the characteristics of sponsoring entities (i.e. their sponsorship status or experiences) to measure the reputation, whereas these empirical studies typically use the characteristics of securities companies (i.e. their experiences as lead- and co-underwriters) to measure the reputation; and 3) this research takes account of disciplinary actions on sponsoring entities because they are subject to the CSRC's disciplinary regulations, whereas these empirical studies do not have a similar consideration because underwriters (without sponsorship certification) are not subject to disciplinary regulations.

Table 3.1: A summary of empirical studies on the underpricing of Chinese IPOs

This table presents a summary of empirical studies that provide insights into the explanations of IPO underpricing in China's A-share market across various periods. In the last column of table, the positive and negative signs in brackets indicate how the corresponding factors lead to aggravate [+] and mitigate [–] the underpricing of Chinese IPOs, respectively. † shows the corresponding empirical studies do not support the hypothesized relationship in terms of statistical significance.

	Study	Sample period	Sample size	Average underpricing	The outlines of the explanations of IPO underpricing	[sign]
1	Chen et al. (2015)	1999 - 2007	675	127%	> Share issue privatization (SIP) state-owned enterprises (SOEs)	[+]
					> Institutional environment measured by credit market development, legal environment and government decentralization in China's province level	[–]
2	Fan et al. (2007)	1993 – 2001	790	241%	> Political connected executives in partially privatized firms	[–]
3	Tian (2011)	1992 – 2004	1377	247%	> Regulatory interventions in IPO pricing and share supplies by government	[+]
					> The risk of listing lag between the offer date and the listing date	[+]
					> Grabbing risk and tunneling risk, i.e., expropriations of assets by government and insiders, respectively	† [+]
4	Jia et al. (2016)	2006 – 2012	1105	60.32%	> Optimistic analyst coverage between the offer date and the listing date	[+]
5	Su and Bangassa (2011)	2001 – 2008	590	118.62%	> Certification hypothesis, i.e., the prestige of underwriters	† [–]
6	Guo and Brooks (2008)	2001 – 2005	286	93.49%	> IPO pricing mechanisms, i.e., fixed price converts to book-building	[–]
					> In short supply of IPO shares caused by government control	[+]
					> SOEs	[+]
7	Su and Brookfield (2013)	1995 – 2007	1148	124.83%	> Certification role of underwriters changed since 2001, i.e., from the beginning of IPO approval regime	[–]
8	Huyghebaert and Quan (2009)	1994 – 2005	521	123.49%	> Firm-level characteristics of privatization SOEs, e.g., the proportion of loans from the stated-owned commercial banks	[+]
					> Uncertainty over government commitment to privatization	[+]
					> The proportion of public allocation of SOE's shares at privatization	[+]
9	Su (2004)	1994 – 1999	348	124.2%	> Asymmetric information-based models, including winner's curse, signaling and *ex ante* uncertainty	[+]
					> Fixed price offer with the lottery mechanism of share allocations	[+]
10	Francis et al. (2009)	1994 – 1999	423	116.2%	> Firms with political connections	[–]
11	Zhou and Zhou (2010)	1991 – 2005	1380	238%	> Government interventions in IPO pricing and share supplies	[+]
					> Hot-issue market, i.e., the autocorrelation of both the monthly IPO volume and the monthly average initial return	[+]
12	Wu (2014)	1990 – 2007	1582	230.8%	> Cross-listings of A-share IPOs in the Hong Kong (H-share) and the U.S. (ADR)	† [–]

13	Gannon and Zhou (2008)	2000 – 2003	293	120.78%	> Certification hypothesis, i.e., the prestige of underwriters, for 2003 IPOs only	† [–]
					> Underwriting fees, for 2003 IPOs only	[–]
					> Flipping activities in the second market	[+]
14	Deng and Zhou (2015)	2009 – 2012	355	34.41%	> Over demand of institutional investors for IPO shares, for China's Growth Enterprise Market (GEM) IPOs only	[+]
					> Market momentum hypothesis, for China's GEM IPOs only	[+]
					> *Ex ante* uncertainty and asymmetric information hypotheses, for GEM IPOs only	[+]
15	Bradley et al. (2011)	1999 – 2005	508	124%	> Investors' large and aggressive trades on the IPO first day of trading	[+]
					> Quoted depths on the IPO first day of trading	[–]
16	Güçbilmez	1999 – 2012	1665	97%	> Hot-issue market caused by Chinese government regulatory decisions	[+]
17	Jiang et al. (2014)	2004 – 2010	479	54.38%	> Venture capital (VC) backed IPOs, for small- and medium-sized firms only	[–]
18	Su and Fleisher (1999)	1987 – 1995	308	948.59%	> Signaling hypothesis	[+]
					> Fixed price offer with the lottery mechanism of share allocations	[+]
19	Mok and Hui (1998)	1990 – 1993	87	289%	> *Ex ante* uncertainty about the value of the new issues, for IPOs in Shanghai Stock Exchange (SSE) only	[+]
					> Retention of IPO shares by the state, for IPOs in SSE only	[+]
					> The risk of listing lag between the offer date and the listing date, for IPOs in SSE only	[+]
20	Chan et al. (2004)	1993 – 1998	570	177.8%	> The degree of development of China's provinces, measured by the number of stock investors, where IPO firms located	[+]
					> The risk of listing lag between the offer date and the listing date	[+]
21	Chi and Padgett (2005)	1996 – 2000	668	129.16%	> In short supply of IPO shares caused by the quota system	[+]
					> Signaling hypothesis	† [+]
22	Gao (2010)	2006 – 2008	217	157%	> Market and/or investor sentiment	[+]
23	Cheung et al. (2009)	1992 – 2006	1191	133.61%	> Changing of IPO pricing mechanisms over time, from fixed-price to book-building	[–]
24	Wang (2005)	1994 – 1999	747	271.9%	> Signaling hypothesis	† [+]
25	Yu and Tse (2006)	1995 – 1998	343	123.59%	> Winner's curse and *ex ante* uncertainty	[+]
					> Signaling hypothesis	† [+]
26	Chen et al. (2004)	1992 – 1997	701	298%	> The risk of listing lag between the offer date and the listing date	[+]
					> Signaling hypothesis	[+]
					> Retention of IPO shares by the state	[+]
27	Lin and Tian (2012)	2001 – 2009	674	110.9%	> Accounting conservatism	[–]
28	Kao et al. (2009)	1996 – 1999	366	134%	> IPO pricing regulations regarding accounting earnings	[–]
29	Hao et al. (2014)	2004 – 2011	902	74.85%	> IPO firms connect with high credit quality of commercial banks	[–]
					> Commercial banks connect with those IPO firms without political connection	[–]
30	Liu et al. (2014)	1997 – 2009	963	123.02%	> The level of legal protection in China's province level	[–]
31	Shen et al. (2014)	1998 – 2003	506	129.23%	> Earning management measured by discretionary accruals	[+]
					> Overreaction hypothesis, i.e., investors overreact to managed accruals	[+]

La Porta et al. (2006) suggest that the arrangements of securities laws (regarding new share issuance), which mandate disclosure and facilitate private enforcement, contribute to reducing information uncertainty, protecting investors and ultimately benefiting stock markets. In contrast, the pattern of legal arrangements largely relying on public regulatory enforcement (i.e. the main government agency takes sole charge of supervising markets) is unlikely to be effective for jump-starting the development of stock markets in countries with inefficient government bureaucracies (La Porta et al., 2006). In this regard, China's IPO market, which is under the governance of a sponsorship regulatory model, should be more effective in reducing information uncertainty and protecting investors than one with strictly public regulatory enforcement. More specifically, before the sponsorship-reform period, the Chinese government bureaucracies were poorly staffed or less efficient (Allen et al., 2005), and IPO firms were subject to the initial version of China's Securities Law (henceforth called Securities Law I), [72] which is the one that largely empowers government agencies to verify and oversee IPO candidate firms. Following the passing of the CSRC's (2003a) Decree for the sponsorship regulatory approach, the role of IPO oversight was partially transferred to the private sector via sponsoring entities and was written into securities law in 2005 (henceforth called Securities Law II), which is the one that facilitates private enforcement and related disclosure.[73] Collectively, given that the underpricing of IPOs is a central measure of the efficiency of the IPO market (Chambers and Dimson, 2009), I anticipate that China's IPO market has become more effective in terms of controlling IPO underpricing after experiencing the sponsorship regulatory reform, which leads to my first hypothesis:

Hypothesis 1: IPO underpricing is lower during the post-sponsorship-reform period than during the pre-sponsorship-reform period.

Since sponsorship regulatory reform is characterized by improvements in the certification role of sponsoring entities, the disclosure of issuance sponsorship letter, the membership-

[72] Securities Law I was drafted in 1992 and promulgated in 1999. In practice, before it formally went into effect, IPO firms were subject to Corporate Law and official regulations (or decrees). Because most of these decrees and sections of Corporate Law were copied into Securities Law I, IPO firms that went public before 1999 were still essentially covered by Securities Law I.
[73] Securities Law II reserves the power of the CSRC in reviewing IPO admission documents.

composition change of the Issuance Examination Commission in the CSRC and the disciplinary mechanism of sponsoring entities, the development of the remaining hypotheses is based on these characteristics in order to investigate whether these factors can explain the variation in the initial underpricing of IPO firms that went public during the period of sponsorship regulatory reform.

It is possible that there are cross-sectional differences in IPO underpricing for firms that went public under the sponsorship system based on the characteristics and reputation of sponsoring entities. Early studies, focusing on the US market, document that prestigious underwriters can effectively reduce the level of informational asymmetry and/or *ex ante* uncertainty about the offer's value, and thus mitigate the underpricing of IPO firms (Booth and Smith, 1986; Carter and Manaster, 1990; Megginson and Weiss, 1991; Michaely and Shaw, 1994; Carter et al., 1998). However, this certification hypothesis is later found, in the studies of Beatty and Welch (1996), and Loughran and Ritter (2004), to be sensitive to the sample period examined. For the UK market, Chambers and Dimson (2009) find that the rise of a body of prestigious underwriters after World War II (WWII) made little contribution to reducing the IPO underpricing, relative to the investment banks before WWII. Su and Brookfield (2013) suggest that the underwriter's reputation reduces the underpricing of Chinese IPOs only after the deregulation event of 2001, whereas the underwriter's reputation is unrelated to the variation in IPO underpricing before 2001. Following the recent studies on the nominated advisors (Nomads) of London's AIM experience of private-sector oversight (e.g. Espenlaub et al., 2012; Gerakos et al., 2013), this research focuses on the certification role of the IPO nominated advisor, which is played by both sponsor institutions (i.e. institutional sponsors) and sponsor representatives (i.e. individual sponsors) in China's stock market. Collectively, I hypothesize that more reputable sponsoring entities are inclined to better fulfil the responsibility of IPO oversight (i.e. verifying information-disclosure materials and attesting to the quality of candidate firms through premarket due diligence) as required by Securities Law II and the CSRC's (2003a) Decree, and therefore the certification hypotheses for the sponsoring entities are built as follows:

Hypothesis 2a: The reputation of the sponsor institution has a negative impact on IPO underpricing.

Hypothesis 2b: The reputation of the sponsor representative has a negative impact on IPO underpricing.

The accounting literature on disclosure (e.g. Verrecchia, 2001; Dye, 2001) asserts that firms benefit from a high level of public disclosure at the time of the IPO, which reduces the information-asymmetry component of the cost of capital. To the extent that IPO underpricing is a measure of the indirect cost of equity capital, Schrand and Verrecchia (2005) suggest a negative association between the level of IPO disclosure and the degree of underpricing. However, with analysing the information content of the IPO prospectus, previous research has provided mixed evidence on the nexus of disclosure and underpricing. For instance, Beatty and Ritter (1986) document that greater disclosure in the use-of-proceeds section is associated with higher IPO underpricing, whereas Leone et al. (2007) show that the opposite relation holds true. Moreover, Chambers and Dimson (2009) find that having more years of historic profits disclosed in the IPO prospectus contributes to minimizing information gaps and decreasing underpricing. With respect to examining the prospectus section regarding the disclosure of risk factors, Beatty and Welch (1996), and Arnold et al. (2010) document a positive relationship between the degree of the disclosure in the risk-factor section and the level of IPO underpricing, but Hanley and Hoberg (2010) present evidence that a risk-factor-disclosure section with greater informative content is associated with lower underpricing. Since Securities Law II and the CSRC's (2003a) Decree require that, in addition to the IPO prospectus, sponsoring entities must disclose their comments on the candidate firm's risk factors within an issuance sponsorship letter, this study turns its focus of investigation to this specific disclosure. My empirical predication on the relation between risk-factor disclosure and underpricing builds on the view of Hanley and Hoberg (2010). Specifically, Hanley and Hoberg (2010) suggest that a greater effort in premarket due diligence reveals more information about risk, enriches informative content, improves pricing accuracy and thus reduces underpricing. On the other hand, they argue that issuers and underwriters may also choose to invest less in premarket due diligence, i.e. providing standard content for disclosure by "copying" the prospectus from other sources, and ultimately use high underpricing to compensate investors for revealing information during the book-building period. In the sense that the role of the sponsoring entities is set to ensure a sufficient degree of premarket due diligence and information disclosure before IPO pricing, I anticipate that the issuance sponsorship letter produces informative disclosure content rather than standard disclosure content, and the degree of disclosure in this letter should be negatively related to underpricing. Therefore, I hypothesize the following:

Hypothesis 3: The size of the risk-factor-disclosure section in the issuance sponsorship letter has a negative association with IPO underpricing.

Although the body of public regulatory enforcement (i.e. the CSRC) has partially transferred oversight to the private sector, IPO admission documents prepared by sponsoring entities still need to be reviewed and approved by the CSRC's Issuance Examination Commission[74] under the sponsorship system. Nevertheless, under the effect of the CSRC's (2003b) regulations on the Issuance Examination Commission, the composition of the members of this examination commission has changed after the sponsorship regulatory reform. Unlike the prior commission board, which mainly consisted of government or CSRC officials, the CSRC's (2003b) Decree requires the examination commission to recruit more professional staff (e.g. professionals from industry, research institutions and universities). La Porta et al. (2006) argue that an effective public enforcer should be the independent body that facilitates the recruitment of professional staff and prevents political interference, while they find such a form of public enforcer has limited impact on the stock-market development based on the country-level evidence. Following La Porta et al. (2006), I anticipate that the CSRC's Issuance Examination Commission has become more effective in improving the efficiency of China's IPO market after the composition change of the board, and therefore I hypothesize the following:

[74] The Issuance Examination Commission in the CSRC takes charge of the admission-document review and IPO approval.

Hypothesis 4: The strength of the IPO admission review conducted by the CSRC's Issuance Examination Commission is negatively related to the level of IPO underpricing.

Earlier literature concerning law enforcement in society (e.g. Becker, 1968; Stigler, 1970) articulates that criminal punishments are set to deter illegal behaviour (or further crimes) and achieve compliance with the rules. In the context of the financial market, the presence of a securities-market regulator that imposes sanctions for violations of securities laws should be more effective than enforcement by the court (Glaeser et al., 2001; Glaeser and Shleifer, 2003), and, in particular, for an institutional environment with incomplete law (Pistor and Xu, 2002). Also, La Porta et al. (2006) suppose that the basic function of the public regulator is imposing sanctions so as to supplement the insufficient private enforcement and ultimately benefit stock markets, while their empirical results based on a country-level study indicate that imposing penalties for crimes, sanctions for non-criminal violations, and related investigations of issuers and/or intermediaries have little impact on the development of stock markets. Recent work by Gerakos et al. (2013) only provides descriptive evidence on disciplinary practices against IPO Nomads in the AIM, and it is still not clear what the economic consequences are of disciplinary penalties on these private-sector advisors. In theory, penalties on Nomads/sponsors should increase their incentives to effectively monitor and perform due diligence, and thus the client firm's performance should be improved following the Nomad's penalties (Piotroski, 2013). Given that the legislation of China is far from "complete law",[75] i.e. it contains large amounts of ambiguous criteria (Liu et al., 2013), I anticipate that disciplinary actions enforced by the CSRC will be effective against sponsor institutions and sponsor representatives, such that the behaviour of these sponsoring entities will shift to provide a higher level of due diligence as a result of the penalties. Therefore, imposing sanctions on sponsoring entities should be associated with reductions in information asymmetry or *ex ante* uncertainty about the value of their client firms, which leads to my final hypothesis:

[75] Pistor and Xu (2002) define a complete law as "all potential harmful actions can be unambiguously specified in the law"; otherwise, a law is incomplete.

Hypothesis 5a: IPO firms managed by sponsor institutions that have been punished have a negative association with IPO underpricing

Hypothesis 5b: IPO firms managed by sponsor representatives who have been punished have a negative association with IPO underpricing.

3.4 Data, methodology and descriptive statistics

3.4.1 Data and sample

I collected data on all the IPOs in the Chinese A-share market between January 1992 and October 2012. The sample ends in 2012 because the CSRC suspended A-share IPO activity in November 2012. After eliminating 16 IPOs that have missing returns data, the full sample consists of 2,518 IPOs. The sample covers 98.86% of IPOs that went public from the beginning of China's stock market to the recent IPO moratorium.

In order to precisely identify which among those 2,518 IPO firms are affected by sponsorship regulatory reform, I manually collected the names of the sponsor institutions and sponsor representatives from each IPO prospectus. Only those IPO firms for which I could identify their sponsoring entities' signatures from the prospectus are considered to be covered by the sponsorship regulatory reform. As of 1st June 2004, there are 1,230 IPO firms that are subject to the oversight of sponsoring entities. After removing 15 IPOs that have incomplete returns data, I was ultimately left with a subsample of 1,215 IPO firms (a coverage rate of 98.78%) to examine the hypotheses related to the characteristics of the sponsorship regulatory reform.

With respect to the data for the construction of my key independent variables, I manually collected the profiles of the sponsoring entities, the processing times of IPO admission reviews, and the penalty records of the sponsoring entities from the CSRC website. From the CNINFO website,[76] I manually collected the issuance sponsorship letters that were needed to determine the size of the risk-factor section. Finally, the stock returns and

[76] CNINFO is an IPO information disclosure website in China's stock market officially authorized by the CSRC.

financial data were taken from the China Security Market and Accounting Research (CSMAR) database.

Table 3.2 provides the distribution of the full sample of IPOs from 1992 to 2012. As shown in Panel A, 48.25% of the sample of IPO firms are affected by the sponsorship regulatory reform, and the remaining IPOs in the sample – of which 43.01% of the sample's firms went public under the quota regulatory system and 8.74% under the channel regulatory system – are subject to strong public enforcement. Probably due to the frequent moratoriums for IPO activities by the CSRC, the number of IPO firms in the sample are unevenly distributed by year. Panel A also presents the cumulative number of sponsor institutions and sponsor representatives, by year, during the period of sponsorship regulatory system. Excluding 2005, the number of IPO firms is greater than the number of sponsor institutions in any given year, suggesting that each sponsor institution takes charge of at least one IPO firm's oversight on average per year. By contrast, even though the CSRC (2003a) requires that every IPO firm is overseen by two sponsor representatives, the cumulative number of sponsor representatives is much greater than the number of IPO firms in each year.

Table 3.2 Panel B presents the distribution of the sample IPOs by industry.[77] Due to the prosperity of the manufacturing industry in China over the past two decades, 62.43% of Chinese IPOs are concentrated in the manufacturing sector. Moreover, Chinese IPOs are also highly concentrated in the wholesale and retail industry (5.84%), the real-estate industry (5.28%) and the information-technology industry (5.12%). Panel C shows that most of the sample of IPO firms (61.28%) chose to list on the Shenzhen Stock Exchange (SZSE), and the rest of the sample of IPO firms (38.72%) listed on the Shanghai Stock Exchange (SSE). To control for the potential effects due to year, industry and listing venue, I include an array of dummy variables in regressions as proxies for these effects.

[77] The categorization of industry is based on the CSRC's (2012) Guidelines for the Industry Classification of Listed Companies.

Table 3.2: Distribution of the sample of Chinese A-share IPOs over 1992 to 2012

This table presents the distribution of the full sample of Chinese A-share IPOs by year (Panel A), by industry (Panel B), and by stock exchanges (Panel C), where Panel A also shows the cumulative distributions of annually registered sponsor institutions and sponsor representatives. For brevity, in Panel A, the year distribution of IPO firms before sponsorship system (June 2004 – October 2012) presents in two subsamples: Quota System (January 1992 – March 2001) and Channel System (March 2001 – May 2004). The industry categorization is based on the CSRC's Guidelines for the Industry Classification of Listed Companies (2012 Revision).

Panel A: Distribution of IPOs and cumulative numbers of sponsoring entities by year

Year	Number of IPOs	%	Cumulative number of Sponsors	Cum %	Cumulative number of Representatives	Cum %
Quota System	1083	43.01	0	0	0	0
Channel System	220	8.74	0	0	0	0
2004	61	2.42	39	60.94	517	38.35
2005	14	0.56	47	73.44	555	41.17
2006	65	2.58	50	78.13	607	45.03
2007	126	5.00	55	85.94	785	58.24
2008	77	3.06	57	89.06	899	66.69
2009	99	3.93	62	96.88	997	73.96
2010	349	13.86	63	98.44	1173	87.02
2011	279	11.08	64	100	1323	98.15
2012	145	5.76	64	100	1348	100
Total	2518	100	64	100	1348	100

Panel B: Distribution of IPOs by industry

Industry (Code)	Number of IPOs	%
Agriculture, Forestry, Farming & Fishery (A)	45	1.79
Mining (B)	73	2.90
Manufacturing (C)	1572	62.43
Energy (D)	85	3.38
Construction (E)	69	2.74
Wholesale & Retail (F)	147	5.84
Transportation (G)	83	3.30
Lodging & Catering (H)	11	0.44
Information Technology (I)	129	5.12
Finance (J)	44	1.75
Real Estate (K)	133	5.28
Leasing & Commercial Services (L)	22	0.87
Scientific Research & Technical Services (M)	11	0.44
Environment & Utilities (N)	25	0.99
Community Services, Repair Services and Others (O)	0	0
Education (P)	1	0.04
Social Services & Health Care (Q)	4	0.16
Culture, Entertainment & Sport (R)	31	1.23
Others (S)	33	1.31
Total	2518	100

Panel C: Distribution of IPOs by stock exchanges

Stock exchanges	Number of IPOs	%
Shanghai Stock Exchange (SSE)	975	38.72
Shenzhen Stock Exchange (SZSE)	1543	61.28
Total	2518	100

3.4.2 Variable definition and methodology

In this subsection, I first defined the dependent variable used in the empirical analysis. Then, based on several hand-collected characteristics related to the sponsorship regulatory system, I constructed a number of key independent variables (also referred to as explanatory variables of interest) for examining the hypotheses. Next, I detailed the definition of the control variables introduced in the empirical analysis. Finally, I built the empirical models used for the analysis.

3.4.2.1 IPO underpricing

In this study, I use the market-adjusted initial returns of IPO firms (IR_{Market}) as the dependent variable to measure the degree of IPO underpricing,[78] where the initial returns are adjusted by subtracting the SSE/SZSE value-weighted market returns depending upon the listing venue of the IPO firms. The market-adjusted initial return is a widely used measure of IPO underpricing in the literature such as Carter et al. (1998) and Chan et al. (2004). The definition of the dependent variable IR_{Market} is as follows:

$$IR_{i,Market} = \frac{P_{i,1}}{P_{i,0}} - \frac{I_{i,1}}{I_{i,0}} \tag{3.1}$$

Where $P_{i,1}$ and $P_{i,0}$ are the first-trading-day closing price and the offer price of IPO firm *i*, respectively; and $I_{i,1}$ and $I_{i,0}$ are the market indices corresponding to IPO firm *i* on the first trading day and the offering day, respectively.

3.4.2.2 Distinguishing regulatory systems

To test Hypothesis 1, I defined a regulatory dummy variable (*D_SPONSOR*) to distinguish between IPO firms affected by the sponsorship regulatory reform and IPO firms affected by other regulatory systems prior to the reform (i.e. the quota system and/or the channel system), which takes a value of 1 if an IPO firm is managed by sponsoring entities under the sponsorship system and 0 otherwrise. I anticipated a negative coefficient estimate for this regulatory dummy variable, implying that an improvement in

[78] The empirical results obtained by using the unadjusted initial returns as the dependent variable are qualitatively similar to the results based on the market-adjusted initial returns. In fact, the pattern of the market-adjusted initial returns is very close to the unadjusted initial returns (see Table 3.3).

the legal/regulatory arrangement in China's IPO market, which reduces public enforcement and facilitates private enforcement, contributes to mitigating IPO underpricing.

3.4.2.3 Reputation measures for the sponsor institution

For Hypothesis 2a, in order to examine the certification role of the sponsor institution, I constructed five proxies to measure the reputation of the sponsor institution or the quality of its IPO oversight, which are based on the *ex ante* characteristics of the sponsor institution, as follows:

1) *SponsorDate* is the difference in years between the offering date of the IPO firm and the registration date of the sponsorship qualification, which measures the number of years a sponsor institution has been engaged in sponsorship-related activities prior to any given offering date for an IPO firm (i.e. the work experience as the role of IPO sponsor).[79] If an institution (or securities company) has served as sponsor for longer, the institution should be more sophisticated in managing the team for on-site due diligence, coordinating with individual representatives and performing an internal review of the admission documents, and therefore the more effective it should be in reducing the influence of information asymmetry in the IPO process. Also, as repeated players in the IPO markets, the sponsor institutions that hold the sponsorship certification (entrusted by the CSRC) for longer will be more reputable concerns. Therefore, it is of crucial importance for these sponsor institutions to maintain their reputation by limiting informational problems.

2) *SponsorCapital* is the registered capital of the sponsor institution. This is a measure of the size of the sponsor institution in terms of the total capital contribution of shareholders when the institution was registered as a sponsor at the CSRC. Previous research on underwriter reputation suggests that underwriters with larger amounts of capital are associated with more severe consequences of lost reputation (Michaely and Shaw, 1994). Hence, I expected that a sponsor institution with a greater amount of registered capital

[79] As a requirement of the CSRC (2003a) Decree, the sponsorship-related activities include IPOs, seasoned equity offerings (SEOs), and convertible corporate bonds.

will be more concerned with the loss of reputation and thereby be better able to perform due diligence.

3) *SponsorPersonnel* is the number of employees (including sponsor representatives and related personnel) hired by the sponsor institution. This proxy variable measures the size of the sponsor institution in terms of human capital when the institution was registered as a sponsor. It is possible that a sponsor institution that can recruit a large number of experts and/or professionals is a reputable one. Given that the quality of the on-site due diligence relies on the professionalism of the sponsorship team (organized by the sponsor institution), well-staffed sponsor institutions could have more human resources available to perform the premarket due diligence on client firms.

4) *SponsorAge* is the difference in years between the incorporation of the sponsor institution and the offering date of the IPO firm. A previous study on the reputation of Nomads, by Espenlaub et al. (2012), uses the age of the Nomad institution to measure the Nomad's reputation, and suggests that a more established institution is a more reputable concern. Following their definition, I also computed the age of the underlying institution (securities company or financial institution) as an alternative reputation measure for the sponsor institution. *Ln(SponsorAge)* presents the natural logarithm value of this proxy.

5) *D_TOP10* is an indicator variable, based on the annual ranking of the Securities Association of China (SAC) for the market share of the securities companies, in terms of the number of managed issuances, which takes a value of 1 if the sponsor institution (its underlying securities company) is placed in this Top 10 in any given offering year for the IPO firm and 0 otherwise.[80] Although this reputational proxy variable builds on the ranking of the securities companies instead of the ranking for its role of sponsor institution, I also anticipated that the top-ranking securities companies were still reputable concerns when they played the role of the sponsor institution.

[80] It should be noted that the 2012 rank is unavailable. By checking the previous three years' rankings, I find there are no significant changes in the Top-10 rankings. Therefore, I just used the 2011 rank to represent the 2012 rank.

3.4.2.4 Reputation measures for the sponsor representative

For Hypothesis 2b, to examine the certification role of the sponsor representative, I developed four proxies to measure the representative's reputation or the quality of IPO oversight provided by him/her, which are based on the *ex ante* characteristics of the sponsor representative, as follows:

1) Similar to the primary measure for the reputation of the sponsor institution, *RepDate* was computed as the difference in years between the offering date of the IPO firm and the registration date of the individual sponsorship qualification, which measures the number of years an individual sponsor representative has been engaged in the sponsorship-related industry prior to any given offering date for his/her managed firms. At least two possibilities exist with respect to the connection between the length of time holding a sponsorship qualification and the reputation/quality of the individual sponsor representatives. First, it is possible that the individual sponsor representatives with longer work experience have more expertise and are more reputable concerns in the sponsorship-related industry, and thus provide more credible assurance to investors about the quality of IPO firms and related information. Second, since individual sponsor representatives must annually attend the specific training held by the SAC to renew their (sponsorship) licence,[81] the representatives who have held this licence for longer could be more of an expert and more credible in performing the premarket due diligence on client firms.

2) *RepIBDExp* is the number of years that an individual sponsor representative has been working in the investment-banking division (IBD) prior to any given offering date of his/her managed firms, which measures the IBD work experience of the sponsor representatives.[82] Work experience in the investment-banking industry is an important requirement for individuals to become individual sponsor representatives, and the CSRC requires that the individuals must have around three years of IBD experience before getting a sponsorship licence. This is probably because the individuals who have longer

[81] The trainings include but not limited to ethics, regulatory advices, and skills of due diligence.
[82] I get rid of the work experiences that are not related to share issues, such as factory workers, medical doctors, engineers, M&A, and stock broker.

IBD work experience may be more of an expert in performing due diligence on IPO firms. Also, the individual entities with senior levels of experience in the investment-banking industry may be more concerned with their reputational capital, and thereby provide more credible assurance about the quality of IPO firms and related information.

3) *RepAge* is the age of the sponsor representative at the date of the managed IPO. This proxy variable is similar to the previously defined proxy of SponsorAge, which is used for measuring the institution's reputation. *Ln(RepAge)* represents the natural logarithm value of this proxy. I expected that the mature sponsor representatives may follow the code of sponsorship ethics strictly and be more concerned about their reputation in the sponsorship-related industry, and therefore they are more credible in reducing the information asymmetry during the IPO process.

4) *D_RepEdu* is an indicator variable that measures the individual sponsor representative's education level, which takes a value of 1 if the representative holds a master's degree or PhD, and 0 otherwise. It is possible to connect the level of education with the individual representative's reputation, in that a representative with a higher level of education may provide a greater level of screening and oversight for the IPO firms.

In practice, each IPO firm under the sponsorship regulatory system is managed by two sponsor representatives. To address this issue, I built my key independent variables for the representative's reputation by taking the highest value of those reputation measures between the two sponsor representatives. The assumption behind that is the quality of IPO oversight or due diligence depending on the most reputable representative within a sponsorship team consisting of two sponsor representatives.

3.4.2.5 Risk factors revealed by sponsoring entities

Regarding Hypothesis 3, I defined the variable *RISK* as the number of risk factors revealed in the issuance sponsorship letter, which measures the size of the risk-factor-disclosure section produced by sponsoring entities. Previous research (Beatty and Welch, 1996; Arnold et al., 2010) uses the number of risk factors listed in the prospectus as a proxy of *ex ante* uncertainty of the offerings. Hanley and Hoberg (2010) argue that a greater effort in premarket due diligence reveals more information about risk, enriches informative content, improves pricing accuracy and thus reduces IPO underpricing. Therefore, if sponsoring entities have put more effort into premarket due diligence, then I anticipated that their production of the risk-factor-disclosure section will be informative and be negatively related to the degree of IPO underpricing.

3.4.2.6 Processing times for the IPO admission review

To test Hypothesis 4, I used the processing times of the IPO admission review conducted by the Issuance Examination Commission of the CSRC (*ApprovalCSRC*) as a proxy to measure the strength of public enforcement under the sponsorship system, where the variable ApprovalCSRC was calculated using the net working days between the submission date of the IPO admission documents and the approval date for the submission. La Porta et al. (2006) suggest that the public enforcer should be effective if it facilitates the recruitment of professional staff and prevents political interference. Since the Issuance Examination Commission of the CSRC has been changed to be well staffed (having recruited financial professionals and reduced the number of official administrative positions) after the sponsorship regulatory reform, I anticipated that public regulatory enforcement via this composition change will improve the efficiency of the IPO market, which implies a decreasing function between the processing times of the IPO admission review carried out by the CSRC and the degree of IPO underpricing.

3.4.2.7 Disciplinary actions

For Hypotheses 5a and 5b, I developed two indicator variables, *D_PENALTY1* and *D_PENALTY2*, to capture the IPO firms managed by sponsor institutions and sponsor representatives who have the record of disciplinary actions, respectively. For D_PENALTY1, it takes a value of 1 for the IPOs after the sponsor institutions' disciplinary proceedings, otherwise the dummy variable takes a value of 0 for the IPOs before the sponsor institutions' disciplinary proceedings. For D_PENALTY2, it takes a value of 1 for the IPOs after the sponsor representatives' disciplinary proceedings, otherwise the dummy variable takes a value of 0 for the IPOs before the sponsor representatives' disciplinary proceedings. I anticipated that disciplinary actions enforced by the CSRC have influenced the reputation of sponsoring entities, such that sponsoring entities have the motivation to rebuild their reputation and conduct a higher level of due diligence on the subsequent IPO firms. Thus, if the disciplinary action is able to be effective against the weak oversight of sponsoring entities, I expected to see a reduction in the underpricing of IPOs managed by sponsoring entities following their disciplinary actions.

3.4.2.8 Control variables

In addition to the aforementioned explanatory variables of interest, I also introduced some control variables that are found to affect IPO underpricing in the previous literature. With respect to the firm- and offer-specific characteristics, the size of the IPO firm in terms of total assets (*FirmSize*) and the pre-IPO profitability in terms of the firm's return on assets (*ROA*) have been extensively used in previous IPO-underpricing studies to measure the degree of information asymmetry or the risk of *ex ante* uncertainty (e.g. Loughran and Ritter, 2004; Tian, 2011; Chen et al., 2015; Jia et al., 2016), where the large and profitable firms should be lower risk or have less information asymmetry. Huyghebaert and Quan (2009) find that the cross-listed firms in China's IPO market are underpriced significantly more than the domestic-only IPO firms. In this regard, I set an indicator variable (*D_BHoffer*) that was given a value of 1 if my sample A-share IPOs also have cross-listed stocks on the B- or H-share markets, and 0 otherwise.[83] As with the certification role of prestigious underwriters, in theory, the use of a prestigious auditor may also be helpful in reducing IPO underpricing (Balvers et al., 1988). I therefore employed an indicator variable (*D_Big4*) to control the potential effect of a prestigious auditor, which was given a value of 1 if the IPO firm is backed by an international Big-Four auditor and 0 otherwise.

Jenkinson and Ljungqvist (2001), and Ritter and Welch (2002) suggest that the ownership structure of IPO firms contributes to explaining the underpricing of the new stock issues.

[83] B-share refers to the shares that are listed on China's mainland market but traded in foreign currencies, where firms went public through the B-share market following international accounting standards. H-share refers to the IPO shares that are listed and traded on the Hong Kong stock market.

One of the important characteristics of Chinese IPO firms is the block of shares owned by the state. Although there is inconclusive evidence on the relation between the ownership of state-owned enterprises (SOEs) and IPO underpricing (e.g. Francis et al., 2009; Chen et al., 2015; Jia et al., 2016), I used an indicator variable (*D_SOE*) to control the potential influence of the state ownership, which was given a value of 1 if the firm is owned by the state and 0 otherwise. Fan et al. (2007) find that the greater the percentage of a Chinese IPO firm's shares that are owned by its largest shareholder, the lower the level of underpricing. In this context, I introduced the control variable of *LargestOwnership* into regression models, which was computed as the proportion of the firm's shares held by the largest shareholder at the time of the IPO. Some Chinese firms offer two types of shares (tradable and non-tradable shares) when they go for IPO, and Chan et al. (2004) find that the larger percentage of non-tradable shares retained by Chinese IPO firms decreases the level of underpricing. To control this potential effect of the non-tradable ownership block, I included the control variable of *NonTradable*, which is a ratio of the firm's non-tradable shares to its total shares. Jia et al. (2016) predict that fewer shares being sold to investors increases the market demand for IPO shares and thereby leads to greater IPO underpricing, and they find a strongly positive connection between share overhang and underpricing in China's IPO market. This is consistent with the results reported in previous research on the US IPO market (e.g. Bradley and Jordan, 2002). I also included the control variable of *Overhang*, which measures the scarcity of IPO shares and was computed as the number of shares retained divided by the number of shares offered.

Finally, a striking feature of the institutional environment of China's IPO market is the long waiting time for IPO firms to list on the stock exchanges; most studies (Mok and Hui, 1998; Su and Fleisher, 1999; Chan et al., 2004; Chen et al., 2004; Fan et al., 2007; Tian, 2011) suggest that a longer listing lag increases the *ex ante* uncertainty about the firm's offer and thus leads to higher IPO underpricing. To control for this potential effect of the China's institutional feature, the *ListingLag* variable was included in regression models to measure the IPO firms' waiting time for listing on stock exchanges, and was computed as the number of days between the offering date and the listing date.

3.4.2.9 Empirical models

With respect to the empirical model, cross-sectional ordinary least squares (OLS) regressions with the use of market-adjusted initial returns (IR_{Market}) as the dependent variable were run to formally examine the hypotheses. Independent variables were defined in detail in Subsections 3.4.2.2 to 3.4.2.8, and a relevant summary of variable definitions was reported in Appendix 2. In order to control for the potential effects of industry, year and listing venue on IPO underpricing, all regressions have included an array of *Industry dummy variables*, covering each industry sector according to the CSRC's (2012) Guidelines for the Industry Classifications of Listed Companies; an array of *Year dummy variables*, indicating the calendar years of the IPOs; and an *Exchange listing dummy variable* (e.g. Fan et al., 2007), which takes the value 1 if the IPO stock was listed on SSE and 0 otherwise. A baseline regression model is as follows:

$$\begin{aligned} IR_{i,Market} = {} & \alpha + \beta_1 * [Explanatory\ variables\ of\ interest]_i + \sum_{j=1}^{9} v_j * [Control\ variables]_{j,i} \\ & + \sum_{k} [Exchange\ listing\ dummies]_{k,i} + \sum_{l} [Year\ dummies]_{l,i} \\ & + \sum_{m} [Industry\ dummies]_{m,i} + \varepsilon_i \end{aligned} \tag{3.2}$$

Where the assumption behind the model is homoscedastic errors in the residuals (i.e. standard errors under the assumption of independent and identically distributed errors). This assumption works toward being too inclusive. Given that the distribution of market-adjusted initial returns is not normally distributed,[84] the assumption of homoscedastic errors produces downward biased standard errors. To address this issue, when reporting estimation results, I used different assumptions about the residuals in the error term. For example, I used the method of Huber (1967) and White (1980) that assumes independent but not identically distributed errors (i.e. heteroscedastic errors); I reported the test statistics that are based on standard errors under the assumption of neither independent nor identically distributed errors (i.e. heteroscedasticity with correlated errors by sponsor); and I also used the bootstrap method of Efron and Tibshirani (1993) and reported the test

[84] The market-adjusted initial returns have a coefficient of skewness of 2.43 and a coefficient of kurtosis of 10.72.

statistics that are based on bootstrapped standard errors (for the relevant results, see Subsection 3.5.5.3).

3.4.3 Descriptive statistics

Figure 3.1 illustrates the annual average initial returns (left-hand-side [LHS] lines) and the distribution of IPO volumes (right-hand-side [RHS] bars) for the sample of China's A-share IPOs from 1992 to 2012. A striking feature that can be observed from the Figure is a clearly decreasing trend of the average underpricing of Chinese IPOs over the long term, especially where the average level of underpricing during the post-sponsorship-reform period (i.e. 2004 to 2012) is much lower than during the pre-sponsorship-reform period (see the horizontal dotted lines in Figure 3.1 for comparisons of the average underpricing across regulatory systems). This is in sharp contrast to the pattern reported by Chambers and Dimson (2009), who present evidence that the average level of UK IPO underpricing has an increasing trend over the very long term following a series of improvements in regulation, disclosure and underwriting quality. Focusing on the sponsorship regulatory reform, the emphasis of my research is to investigate how such a sponsorship legal/regulatory arrangement, formulated by developed economy (UK), has an influence on the efficiency of the IPO market (in terms of underpricing) in the largest emerging economy (China).

Figure 3.1: Time series of underpricing (LHS lines) and volume (RHS bars) for China's A-share IPOs, 1992 to 2012

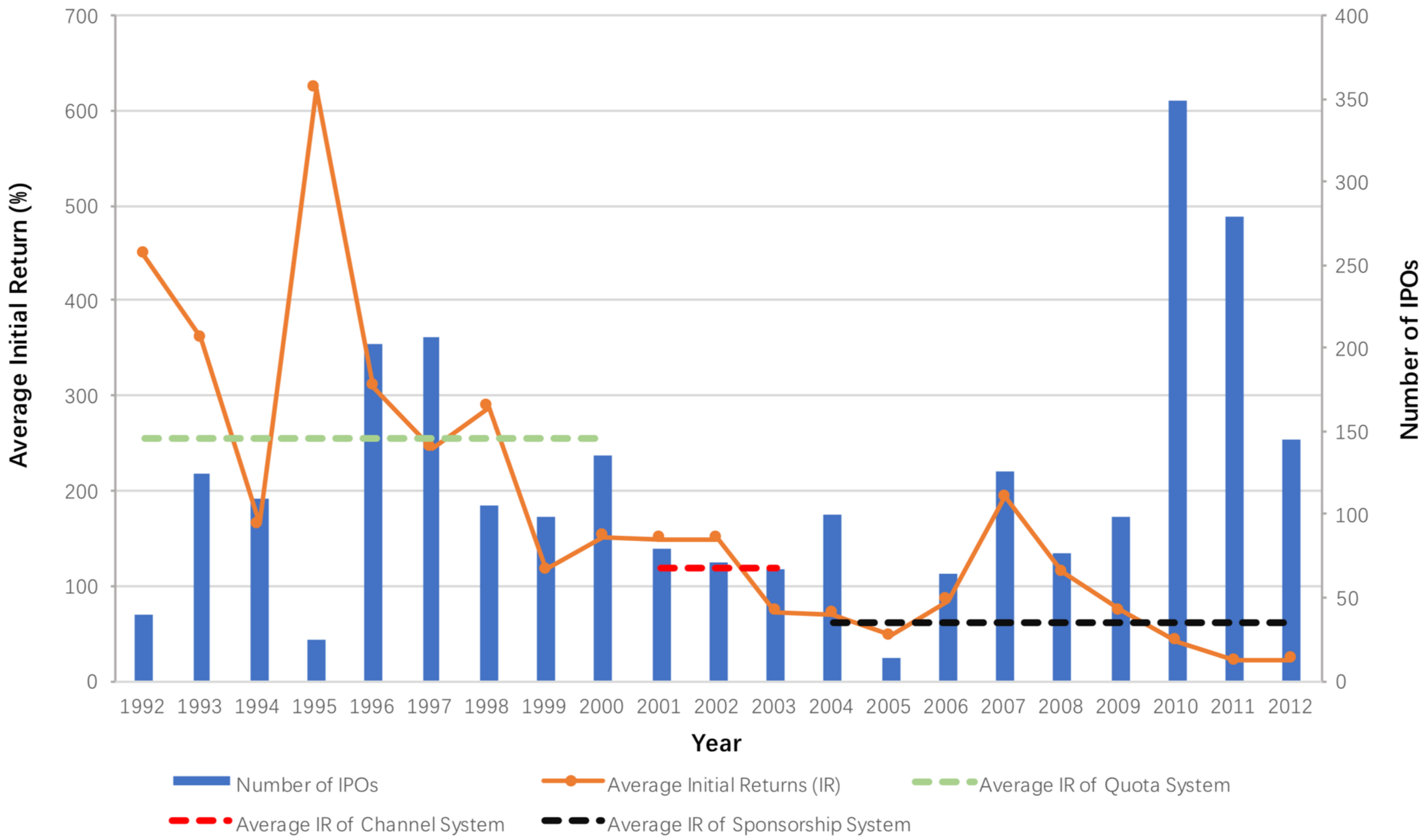

Table 3.3 presents the descriptive statistics for the characteristics of the sample IPO firms. As shown in Panel A, approximately 50% of sample firms (1,215 IPOs) went public during the post-sponsorship-reform period, and the mean and median underpricing of these IPO firms are 61.26% and 37.67%, respectively. Although this underpricing level is still greater than for many other countries (for the country-level evidence of IPO underpricing, e.g. Loughran et al., 1994; Ljungqvist, 2007), it has been significantly reduced relative to the average and median underpricing levels before China's sponsorship regulatory reform, e.g. 254.50% and 131.80%, respectively, for the quota regulatory period, and 119.38% and 91.72%, respectively, for the channel regulatory period. In other words, the indirect cost of going public in China after the sponsorship reform is on average two to four times less than before the reform. This confirms my expectation that a pattern of legal/regulatory arrangement that reduces public regulatory enforcement and facilitates private sector oversight will be helpful for mitigating the extreme underpricing in China's IPO market.

Panel B of Table 3.3 indicates that there are significant differences in the firm- and offer-specific characteristics between sponsoring-entity-backed IPOs and non-sponsoring-entity-backed IPOs. With respect to the firm-specific characteristics, the IPO firms screened by sponsoring entities are, on average, larger in terms of total assets (FirmSize) and more profitable (ROA) than the firms without the oversight of sponsoring entities. In the context of the asymmetric information model, these sponsoring-entity-backed IPO firms should be lower risk (or subject to less information asymmetry) and thereby underpriced less. For the offer-specific characteristics, the ratios of share overhang indicate that the sponsoring-entity-managed IPO firms (3.49%) are (on average) inclined to offer more shares to the public than the firms without the management of sponsoring entities (7.49%), which is comparable to the reports of Jia et al. (2016). Also, relative to the non-sponsoring-entity-backed firms, the group of sponsoring-entity-backed IPO firms is not willing to retain a high percentage of the offers as non-tradable shares (NonTradable) or a large proportion of the firm's shares for the largest shareholder (LargestOwnership). This implies that the IPO firms covered by the sponsorship regulatory model face lower agency costs and higher liquidity. The institutional environment (in terms of the IPO firm's ListingLag) during the post-reform period also has been changed relative to the pre-reform period, where the IPO firms' average waiting time for listing on stock exchanges is significantly lower during the post-reform period (12 days) than during the pre-reform period (205 days). This suggests a pronounced reduction in the uncertainty about the firm's offers during the post-sponsorship-reform period, and thereby a lower level of IPO underpricing. The coverage rate of the indicator variable D_SOE shows that 62.7% of the firms that went public during the pre-sponsorship-reform period are SOEs, and the sponsoring entities prefer to select private firms to go public. Finally, the coverage rate of the indicator variable D_Big4 shows that there are a few firms using an international Big-Four auditor as their IPO accountant (4.8% of IPO firms), suggesting that the market share of international Big-Four auditors in China's IPO market is very low.

Table 3.3 Panel C presents the summary statistics of the key independent variables. Concerning the number of years' experience for sponsoring entities that engaged in sponsoring activities prior to the offering date of the managed IPO firms, sponsor institutions have a slightly longer work experience on average (SponsorDate = 4.746 years) than sponsoring representatives (RepDate = 4.016 years). In addition, individual representatives have approximately 10 years of work experience in the IBD (RepIBDExp) on average. This implies that, before getting the sponsorship licence, most individual sponsor representatives have been an expert in securities underwriting. With respect to the length of the CSRC review of the IPO admission documents, I find that the average processing time of IPO applications is quite long (215 net working days) and more than half of the sample's IPO firms are subject to the CSRC's admission review for at least 177 net working days.[85] As shown in the bottom row of Panel C, there are lower coverage rates for the indicator variables D_PENALTY 1 and 2 (18.6% and 31.9%, respectively), suggesting that there is a pronounced decline in the number of IPOs managed by sponsoring entities after having undergone disciplinary actions. For example, the number of IPOs managed by sponsor institutions is 371 [= 456*(1-18.6%)] before introducing

[85] There are about 250 net working days per year in China.

penalties for institutions, while this number dramatically declines to 85 [= 456*18.6%] after introducing penalties for institutions. The possible interpretation of this result is that disciplinary actions cause damage to reputation. Additionally, it appears that a sponsor institution is more sensitive to the loss of reputational capital than an individual sponsor representative because the former has a more dramatic decrease in sponsoring activities than the latter after undergoing disciplinary action from the CSRC. Therefore, these results imply that public enforcement in terms of non-criminal penalties has a deterrent effect on the private entities.

Table 3.3: Descriptive statistics

This table presents descriptive statistics on the sample of China's A-share IPOs. Panel A presents the univariate comparisons of initial returns (IR) across regulatory systems, and especially for the comparisons of IR between the post-sponsorship-reform period and pre-sponsorship-reform period, where the market-adjusted IR is the initial returns that are adjusted by the SSE or the SZSE value-weighted market returns depending upon the listing venue of the IPO firms. Panel B presents the comparisons of firm- and offer-specific characteristics (i.e. control variables) between the post-sponsorship-reform period and the pre-sponsorship-reform period, where the FirmSize (i.e. total assets) is measured in Chinese Yuan (RMB) of 2000 purchasing power using China's GDP deflator. Panel C reports the descriptive statistics for the characteristics related to sponsorship system (i.e. key independent variables). Definitions of all variables are discussed in detail in Subsection 3.4.2 and summarised in Appendix 2. *t*-tests and Wilcoxon-Mann-Whitney tests are provided for mean and median comparisons in Panel A and Panel B. ***, ** and * denote significance at 1%, 5% and 10% level, respectively.

Panel A: Comparisons of IPO underpricing across regulatory systems

	Pre-sponsorship-reform (Non-sponsoring-entities-backed IPOs)						Post-sponsorship-reform (Sponsoring-entities-backed IPOs)		
	Quota regulatory model			Channel regulatory model (Transition)			Sponsorship regulatory model		
	N	Mean	Median	N	Mean	Median	N	Mean	Median
Unadjusted IR (%)	1083	254.534	130.509	220	119.262	91.241	1215	61.104***	37.278***
Market-adjusted IR (%)	1083	254.503	131.799	220	119.383	91.715	1215	61.257***	37.669***

Panel B: Firm- and offer-specific characteristics (control variables)

	Pooled sample			Pre-sponsorship-reform (Non-sponsoring-entities-backed IPOs)			Post-sponsorship-reform (Sponsoring-entities-backed IPOs)		
Variable	N	Mean	Median	N	Mean	Median	N	Mean	Median
ROA (%)	2210	13.562	12.027	1002	12.324	10.681	1208	14.588***	13.158***
FirmSize (¥m)	2373	22400	566	1161	1780	388	1212	42100**	787***
ListingLag (day)	2518	112.066	15	1303	205.130	28	1215	12.263***	11***
Overhang	2518	5.559	2.968	1303	7.491	2.5	1215	3.486**	2.999***
LargestOwnership (%)	2473	43.420	42.500	1258	47.803	49.120	1215	38.881***	37.749***
NonTradable (%)	2518	25.285	6.051	1303	37.545	43.129	1215	12.137***	0***
D_SOE	2518	0.408	0	1303	0.627	1	1215	0.174	0
D_BHoffer	2518	0.061	0	1303	0.085	0	1215	0.035	0
D_Big4	2518	0.048	0	1303	0.039	0	1215	0.058	0

Panel C: Characteristics related to sponsorship system (key independent variables)					
	Sponsoring-entities-managed IPOs				
Variable	N	Min	Max	Mean	Median
SponsorDate (year)	969	0	8	4.746	5
SponsorCaptial (¥m)	969	100	11016.900	4589.043	5000
SponsorPersonnel	969	36	664	284.954	260
SponsorAge (year)	969	0	24	12.579	14
D_TOP10	1156	0	1	0.483	0
RepDate (year)	1125	0	8	4.016	4
RepIBDExp (year)	1106	2	18	10.483	10
RepAge (year)	1106	25	49	37.763	38
D_RepEdu	1106	0	1	0.914	1
RISK	1156	0	35	6.644	5
ApprovalCSRC (day)	1131	5	1007	215.441	177
D_PENALTY1	456	0	1	0.186	0
D_PENALTY2	116	0	1	0.319	0

3.4.4 Correlation analysis

To examine the univariate relationships or correlations among the variables used in this study, Pearson correlation coefficients are estimated and reported in Table 3.4. As expected, most relationships given by the correlation coefficients between the market-adjusted initial returns of IPOs and the explanatory variables of interest are in line with the directions predicted by the hypotheses. For example, as shown in the upper triangle of the matrix, the regulatory dummy variable (D_SPONSOR) is negatively related to the market-adjusted initial return, indicating that firms that went public during the post-sponsorship-reform period are associated with lower IPO underpricing. Moreover, as shown in the lower triangle of the matrix, most reputation measures have a negative association with the market-adjusted initial return, suggesting that IPO firms with reputable sponsor institutions and reputable sponsor representatives appear to suffer less underpricing. In particular, in terms of the strength of the relationship, the correlations between market-adjusted initial returns and the primary reputation measures (e.g. for sponsor institutions, SponsorDate = -0.40; and, for sponsor representatives, RepDate = -0.24) are more stronger than other reputation measures. Additionally, several reputation measures are highly correlated, such as the correlation coefficient between SponsorCapital and SponsorPersonnel is 0.74 and the correlation coefficient between SponsorCapital and D_TOP10 is 0.77. Hence, in order to avoid multicollinearity, I will not include these reputation measures in the same regression model.[86]

As for the correlations between control variables and market-adjusted initial returns, I found that the longer the candidate firms wait for listing on the stock exchanges, the higher the underpricing of their IPO stocks. This relationship (i.e. the correlation between ListingLag and IR_{Market} = 0.69) is particularly strong when examining the full sample of IPO firms listed over the period 1992 to 2012. This implies that the institutional or listing environment of China's IPO market brings considerable uncertainty to candidate firms and market participants.

[86] The overall value of the VIFs across all multivariate regressions never exceeded 3.0, and the individual VIFs for the measures included in the regression models never exceeded 10, which confirm the non-existence of multicollinearity in this study.

Table 3.4: Pearson Correlation Coefficients

This table reports the estimates of Pearson correlation coefficients for the variables used in the empirical analysis. *Upper triangle* presents the Pearson correlation matrix for the full sample of 2,518 IPOs listed over the period 1992 to 2012, including the regulatory dummy variable (D_SPONSORS) but not containing variables related to the characteristics of sponsorship system. *Lower triangle* presents the Pearson correlation matrix for the subsample of 1,215 IPOs that went public under the sponsorship system over the period 2004 to 2012, including variables related to the characteristics of sponsorship system. Definitions of all variables are discussed in detail in Subsection 3.4.2 and summarised in Appendix 2. * denotes the statistical significance of correlation coefficients at the 10% level or better, using to test the null hypothesis that there is no relationship between the variables.

		Upper triangle: Pearson correlation matrix for 2,518 IPOs listed over the period 1992 to 2012																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	IR_{Market}	1	-.28*	–	–	–	–	–	–	–	–	–	–	–	–	–	-.14*	-.11*	-.06*	-.00	.08*	.10*	.04*	.69*	.02
2	D_SPONSOR	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	.20*	.13*	.05*	-.10*	-.46*	-.44*	-.25*	-.23*	-.04*
3	RepDate	-.24*	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4	RepIBDExp	-.20*	–	.59*	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5	RepAge	-.16*	–	.47*	.61*	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
6	D_RepEdu	-.03	–	.10*	.07*	.12*	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7	SponsorDate	-.40*	–	.47*	.31*	.32*	.08*	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
8	D_TOP10	-.03	–	-.07*	-.06*	-.07*	.00	.15*	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
9	SponsorAge	-.11*	–	.11*	.06*	.08*	.02	.59*	.27*	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
10	SponsorCapital	.02	–	-.08*	-.03	-.02	.01	.15*	.77*	.23*	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
11	SponsorPersonnel	-.00	–	-.03	.02	.02	.04	.20*	.62*	.31*	.74*	1	–	–	–	–	–	–	–	–	–	–	–	–	–
12	RISK	-.09*	–	.22*	.16*	.12*	-.02	.17*	-.01	-.01	-.09*	-.09*	1	–	–	–	–	–	–	–	–	–	–	–	–
13	ApprovalCSRC	-.10*	–	.05*	.05	.04	-.01	.02	-.00	.04	.00	.02	-.02	1	–	–	–	–	–	–	–	–	–	–	–
14	D_PENALTY1	-.05	–	.11*	.13*	.12*	.08	.24*	-.42*	.05	-.41*	-.36*	.09*	.02	1	–	–	–	–	–	–	–	–	–	–
15	D_PENALTY2	-.11	–	.33*	.15	.19*	.13	.16	.02	.17*	-.03	.15	-.07	.01	.14	1	–	–	–	–	–	–	–	–	–
16	FirmSize	-.09*	–	.05	.05	.02	.10*	-.06*	-.01	-.11*	.11*	.11*	-.26*	.05*	-.03	-.05	1	-.26*	.47*	.37*	.18*	.22*	.13*	-.09*	.05*
17	ROA	-.15*	–	.08*	.07*	.09*	-.01	.16*	.07*	.12*	.04	.09*	.11*	-.08*	-.03	.00	-.38*	1	-.09*	-.08*	-.11*	-.14*	.08*	-.11*	-.03
18	D_Big4	.00	–	-.07*	-.08*	-.07*	.03	-.14*	-.04	-.15*	-.04	-.02	-.19*	-.02	.03	.01	.56*	-.15*	1	.38*	.11*	.11*	.04*	-.05*	.01
19	D_B/Hoffer	.03	–	.00	-.02	-.04	.04	-.07*	-.00	-.07*	.08*	.09*	-.16*	-.11*	-.03	.07	.61*	-.15*	.56*	1	.17*	.17*	.06*	-0.02	.03
20	D_SOE	.14*	–	-.21*	-.16*	-.13*	-.00	-.29*	-.02	-.19*	.08*	.03	-.24*	.05*	-.03	-.05	.44*	-.21*	.28*	.35*	1	.61*	.32*	0.03	.01
21	NonTradable	.12*	–	-.19*	-.13*	-.12*	-.02	-.25*	-.01	-.17*	.08*	.01	-.24*	.07*	-.03	-.03	.49*	-.23*	.27*	.31*	.82*	1	.44*	.10*	.06*
22	LargestOwnership	.02	–	-.06*	-.00	-.03	.01	-.02	.05*	.03	.04	.06*	-.17*	.06*	-.03	.05	.21*	-.02	.12*	.08*	.24*	.29*	1	.04*	.06*
23	ListingLag	.21*	–	-.15*	-.08*	-.07*	-.03	-.25*	-.07*	-.20*	-.05	-.03	-.05*	-.09*	-.17*	-.03	.01	-.10*	.00	-.02	.04	.03	-.06*	1	.14*
24	Overhang	.03	–	.10*	.09*	.07*	.05	.04	-.03	-.07*	.00	.02	-.09*	-.04	-.04	-.09	.55*	-.07*	.38*	.52*	.18*	.20*	.11*	.23*	1
		Lower triangle: Pearson correlation matrix for 1,215 IPOs that went public under the sponsorship system over the period 2004 to 2012																							

3.5 Empirical results

3.5.1 Multivariate comparisons of IPO underpricing across regulatory systems

According to the Hypothesis 1, if the sponsorship regulatory reform is beneficial to the efficiency of China's IPO market, I anticipated that the underpricing of IPO firms that went public during the post-sponsorship-reform period is lower than firms that went public during the pre-sponsorship-reform period. In this subsection, I employed the regulatory dummy variable (D_SPONSOR) in the framework of Equation (3.2) to examine the impact of the sponsorship regulatory reform on IPO underpricing. Table 3.5 reports the estimates of cross-sectional OLS regressions with the use of market-adjusted initial returns as the dependent variable, in which the *t*-statistics were computed based on Huber-White heteroscedasticity-consistent standard errors.

Table 3.5: Multivariate comparisons of the market-adjusted initial returns across regulatory systems

This table presents the estimates of ordinary least squares regressions that compare the market-adjusted initial returns between IPOs affected by the sponsorship regulatory reform and IPOs affected by the government-dominated regulatory systems prior to the reform (i.e. the quota system and/or channel system). Panel A reports the results using a pooled IPO sample that includes IPOs under sponsorship system, channel system and quota system. Panel B presents the results excluding the IPO firms that went public under the channel regulatory system. Panel C reports the results using only private IPO firms (i.e. non-SOEs' IPOs) across the three regulatory systems. The key independent variable is the indicator variable D_SPONSOR, which equals 1 if an IPO firm is managed by sponsoring entities under the sponsorship system and 0 otherwise. Definitions of all variables are discussed in detail in Subsection 3.4.2 and summarised in Appendix 2. The market-adjusted initial returns are winsorised at the 99th percentile. All regressions include an array of year and industry dummy variables, and an exchange listing dummy variable. The Huber-White heteroscedasticity-consistent *t*-statistics are reported in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

	Panel A: IPOs of sponsorship system *versus* quota & channel systems		Panel B: IPOs of sponsorship system *versus* quota system		Panel C: Private IPO firms of sponsorship system *versus* quota & channel systems	
	Dependent variable: Market-adjusted initial returns					
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
D_SPONSOR	-0.2375**	(-2.09)	-0.8210***	(-4.44)	-0.8670***	(-4.77)
ROA	-0.8986***	(-3.34)	-0.7561***	(-2.69)	-1.083***	(-3.51)
Ln(FirmSize)	-0.1659***	(-4.94)	-0.1411***	(-3.81)	-0.1230***	(-2.60)
ListingLag	0.0045***	(14.08)	0.0045***	(13.58)	0.0040***	(11.23)
Overhang	-0.0285***	(-11.32)	-0.0287***	(-11.28)	-0.0275***	(-11.17)
LargestOwnership	-0.0024	(-1.42)	-0.0024	(-1.30)	-0.0001	(-0.06)
D_SOE	0.1087	(1.16)	0.1005	(0.95)	–	–
D_BHoffer	0.3004**	(2.42)	0.2999**	(2.21)	-0.2294	(-0.87)
D_Big4	0.1014	(1.20)	0.0571	(0.58)	0.0271	(0.24)
NonTradable	0.0847	(0.55)	0.0463	(0.27)	0.1447	(0.53)
Constant	5.0933***	(8.06)	4.4972***	(6.54)	4.8594***	(3.90)
Exchange Indicator:	Included		Included		Included	
– SSE	-0.0890	(-1.06)	-0.1065	(-1.22)	-0.2210	(-1.63)
Year Indicator	Included		Included		Included	
Industry Indicator	Included		Included		Included	
No. of Observations	2192		1980		1360	
R-squared	72.3%		72.5%		76.4%	

Panel A of Table 3.5 presents the results of multivariate comparisons of the market-adjusted initial returns between IPO firms affected by the sponsorship system and IPO firms affected by the quota and channel systems. After controlling for other relevant factors, the estimated coefficient of the D_SPONSOR indicator is negative and significant at the 5% level, suggesting that IPO firms under the effect of the sponsorship regulatory reform underprice, on average, less than IPOs under the previous regulatory models (i.e. the quota and channel systems) by 23.75%. This is in line with the earlier predictions (e.g. La Porta et al., 2002; Shleifer and Wolfenzon, 2002) that investors are willing to pay more for equity and firms can raise more funds if the legal/regulatory environment is improved to become better at protecting investors. Also, my finding supports the view of La Porta et al. (2006) that a legal arrangement that relies largely on public regulatory enforcement is unlikely to be effective for jump-starting stock-market development, whereas laws mandating particular disclosures and facilitating private enforcement can improve the efficiency of the IPO market. As shown in the bottom row of Table 3.5, the coefficient of determination (72%) is relatively higher than for the previous analysis of the underpricing of Chinese IPOs (e.g. in the literature listed in Table 3.1). Collectively, these results confirm Hypothesis 1, indicating that the indirect cost of firms going public under the sponsorship system (i.e. IPOs mainly handled by the private entities) is lower than under the government-dominated regulatory systems (i.e. IPOs mainly handled by the government agencies), and suggesting that the efficiency of China's IPO market has improved after experiencing the sponsorship regulatory reform.

In the context of La Porta et al. (2006), the strictly public regulatory enforcement requires the main government agency to take sole charge of supervising securities markets. In my sample, however, there is a subsample of IPO firms belong to the channel system (from 2001 to 2003). Under this transitional regulatory system, although the public regulator still closely inspects and monitors the process of IPO screening and oversight, it attempts to partially transfer oversight to the private sector via *interim* IPO supervisory institutions.[87] Therefore, for the IPO firms under the channel regulatory system, it is

[87] During the channel-system period, the placement of these *interim* IPO supervisors was not formally written into the Securities Laws, but it was required by IPO market regulations.

difficult to say which form of enforcement or oversight has more influence on the market-adjusted initial returns. To address this potential issue of ambiguous effects, I dropped such a subsample of IPOs related to the channel system and compared directly the degree of IPO underpricing between the quota system and the sponsorship system.

As a robustness test, shown in Panel B of Table 3.5, I replicated the regression analysis excluding the subsample of channel-system-related IPO firms. After controlling for other relevant factors, the coefficient estimate of the D_SPONSOR indicator remains negative and becomes statistically significant at the 1% level. More importantly, the economic magnitude of the coefficient estimate of D_SPONSOR (= -82.10%) is greater than the one in the specification of Panel A. This suggests that IPO underpricing is more severe if a regulatory framework (such as the quota system) lacks private enforcement and relies largely on public enforcement. Hence, the preceding result is robust with respect to using this alternative specification.

Previous literature on examining the relation between SIPs and IPO underpricing reveals that, for political and economic objectives, SOEs are inclined to sell IPO shares with large discounts in the process of privatization (Perotti, 1995; Jones et al., 1999), and such discounts of SIP shares are markedly higher in less developed capital markets (Dewenter and Malatesta, 1997). Most Chinese SOEs have also experienced large-scale SIPs through public offerings of common stock before the sponsorship regulatory reform[88], and Guo and Brooks (2008), Huyghebaert and Quan (2009), and Chen et al. (2015) find that these privatizations of SOEs underprice significantly more than those for private firms. Therefore, my results may be driven by the large-scale privatization programmes.[89]

As shown in Panel C of Table 3.5, I further tested the robustness of my results using a subsample of non-SOE's IPOs (i.e. private IPO firms), and replicated the preceding regression analysis of IPO underpricing across regulatory systems. As expected, when the

[88] As indicated in Panel B of Table 3.3, 62.7% of IPOs were SOEs during the pre-sponsorship-reform period, while this figure reduces to 17.4% during the post-sponsorship-reform period.
[89] Although I have introduced the indicator variable D_SOE into each regression to control for the potential effect of SOEs on IPO underpricing, the potential influence of large-scale privatizations before the period of sponsorship regulatory reform has still not been addressed.

analysis only takes account of private firms before and after the sponsorship regulatory reform, the estimated coefficient of the D_SPONSOR indicator is still negative and significant at the 1% level. In terms of economic magnitude, private IPO firms affected by the sponsorship regulatory reform underprice, on average, 86.70% less than private IPO firms affected by the regulatory systems prior to the reform. This magnitude is greater than the one estimated in the specification of Panel A, suggesting that private IPO firms are sensitive to the sponsorship regulatory reform. This is broadly consistent with the findings of Chen et al. (2015), who demonstrate that a better institutional or legal environment reduces the underpricing of Chinese private IPO firms more than SOEs.

With respect to the control variables in Table 3.5, most firm- and offer-specific characteristics have significant impacts on the market-adjusted initial returns. More specifically, in line with the information-asymmetry explanations (e.g. Ljungqvist, 2007) and the related empirical evidence of Chinese IPOs (e.g. Tian, 2011; Chen et al., 2015; Jia et al., 2016), I find that if a firm has larger pre-IPO assets (LnFirmSize) and better pre-IPO operating performance (ROA), this reduces underpricing considerably. Consistent with Chan et al. (2004) and Fan et al. (2007), I find that a higher level of IPO underpricing is associated with a longer waiting time between the offering date and the listing date (ListingLag), and underpricing level is not related to the venue of listing (Exchange Indicator). The signalling hypothesis of Allen and Faulhaber (1989), Grinblatt and Hwang (1989), and Welch (1989) suggests that high-quality firms are able to distinguish themselves from low-quality firms by underpricing IPO shares, so good-quality firms should be associated with a greater IPO discount. The positive and significant coefficient estimates of the D_BHoffer indicator support the signalling hypothesis, in which I considered those cross-listed firms facing dual listing standards (i.e. A-share along with one of B-share and/or H-share listing rules) as high-quality firms. In examining the full sample of IPOs, I find that share overhang is negatively and significantly related to IPO underpricing; however, consistent with the results of Jia et al. (2016), I find a positive and significant relationship between share overhang and underpricing when examining the sample of Chinese IPOs over 2004 to 2012. Finally, with respect to the potential effect of firm ownership, I do not find that the ownership concentration (LargestOwnership), state-owned firms (D_SOE) and non-tradable ownership blocks (NonTradable) have a significant association with the market-adjusted initial returns. Also, the use of an international Big-Four auditor (D_Big4) is unlikely to mitigate underpricing. This may be because all international auditing firms that operate in China must cooperate with local auditing firms using Chinese accounting standards (i.e. the performance of the Big-Four auditor may be affected by the local auditors' decisions).

Overall, the results obtained in this subsection suggest that the sponsorship regulatory reform that moves towards private sector oversight is beneficial to the efficiency of China's IPO market in terms of mitigating underpricing. The results are robust when accounting for the potential effects due to the channel system and the privatization programme. Therefore, the results cast doubt on the effectiveness of purely public regulatory enforcement (i.e. the main government agency takes sole charge of supervising markets) in controlling the indirect cost of going public.

3.5.2 Impact of sponsoring entities' reputation on IPO underpricing

The crucial improvement from Securities Law II and the CSRC (2003a) Decree is facilitating private enforcement through liability rules between sponsoring entities and their client firms, where sponsor institutions and sponsor representatives are entrusted by the public enforcer to take charge of IPO oversight (this refers to performing due diligence, monitoring candidate firms and intermediary agencies, and ultimately attesting to the credibility of information disclosures and the viability of IPO candidate firms). These sponsoring entities, which interact repeatedly with the issuance market, have reputation capital at stake. Within an asymmetric information framework, the greater the reputation of the investment banks, the more effective and credible they are in revealing the information about the value of the issuers, and thus generate a lower IPO underpricing level (Booth and Smith, 1986; Chemmanur and Fulghieri, 1994). Therefore, the decline in IPO underpricing during the post-sponsorship-reform period should relate to the introduction of private-sector oversight. To examine the certification hypotheses for both sponsor institutions and sponsor representatives, I employed the reputation measures for sponsoring entities as the explanatory variables of interest in the framework of Equation (3.2).

Table 3.6 Panel A presents the results of the pooled OLS regressions that were used to examine the impact of sponsor institutions' reputation on the market-adjusted initial returns of IPOs.[90] To assess the significance of the regression coefficients, I used *t*-statistics based on cluster-adjusted standard errors, where the observations are clustered at the sponsor level to take account of any potential error dependence within each sponsor. As shown in column (1), the estimated coefficient of my primary reputation measure (SponsorDate) is negative and significant at the 1% level, suggesting that sponsor institutions that have longer work experience in a sponsorship-related industry contribute to reducing IPO underpricing more. By contrast, the remaining reputation proxies have relatively low explanatory power regarding the cross-sectional variation of the market-adjusted initial returns. For example, as shown in column (2), the coefficient estimate of the D_TOP10 indicator is negative but insignificant, suggesting that the use of the Top-10 securities companies as IPO sponsors has little association with lower underpricing.[91] This finding is consistent with Chen et al. (2015), who also use the ranking of securities companies / underwriters to measure the underwriting quality in China's IPO market and document an insignificant relationship between this reputation measure and underpricing. As shown in column (3), while the more established sponsor institutions (LnSponsorAge) have an association with a lower IPO underpricing, the evidence there is weak in terms of statistical significance. In columns (4) and (5), the coefficient estimates of SponsorCapital and SponsorPersonnel are insignificant, suggesting that sponsor institutions with greater registered capital and human capital have a limited contribution to mitigating IPO underpricing. Finally, as shown in column (6), all reputation measures

[90] The analysis of the reputation effect of sponsoring entities with fixed-effects models is discussed in Subsection 3.5.5.1.

[91] Because there is no specific ranking for the role of the sponsor in China's stock market, I use the ranking of securities companies / underwriters listed by the SAC as a substitution. However, if there were a ranking for the role of sponsor, it may be different from the ranking for the role of underwriter played by securities companies. Specifically, the underwriter ranking counts both lead- and co-managers served by the securities companies for all stock businesses, while the sponsor ranking should only count the lead-managers served by securities companies for IPO, SEO and convertible bond businesses. Consequently, the ranking of underwriters may not exactly reflect the reputation of securities companies with respect to their role of sponsor.

were included in the analysis.[92] For this specification, only the coefficient estimate of SponsorDate remains negative and significant at the 1% level, which suggests that SponsorDate, as a proxy for sponsor reputation, outperforms the other reputation measures in explaining the cross-sectional variation of the market-adjusted initial returns. Interestingly, when putting all the reputation measures together, the sign of the coefficient estimate on the proxy of Ln(SponsorAge) turns to be positive. This is broadly consistent with the findings of Aggarwal et al. (2002) and Lowry et al. (2010), who interpret the positive correlation as issuers value the other services provided by reputable investment banks rather than the capability of pricing. In this case, it is possible that more established sponsor institutions can provide some services that attract client firms to accept lower offer prices (i.e. greater underpricing). Collectively, the results reported in Table 3.6 Panel A confirm Hypothesis 2a, the sponsor institutions' certification hypothesis, which suggests that more prestigious sponsor institutions can effectively and credibly certify the value of the firm's offer and ultimately contribute to lower IPO underpricing.

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[92] As SponsorCapital (i.e. registered capital) and SponsorPersonnel (i.e. human capital) are highly correlated with each other and with the other reputation measures, I do not introduce them simultaneously into the regression along with the other proxies.

Table 3.6: The impact of sponsoring entities' reputation on the market-adjusted initial returns of IPOs

This table presents the results of cross-sectional OLS regressions that examine the impact of sponsoring entities' reputation on the market-adjusted initial returns of Chinese IPOs under the sponsorship system. Panel A reports the results of the regressions that examine the impact of sponsor institutions' reputation by using the five reputation measures of sponsor institutions as key independent variables (i.e. SponsorDate; D_TOP10; LnSponsorAge; SponsorCapital; and SponsorPersonnel). Panel B reports the results of the regressions that examine the impact of individual sponsor representatives' reputation by using the four reputation measures of sponsor representatives as key independent variables (i.e. RepDate; RepIBDExp; LnRepAge; and D_RepEdu). Definitions of all variables are discussed in detail in Subsection 3.4.2 and summarised in Appendix 2. The market-adjusted initial returns are winsorised at the 99th percentile. All regressions include an array of year and industry dummy variables, and an exchange listing dummy variable. The *t*-statistics, based on cluster adjusted standard errors where the observations are clustered at the sponsor level to take account of potential error dependence within each sponsor, are given in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

Panel A: Examine the impact of sponsor institutions' reputation						
	Dependent variable: Market-adjusted initial returns					
	(1)	(2)	(3)	(4)	(5)	(6)
SponsorDate	-0.0752 ***					-0.1054 ***
	(-3.75)					(-4.59)
D_TOP10		-0.0345				0.0182
		(-1.24)				(0.60)
Ln(SponsorAge)			-0.0448 *			0.1200 ***
			(-1.83)			(2.74)
SponsorCapital				0.000003		
				(0.71)		
SponsorPersonnel					0.00004	
					(0.65)	
ROA	-1.4005 ***	-1.4401 ***	-1.4986 ***	-1.5275 ***	-1.5290 ***	-1.4093 ***
	(-6.00)	(-6.29)	(-6.48)	(-6.49)	(-6.39)	(-5.94)
Ln(FirmSize)	-0.2182 ***	-0.1982 ***	-0.2173 ***	-0.2195 ***	-0.2194 ***	-0.2215 ***
	(-7.57)	(-7.47)	(-7.65)	(-7.59)	(-7.68)	(-7.66)

ListingLag	0.0035	0.0054 **	0.0049 *	0.0054 **	0.0054 **	0.0040 *
	(1.52)	(2.15)	(1.90)	(2.07)	(2.06)	(1.82)
Overhang	0.0370 ***	0.0335 ***	0.0359 ***	0.0361 ***	0.0361 ***	0.0375 ***
	(4.16)	(4.36)	(4.47)	(4.56)	(4.57)	(4.21)
LargestOwnership	0.0027 **	0.0016	0.0027 **	0.0026 **	0.0026 **	0.0024 *
	(2.07)	(1.31)	(2.11)	(2.05)	(2.03)	(1.87)
D_SOE	0.1380	0.1246	0.1336	0.1376	0.1381	0.1526
	(1.44)	(1.42)	(1.38)	(1.43)	(1.44)	(1.59)
D_BHoffer	0.2372 *	0.2693 *	0.2620 *	0.2569 *	0.2575 *	0.2219
	(1.65)	(1.93)	(1.76)	(1.68)	(1.68)	(1.49)
D_Big4	0.0339	0.0108	0.0487	0.0669	0.0651	0.0590
	(0.41)	(0.13)	(0.57)	(0.80)	(0.78)	(0.74)
NonTradable	0.0396	0.0777	0.0987	0.1018	0.1054	0.0229
	(0.35)	(0.68)	(0.87)	(0.89)	(0.94)	(0.20)
Constant	5.4244 ***	4.6271 ***	5.0347***	4.9498 ***	4.9574 ***	5.3766 ***
	(8.64)	(8.71)	(8.61)	(8.74)	(8.71)	(8.68)
Exchange Indicator:	Included	Included	Included	Included	Included	Included
– SSE	0.0557	-0.0185	0.0110	0.0140	0.0135	0.0821 *
	(1.16)	(-0.41)	(0.25)	(0.32)	(0.31)	(1.65)
Year Indicator	Included	Included	Included	Included	Included	Included
Industry Indicator	Included	Included	Included	Included	Included	Included
No. of Observations	969	1137	969	969	969	969
R-squared	51.2%	48.9%	49.3%	49.2%	49.2%	51.6%

(continued on next page)

Table 3.6 (continued)

Panel B: Examine the impact of sponsor representatives' reputation					
	Dependent variable: Market-adjusted initial returns				
	(1)	(2)	(3)	(4)	(5)
RepDate	-0.0208 ***				-0.0139
	(-3.32)				(-1.57)
RepIBDExp		-0.0156 ***			-0.0135 *
		(-2.77)			(-1.84)
Ln(RepAge)			-0.1844		0.0863
			(-1.06)		(0.39)
D_RepEdu				0.0156	0.0144
				(0.18)	(0.15)
ROA	-1.4600 ***	-1.4262 ***	-1.4418 ***	-1.4577 ***	-1.4384 ***
	(-6.44)	(-5.76)	(-5.80)	(-5.94)	(-5.77)
Ln(FirmSize)	-0.2031 ***	-0.1978 ***	-0.2011 ***	-0.2019 ***	-0.1982 ***
	(-7.59)	(-7.50)	(-7.59)	(-7.55)	(-7.40)
ListingLag	0.0047 *	0.0050 **	0.0050 *	0.0049 *	0.0049 *
	(1.76)	(1.96)	(1.89)	(1.84)	(1.90)
Overhang	0.0386 ***	0.0381 ***	0.0380 ***	0.0380 ***	0.0381 ***
	(5.13)	(5.40)	(5.25)	(5.22)	(5.23)
LargestOwnership	0.0016	0.0017	0.0016	0.0016	0.0016
	(1.27)	(1.29)	(1.24)	(1.27)	(1.30)
D_SOE	0.1186	0.1074	0.1127	0.1111	0.1058
	(1.39)	(1.23)	(1.29)	(1.24)	(1.22)
D_BHoffer	0.2930 **	0.2887 **	0.2869 **	0.2902 **	0.2956 **
	(2.19)	(2.17)	(2.12)	(2.15)	(2.25)

D_Big4	-0.0079	-0.0157	-0.0041	-0.0026	-0.0168
	(-0.10)	(-0.19)	(-0.05)	(-0.03)	(-0.20)
NonTradable	0.0751	0.0853	0.0887	0.0912	0.0796
	(0.66)	(0.76)	(0.79)	(0.79)	(0.69)
Constant	4.7669 ***	4.7588 ***	5.3310 ***	4.6588 ***	4.6549 ***
	(8.72)	(8.83)	(6.13)	(8.57)	(4.38)
Exchange Indicator:	Included	Included	Included	Included	Included
– SSE	0.0001	-0.0082	-0.0109	-0.0138	-0.0043
	(0.00)	(-0.18)	(-0.23)	(-0.29)	(-0.09)
Year Indicator	Included	Included	Included	Included	Included
Industry Indicator	Included	Included	Included	Included	Included
No. of Observations	1125	1106	1106	1106	1106
R-squared	49.3%	48.3%	48.0%	47.9%	48.4%

Table 3.6 Panel B presents the estimates of pooled OLS regressions that were used to examine the impact of individual sponsor representatives' reputation on the market-adjusted initial returns of IPOs. As shown in column (1) of Panel B, consistent with the result for sponsor institutions, the estimated coefficient of my primary reputation proxy for sponsor representatives (RepDate) is also negative and significant at the 1% level. This suggests that individual sponsor representatives who have longer work experience in a sponsorship-related industry also help to reduce IPO underpricing more. Nevertheless, in terms of economic significance, the marginal contribution of sponsor representatives' work experience (in a sponsorship-related industry) to reducing IPO underpricing is lower than for sponsor institutions. Specifically, holding all other variables in the model constant, a one-year increase in the sponsor representatives' work experience leads to a reduction of 2.08% in IPO underpricing, while the expected value of IPO underpricing is reduced by 7.52% for a one-year increase in the sponsor institutions' work experience. Therefore, the certification role of sponsor institutions has more of an impact on mitigating IPO underpricing than individual representatives.

As indicated in column (2), the result with respect to the effect of sponsor representatives' reputation is robust when using the alternative reputation proxy of RepIBDExp, where the coefficient estimate of RepIBDExp is also negative and significant at the 1% level. This suggests that individual sponsor representatives who have longer work experience in the IBD also decrease the degree of IPO underpricing. For the rest of the specifications, the results in columns (3) and (4) reveal that the individual characteristics of age (LnRepAge) and educational attainment (D_RepEdu) have a relatively minor influence on IPO underpricing in terms of statistical significance.

Finally, as identified in column (5), all the four reputation measures of sponsor representatives were included in the regression. In contrast with the results for sponsor institutions, of all four of the reputation measures examined, only the alternative reputation proxy RepIBDExp remains negative and significant, while the primary reputation measure RepDate is insignificant. This result indicates that, for individual sponsor representatives, the RepIBDExp reputation proxy has a greater explanatory power than the other proxies in explaining the cross-sectional variation of the market-adjusted initial returns. The possible explanation for this is that representatives who have longer work experience in the investment-banking industry prior to obtaining sponsorship licence are more expert in performing due diligence, and thus they are more credible/effective in reducing the effect of information asymmetry and IPO underpricing. Taken together, the results reported in Table 3.6 Panel B confirm Hypothesis 2b, the sponsor representatives' certification hypothesis, which suggests that an IPO firm managed by a more reputable sponsor representative is associated with lower underpricing.[93]

Overall, the results obtained in this subsection suggest that the reputation of both sponsor institutions and sponsor representatives, which is especially measured by their work experience in the relevant industry, plays an important role in reducing the underpricing of IPO firms under the sponsorship regulatory system. This reinforces my primary conclusion that sponsorship regulatory reform, which facilitates private-sector oversight and enforcement, can increase the efficiency of the IPO market.

3.5.3 Information disclosure by sponsoring entities and IPO admission review

Following the passing of the CSRC's (2003a) Decree for the sponsorship regulatory approach, Securities Law II requires sponsoring entities to reveal their comments on the quality of IPO candidate firms in the issuance sponsorship letter. If this disclosure requirement has an impact on the efficiency of China's IPO market, I expected that certain information content revealed in the issuance sponsorship letter will explain the cross-sectional variation in the market-adjusted initial returns of Chinese IPOs. As with the previous study on the disclosure of risk-factor section in IPO prospectuses (e.g. Beatty and Welch, 1996; Arnold et al., 2010; Hanley and Hoberg, 2010), I focused my investigation on the impact of the size of the risk-factor-disclosure section in the issuance sponsorship letter on market-adjusted initial returns. Based on the view of Hanley and

[93] The estimated coefficients on control variables have similar patterns with the previous ones in Table 3.5, except that the sign of the estimated coefficients on Overhang becomes positive when examining the sample of IPOs belong to the sponsorship system over 2004 to 2012, which is consistent with the findings of Jia et al. (2016).

Hoberg (2010), if sponsoring entities have made a greater effort in premarket due diligence, I anticipated that they are inclined to provide more information or informative disclosures about risk in the issuance sponsorship letter and thus there should be a negative connection between the size of the risk-factor section and IPO underpricing. Hence, to test Hypothesis 3, I employed the number of risk factors revealed by sponsoring entities in the issuance sponsorship letter as the explanatory variable of interest in the framework of Equation (3.2).[94]

Table 3.7 Panel A presents the results of cross-sectional OLS regressions that were used to investigate the relationship between the size of the risk-factor section in the issuance sponsorship letter and the market-adjusted initial returns of IPOs. As expected, as disclosed in column (1), the coefficient estimate of the RISK variable is negative and significant at the 1% level, suggesting that a larger-sized risk-factor disclosure from sponsoring entities reduces the level of IPO underpricing. As shown in column (2), the RISK variable was introduced into the regression simultaneously with the sponsor institutions' and sponsor representatives' reputation measures.[95] For this specification, the estimated coefficient of the RISK remains negative and significant, which confirms Hypothesis 3. Moreover, consistent with the results of the reputation analyses, the coefficients of both the sponsor institutions' reputation measure (SponsorDate) and the individual representatives' reputation measure (RepIBDExp) also remain negative and significant. In particular, the economic magnitude of the coefficient estimate of the institution reputation proxy (= -7.67%) is greater than that for the representative

[94] In practice, it is difficult to apply the textual-analysis methods of either Loughran and McDonald (2011), or Hanley and Hoberg (2010) to my analysis of Chinese sponsorship documents because their techniques were developed for financial documents in an English linguistic environment. For example, the first step of Hanley and Hoberg's (2010) textual analysis is identifying the word roots. However, the word roots in Chinese linguistics are completely different from the English etymology, and the Chinese word roots are technically difficult to extract. Loughran and McDonald's (2011) method develops negative word list and a term-weighting method for financial documents. However, under different linguistic environments, it is arbitrary/inexact to treat the negative financial English words in the same way as negative financial Chinese words. Consequently, as in the early study of Beatty and Welch (1996), I chose to use the method of counting the number of risk factors.

[95] Since the representative reputation measure (RepIBDExp) outperforms the other reputation proxies in the preceding reputation analyses, I use it to replace the primary representative reputation measure (RepDate) in this specification.

reputation proxy (= -1.19%), confirming the fact that the certification role given to a sponsor institution has more of an impact on mitigating IPO underpricing than the certification role of an individual sponsor representative.

Table 3.7: Analyses of information disclosure by sponsoring entities and IPO admission review by the CSRC

This table presents the estimates of ordinary least squares regressions that investigate, 1) in Panel A, the connection between the size of the risk-factor section in the issuance sponsorship letter and the market-adjusted initial returns of Chinese IPOs under the sponsorship system; and 2) in Panel B, the relation between the degree of CSRC's regulatory review on IPO admission documents and the market-adjusted initial returns of Chinese IPOs under the sponsorship system. Key independent variables: RISK is the number of risk factors revealed by sponsoring entities in the issuance sponsorship letter; and ApprovalCSRC is the processing times of the IPO admission review conducted by the Issuance Examination Commission of the CSRC, which is calculated as the net working days between the submission date of the IPO admission documents and the approval date for the submission. Definitions of all variables are discussed in detail in Subsection 3.4.2 and summarised in Appendix 2. The market-adjusted initial returns of IPO firms are winsorised at the 99th percentile. All regressions include an array of year and industry dummy variables, and an exchange listing dummy variable. The *t*-statistics, based on cluster adjusted standard errors where the observations are clustered at the sponsor level to take account of potential error dependence within each sponsor, are given in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

	Panel A: Disclosure of risk-factor section				Panel B: IPO admission review by the CSRC					
	Dependent variable: Market-adjusted initial returns									
	(1)		(2)		(3)		(4)		(5)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
RISK	-0.0075 ***	(-3.05)	-0.0074 **	(-2.46)					-0.0079 ***	(-2.58)
ApprovalCSRC					-0.0002 *	(-1.74)	-0.00003	(-0.25)	-0.00005	(-0.41)
SponsorDate			-0.0767 ***	(-4.09)			-0.0740 ***	(-3.82)	-0.0742 ***	(-3.99)
RepIBDExp			-0.0119 **	(-2.36)			-0.0121 **	(-2.36)	-0.0112 **	(-2.19)
ROA	-1.4630 ***	(-6.14)	-1.3689 ***	(-5.33)	-1.5582 ***	(-6.48)	-1.4190 ***	(-5.65)	-1.4308 ***	(-5.46)
Ln(FirmSize)	-0.2004 ***	(-7.64)	-0.2112 ***	(-7.32)	-0.2042 ***	(-7.42)	-0.2151 ***	(-7.31)	-0.2153 ***	(-7.37)
ListingLag	0.0056 **	(2.14)	0.0033	(1.50)	0.0105 ***	(2.61)	0.0072 *	(1.78)	0.0076 *	(1.94)
Overhang	0.0341 ***	(4.62)	0.0406 ***	(5.10)	0.0473 ***	(4.88)	0.0452 ***	(4.47)	0.0464 ***	(4.92)
LargestOwnership	0.0014	(1.10)	0.0023 *	(1.82)	0.0017	(1.43)	0.0026 **	(1.99)	0.0023 *	(1.84)
D_SOE	0.1235	(1.41)	0.1180	(1.27)	0.1270	(1.41)	0.1262	(1.34)	0.1231	(1.32)
D_BHoffer	0.2679 **	(1.99)	0.2678 **	(2.01)	0.2408 *	(1.94)	0.2557 *	(1.94)	0.2593 **	(2.06)
D_Big4	0.0130	(0.15)	0.0019	(0.02)	-0.0217	(-0.27)	-0.0304	(-0.38)	-0.0327	(-0.41)
NonTradable	0.0831	(0.68)	0.0426	(0.36)	0.0813	(0.68)	0.0283	(0.26)	0.0334	(0.28)
Constant	4.7534 ***	(8.85)	5.5319 ***	(9.02)	4.8348 ***	(8.15)	5.6838 ***	(8.62)	5.7193 ***	(8.79)
Exchange Indicator:	Included		Included		Included		Included		Included	
– SSE	-0.0685	(-1.39)	0.0149	(0.26)	-0.0171	(-0.37)	0.0716	(1.43)	0.0159	(0.29)
Year Indicator	Included		Included		Included		Included		Included	
Industry Indicator	Included		Included		Included		Included		Included	
No. of Observations	1137		950		1112		939		939	
R-squared	49.2%		51.1%		48.5%		50.0%		50.3%	

To sum up, given that investment banks face a choice between making effort in premarket information production (through their due diligence) and garnering information from investors (while compensating investors for information revelation) at the time of the offering (Hanley and Hoberg, 2010), a negative and significant connection between the size of risk-factor section produced by sponsoring entities and IPO underpricing implies that sponsoring entities are inclined to make more effort in premarket due diligence and reveal more information about risk so as to improve pricing accuracy. Also, the results suggest that the mandatory disclosure of the issuance sponsorship letter required by Securities Law II contributes to mitigating IPO underpricing.

Although the sponsorship regulatory reform makes clear the disclosure obligations and the liability rules faced by sponsoring entities and their client firms, the public enforcer or regulator (the CSRC) still performs a role in reviewing IPO admission documents and making a decision on the approval of IPO applications. Using the processing time of the IPO admission review (ApprovalCSRC) as a proxy for the strength of the public enforcement carried out by the CSRC under the sponsorship system, I next sought to further understand the relation between public regulatory process and IPO underpricing. La Porta et al. (2006) posit that the form of public enforcer that facilitates recruiting professional staff and prevents political interference should be beneficial to stock markets, and I extended this to predict that the CSRC's Issuance Examination Commission, after experiencing changes in the membership composition of the IPO admission review (e.g. CSRC, 2003b), is effective in mitigating IPO underpricing.

Table 3.7 Panel B presents the estimates of the cross-sectional OLS regressions that were used to investigate the relation between the strength of the CSRC's admission review and the degree of IPO underpricing. As indicated in column (3), the coefficient estimate of Approval CSRC has a significant negative relationship, at the 10% level, with the market-adjusted initial returns. However, as shown in column (4), the estimated coefficient of Approval CSRC became insignificant when I included the reputation measures for sponsoring entities simultaneously in the regression. Furthermore, in both specifications, the economic magnitudes of the coefficient estimate of Approval CSRC are relatively small (-0.003% and -0.02%). These results indicate that, even given a change to the staff composition of the public enforcer (i.e. facilitating recruiting professional staff), the impact of public regulatory process on IPO underpricing is relatively minor in terms of both statistical and economic significances. Instead, as shown in column (4), the reputation measures of the sponsoring entities continue to provide a strong negative impact on IPO underpricing.

Collectively, the results obtained in Table 3.7 Panel B suggest that public regulatory enforcement in the form of IPO admission review is unlikely to help improve the efficiency of the IPO market. Additionally, if the degree of initial underpricing can be reflective of information asymmetry during the IPO process to some extent (Ljungqvist, 2007), then the results also imply that public regulatory process in China's IPO market makes little contribution to the improvement of the candidate firm's information environment.

Finally, as shown in column (5) of Table 3.7, I included all the previously examined sponsorship system-related characteristics (i.e. SponsorDate and RepIBDExp as the reputation measures, RISK as the disclosure measure, and ApprovalCSRC as the measure of public enforcement under the sponsorship system) in the regression. Out of all of the four factors examined, except that the coefficient estimate of ApprovalCSRC is insignificant, the coefficient estimates for the other three measures remain negative and significant. Therefore, the results obtained in this specification reinforce my conclusion that the pronounced decline of IPO underpricing during the post-sponsorship-reform period is related to the legal/regulatory arrangement introduced, which mandates disclosure and facilitates private enforcement, while such a decline in underpricing is unlikely to be related to public regulatory enforcement, even after the membership-composition change of the public enforcer.

3.5.4 Disciplinary actions against sponsoring entities

For the public regulator like the CSRC, imposing non-criminal penalties for violations of securities regulations due to insufficient private oversight and enforcement is probably one of its primary functions. If giving disciplinary penalties to sponsoring entities is effective, I expect there will be behaviour changes made by the sponsoring entities before and after the penalties. In this subsection, I examined Hypothesis 5a and Hypothesis 5b, in the framework of Equation (3.2), using the penalty dummy variables (D_PENALTY1 and D_PENALTY2).

Table 3.8 presents the multivariate comparisons of the market-adjusted initial returns of the IPO firms managed by sponsor institutions (Panel A) and sponsor representatives (Panel B), before and after their disciplinary actions. The regression results for uncategorized disciplinary penalties are given in columns (1) and (3). For this specification, the coefficient estimates of the D_PENALTY1 and D_PENALTY2 indicator variables are negative but insignificant. These results suggest that the penalties enforced by the CSRC provide sponsor institutions and sponsor representatives with limited incentives to improve the quality of IPO oversight in their subsequent sponsorship activities.

Polinsky and Shavell (2000) argue that sanctions should be structured so as to prevent different levels of harmful acts. Hence, I next sought to further understand how different dimensions of penalties have impacts on the sponsoring entities. Specifically, I took account of two dimensions for disciplinary actions: 1) penalties for weak due diligence; and 2) penalties classified as suspensions and warnings.[96] In Table 3.8, columns (2) and (4) show the results of cross-sectional OLS regressions that examine the impact of penalties for weak due diligence on sponsor institutions and sponsor representatives, respectively. As shown in column (2), the estimated coefficient of the D_ PENALTY1 indicator is negative and significant at the 10% level, suggesting that sponsor institutions that were punished for weak due diligence have an incentive to monitor and perform due diligence on subsequent client firms more effectively. In terms of economic significance, the magnitude of this coefficient estimate suggests that the underpricing level of IPO

[96] Suspension means the qualification or licence of sponsorship is suspended for a while, and thus sponsoring entities *cannot* engage in all sponsoring activities during the period of suspension. Warning means the public enforcer (the CSRC) publicly criticizes sponsoring entities for their violations of regulations, while sponsoring entities *are still able to* engage in the sponsorship activities.

firms managed by punished sponsor institutions is 11.75% lower than for IPO firms managed by these sponsors before their punishment for weak due diligence. By contrast, in column (4), I do not find a significant coefficient estimate of the D_PENALTY2 indicator, while the predicted sign is negative. These results imply that sponsor institutions are more sensitive to penalties for weak due diligence than sponsor representatives. One possible explanation is that sponsor institutions (to be precise, the underlying securities companies) may regard the penalty for their weak due diligence in IPO sponsorship activities as damaging their reputation for other types of business (e.g. mergers and acquisitions, which also rely on the quality of due diligence, but do not require a licence of sponsorship), and therefore, after the penalty, institutions may have a strong incentive to recoup their reputation in subsequent IPO sponsorship activities so as to prevent the potential losses of other business. By contrast, for the sponsorship-related activities only (e.g. IPO, SEO and convertible bonds), sponsor representatives hired and dispatched by sponsor institutions do not face the risk of losing other types of business, and therefore representatives' incentives for recouping their reputation may not be as strong as for sponsor institutions.

The results of the regressions used to examine another dimension of disciplinary penalties (i.e. those classified as suspensions and warnings) are reported in columns (5) and (6) of Table 3.8 Panel B.[97] For this specification, the coefficient estimate of the D_PENALTY2 indicator is negative but insignificant, under both the suspension classification and the warning classification. This suggests that imposing both serious penalties (i.e. suspensions) and mild penalties (i.e. warnings) on sponsor representatives has little association with the lower underpricing of their subsequent client firms.

[97] Because there was only one sponsor institution that suffered from a suspension penalty, I have not and will not perform this analysis on sponsor institutions.

Table 3.8: Disciplinary actions against sponsor institutions and sponsor representatives

This table presents the estimates of ordinary least squares regressions that compare the market-adjusted initial returns between IPO firms managed by sponsoring entities before disciplinary actions and IPO firms managed by sponsoring entities after disciplinary actions. Disciplinary actions are further classified into two dimensions: 1) penalties for weak due diligence, and 2) penalties classified as the suspension (i.e. a serious penalty) and warning (i.e. a mild penalty). Panel A presents the multivariate comparisons of the market-adjusted initial returns of IPO firms managed by punished sponsor institutions *versus* IPO firms managed by these sponsors before their punishment. Since there was only one sponsor institution punished for suspension, the regression analysis does not further classify disciplinary actions into suspension and warning for sponsor institution. Panel B presents the multivariate comparisons of the market-adjusted initial returns of IPO firms managed by punished sponsor representatives *versus* IPO firms managed by these representatives before their punishment. The key independent variable, D_PENALTY1, is an indicator variable that takes a value of 1 for the IPOs after the sponsor institutions' disciplinary proceedings, otherwise the indicator variable takes a value of 0 for the IPOs before the sponsor institutions' disciplinary proceedings. Likewise, the indicator variable of D_PENALTY2 is built for sponsor representatives. Definitions of all variables are discussed in detail in Subsection 3.4.2 and summarised in Appendix 2. The market-adjusted initial returns of IPO firms are winsorised at the 99th percentile. All regressions include an array of year and industry dummy variables, and an exchange listing dummy variable, except the regression specification for the suspension classification because these dummy variables are jointly insignificant and most indicators are omitted. The Huber-White heteroscedasticity-consistent *t*-statistics are reported in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

	Panel A: Penalties against sponsor institutions		Panel B: Penalties against individual sponsor representatives			
	Market-adjusted initial returns		Market-adjusted initial returns			
	(1) All disciplines (on 11 sponsors)	(2) Weak due diligence (on 9 sponsors)	(3) All disciplines (on 68 reps.)	(4) Weak due diligence (on 48 reps.)	(5) Suspension (on 18 reps.)	(6) Warning (on 46 reps.)
D_PENALTY1	-0.0842	-0.1175 *				
	(-1.24)	(-1.69)				
D_PENALTY2			-0.0850	-0.0269	-0.3599	-0.0699
			(-0.63)	(-0.25)	(-0.82)	(-0.43)
ROA	-1.7485 ***	-1.7084 ***	-1.6975 **	-0.7836	-4.0549	-1.3046
	(-4.07)	(-3.91)	(-2.53)	(-1.31)	(-1.40)	(-1.44)
Ln(FirmSize)	-0.2294 ***	-0.2195 ***	-0.0454	0.0072	-0.2325 **	-0.0060
	(-5.50)	(-4.92)	(-0.54)	(0.07)	(-2.02)	(-0.05)

ListingLag	0.0097	0.0064	-0.0290	-0.0219	-0.0106	-0.0302
	(0.88)	(0.57)	(-1.42)	(-1.16)	(-0.14)	(-1.47)
Overhang	0.0545 ***	0.0507 ***	0.0107	0.0160	-0.0808	-0.0045
	(3.48)	(3.19)	(0.38)	(0.50)	(-0.51)	(-0.13)
LargestOwnership	0.0050 ***	0.0056 ***	-0.0004	0.0012	0.0119	-0.0046
	(2.70)	(2.97)	(-0.11)	(0.27)	(0.75)	(-1.13)
D_SOE	0.2707	0.2994	0.1428	-0.0269	0.1786	0.1750
	(1.48)	(1.62)	(0.74)	(-0.10)	(0.40)	(0.78)
D_BHoffer	-0.0064	-0.1112	-0.0085	0.0364	0.1281	0.0807
	(-0.04)	(-0.57)	(-0.02)	(0.07)	(0.42)	(0.18)
D_Big4	0.1148	0.1884	0.1303	0.0799	–	0.2142
	(0.74)	(1.12)	(0.38)	(0.22)	–	(0.65)
NonTradable	0.1597	0.1575	-0.4249	-0.4761	0.0090	-0.5305
	(0.57)	(0.54)	(-1.11)	(-0.96)	(0.01)	(-1.22)
Constant	4.9444 ***	4.7402 ***	2.4000	1.1641	5.7691 **	1.8207
	(6.02)	(5.35)	(1.45)	(0.59)	(2.13)	(0.83)
Exchange Indicator:	Included	Included	Included	Included	–	Included
– SSE	-0.0272	-0.0449	-0.1934	-0.2523	–	-0.1235
	(-0.34)	(-0.56)	(-1.24)	(-1.30)	–	(-0.65)
Year Indicator	Included	Included	Included	Included	–	Included
Industry Indicator	Included	Included	Included	Included	–	Included
No. of Observations	456	443	116	87	27	89
R-squared	54.1%	53.4%	57.3%	59.9%	37.3%	52.9%

Overall, the results obtained in this subsection lend support to Hypothesis 5a, suggesting that the specific disciplinary action for weak due diligence motivates sponsor institutions to improve their oversight quality and thus mitigates the underpricing of their IPO client firms. By contrast, I do not find strong evidence to support the Hypothesis 5b that the disciplinary actions enforced by the CSRC have an influence on the quality of IPO oversight provided by sponsor representatives. These results suggest that public regulatory enforcement under the sponsorship system plays a role in improving the efficiency of China's IPO market to the extent that it imposes the specific non-criminal penalties on sponsor institutions.

3.5.5 Robustness tests

3.5.5.1 Sponsor fixed effects

In the Subsection 3.5.2, the use of plain-vanilla pooled OLS regressions to examine the certification role of sponsoring entities did not account for any unobservable characteristics of sponsor institutions and representatives that might be correlated with the variables included in the regression models. As a result, the regressions probably suffered from endogeneity bias in the form of omitted variable bias (i.e. unobservable characteristics with respect to sponsoring entities are omitted). In this subsection, to address this potential endogeneity issue, or to control for the average differences across sponsoring entities in any unobservable factors, I employed fixed-effects models to replicate the analyses for the reputation impacts of sponsoring entities. If certain classes of sponsor institutions and representatives can differentiate themselves in mitigating IPO underpricing, I expected that there would be clear patterns in the sponsor fixed effects.

Table 3.9 Panel A presents the results of fixed-effects regressions that were used to examine the impact of sponsor institutions' reputation on the market-adjusted initial returns of IPOs. Of note is that the fixed-effects model makes the researcher unable to assess the effect of variables that have little within-group variation. Due to the variation of the reputation measures of SponsorCapital and SponsorPersonnel is constant within each sponsor-institution group, the fixed-effects regressions have not and will not give the coefficient estimates on these variables. As shown in columns (1) to (3), when introducing three reputation measures into regressions separately, the coefficient estimates for both SponsorDate and Ln(SponsorAge) are still negative and significant, and the coefficient estimate for D_TOP10 turns to be significant (at the 10% level) in the fixed-effects regression. In column (4), when all three reputation measures are included together in the regression, only the primary reputation measure (SponsorDate) remains negative and significant. These results based on fixed-effects regressions reach the same conclusion with my previous findings, suggesting that the reputation of sponsor institution does a role in mitigating IPO underpricing. However, in the regression specifications (1) to (4), sponsor institution fixed effects are insignificant (Sponsor FE *p*-value between 0.1910 and 0.9743), indicating that sponsor institution fixed effects have limited explanatory power for the variation in the market-adjusted initial returns.

Panel B of Table 3.9 reports the results of fixed-effects regressions that were used to examine the impact of sponsor representatives' reputation on the market-adjusted initial returns of IPOs. Due to the variation of the reputation measure of D_RepEdu is constant within each sponsor-representative group, the fixed-effects regressions have not reported the coefficient estimate on this variable. As indicated in columns (1) to (3), when examining three reputation measures for sponsor representatives separately, the coefficient estimates for both RepDate and RepIBDExp remain negative and significant in fixed-effects regressions, and the coefficient estimate for Ln(RepAge) becomes significant (at the 5% level) in the fixed-effects regression. As shown in column (4), after including all the three reputation measures together in the regression, the primary reputation measure (RepDate) is the most significant in explaining the variation in the market-adjusted initial returns. These results confirm my previous conclusion that the reputation of sponsor representatives has strong association with the underpricing of IPO firms that went public under the sponsorship system. Nevertheless, in the regression specifications (1) to (4), sponsor representative fixed effects are also insignificant (Representative FE *p*-value between 0.3841 and 0.6691), suggesting that sponsor representative fixed effects have limited explanatory power for the variability in the market-adjusted initial returns.

Table 3.9: Analyses of the reputation impacts of sponsoring entities with fixed-effects models

This table presents the results of fixed-effects regressions that examine the impact of sponsoring entities' reputation on the market-adjusted initial returns of Chinese IPOs under the sponsorship system. Panel A reports the results of fixed-effects regressions that examine the impact of sponsor institutions' reputation by using the five reputation measures of sponsor institutions as key independent variables (i.e. SponsorDate; D_TOP10; LnSponsorAge; SponsorCapital; and SponsorPersonnel), where the last two measures are removed by the fixed-effects model due to the variation of these two measures is constant within each sponsor-institution group. Panel B reports the results of fixed-effects regressions that examine the impact of individual sponsor representatives' reputation by using the four reputation measures of sponsor representatives as key independent variables (i.e. RepDate; RepIBDExp; LnRepAge; and D_RepEdu), where the last measure is removed by the fixed-effects model due to the variation of this measure is constant within each sponsor-representative group. Definitions of all variables are discussed in detail in Subsection 3.4.2 and summarised in Appendix 2. The market-adjusted initial returns are winsorised at the 99th percentile. All regressions include an array of year and industry dummy variables, and an exchange listing dummy variable. The *t*-statistics, based on cluster adjusted standard errors where the observations are clustered at the sponsor level to take account of potential error dependence within each sponsor, are given in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

Panel A: Sponsor institution fixed effects								
	Dependent variable: market-adjusted initial returns							
	(1)		(2)		(3)		(4)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
SponsorDate	-0.1594***	(-8.54)					-0.1588***	(-7.59)
D_TOP10			-0.1850*	(-1.93)			-0.0796	(-0.63)
Ln(SponsorAge)					-0.4313***	(-3.48)	0.0033	(0.02)
SponsorCapital							–	–
SponsorPersonnel							–	–
ROA	-1.4683***	(-6.07)	-1.4628***	(-6.22)	-1.5332***	(-6.13)	-1.4680***	(-6.06)
Ln(FirmSize)	-0.2258***	(-8.36)	-0.2078***	(-7.86)	-0.2234***	(-7.98)	-0.2262***	(-8.35)
ListingLag	0.0027	(0.97)	0.0050*	(1.77)	0.0020	(0.69)	0.0027	(0.97)
Overhang	0.0414***	(3.71)	0.0331***	(2.90)	0.0408***	(3.54)	0.0408***	(3.64)
LargestOwnership	0.0014	(1.11)	0.0016	(1.25)	0.0022*	(1.71)	0.0015	(1.17)
D_SOE	0.1478*	(1.71)	0.1142	(1.41)	0.1168	(1.31)	0.1458*	(1.68)
D_BHoffer	0.2062	(1.41)	0.3093**	(2.03)	0.2565*	(1.69)	0.2162	(1.47)
D_Big4	0.0209	(0.21)	-0.0074	(-0.07)	0.0086	(0.08)	0.0183	(0.18)
NonTradable	-0.0057	(-0.04)	0.0755	(0.55)	0.1072	(0.71)	-0.0015	(-0.01)
Constant	6.1197***	(10.55)	4.9164***	(8.72)	6.2432***	(9.48)	6.1539***	(9.52)
Sponsor FE:								
– Prob. (F-stat)	0.1910		0.9743		0.9440		0.4484	
– rho	0.3001		0.1871		0.2924		0.3046	
Exchange Indicator:	Included		Included		Included		Included	
– SSE	0.1159	(1.53)	-0.0012	(-0.02)	0.0335	(0.43)	0.1174	(1.55)
Year Indicator	Included		Included		Included		Included	
Industry Indicator	Included		Included		Included		Included	
No. of Observations	969		1137		969		969	
R-squared	53.0%		47.2%		49.8%		53.0%	

Panel B: Sponsor representative fixed effects								
	Dependent variable: market-adjusted initial returns							
	(1)		(2)		(3)		(4)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
RepDate	-0.1275***	(-4.89)					-0.1084***	(-3.31)
RepIBDExp			-0.0742***	(-3.73)			-0.0207	(-0.78)
Ln(RepAge)					-1.1850**	(-2.36)	-0.2693	(-0.48)
D_RepEdu							–	–
ROA	-1.3549***	(-3.70)	-1.4729***	(-3.80)	-1.5932***	(-4.09)	-1.4225***	(-3.70)
Ln(FirmSize)	-0.2016***	(-4.57)	-0.2273***	(-5.03)	-0.2262***	(-4.96)	-0.2100***	(-4.67)
ListingLag	-0.0002	(-0.05)	0.0008	(0.18)	0.0013	(0.29)	-0.0006	(-0.13)
Overhang	0.0364*	(1.69)	0.0393*	(1.79)	0.0419*	(1.89)	0.0398*	(1.83)
LargestOwnership	0.0023	(1.24)	0.0027	(1.47)	0.0026	(1.38)	0.0021	(1.15)
D_SOE	0.2386*	(1.87)	0.2521*	(1.94)	0.2535*	(1.93)	0.2288*	(1.77)
D_BHoffer	0.3477	(1.15)	0.3501	(1.14)	0.3029	(0.98)	0.3475	(1.14)
D_Big4	0.0746	(0.48)	0.0835	(0.53)	0.0863	(0.54)	0.0668	(0.42)
NonTradable	-0.0807	(-0.37)	-0.0381	(-0.17)	0.0150	(0.07)	-0.0714	(-0.33)
Constant	5.4083***	(5.89)	6.0659***	(6.24)	9.5134***	(4.60)	6.7019***	(3.10)
Representative FE:								
– Prob. (F-stat)	0.3841		0.5707		0.6691		0.4230	
– rho	0.5006		0.4708		0.4416		0.4976	
Exchange Indicator:	Included		Included		Included		Included	
– SSE	-0.0189	(-0.18)	-0.0436	(-0.40)	-0.0710	(-0.65)	-0.0248	(-0.23)
Year Indicator	Included		Included		Included		Included	
Industry Indicator	Included		Included		Included		Included	
No. of Observations	1125		1106		1106		1105	
R-squared	57.5%		55.5%		54.7%		56.7%	

Taken together, these results suggest that the results obtained from the analyses of the reputation impacts of sponsoring entities based on plain-vanilla pooled OLS regressions are robust to the use of fixed-effects models, but there are no clear patterns with respect to sponsor institution fixed effects and representative fixed effects.

3.5.5.2 Interaction effects of sponsor institutions and sponsor representatives

In this subsection, as an alternative robustness test, I expand the reputation analyses by assessing the interplay of sponsor institutions and sponsor representative in mitigating IPO underpricing. In practice, there are three potential interaction effects faced by IPO firms: 1) a firm is managed by both a reputable sponsor institution and a reputable sponsor representative (Reputable Sponsor * Reputable Rep); 2) a firm is managed by a reputable sponsor institution and a non-reputable sponsor representative (Reputable Sponsor * Non-reputable Rep); and 3) a firm is managed by a non-reputable sponsor and a reputable sponsor representative (Non-reputable Sponsor * Reputable Rep). For the empirical analyses, using the median value of the primary reputation measures of the sponsoring entities (i.e. 5 for SponsorDate and 4 for RepDate), I split the IPO firms into reputable and non-reputable sponsoring-entity groups. Thus, three interaction dummy variables were created to address the interaction effects in the framework of Equation (3.2).

Table 3.10 presents the estimates of the OLS regressions for the interaction impacts of sponsor institutions' and sponsor representatives' reputations on the market-adjusted initial returns of Chinese IPOs. As shown in column (1), the coefficient estimate of the Reputable Sponsor * Reputable Rep indicator variable is negative and significant the 1% level, suggesting that IPO firms managed by both a reputable sponsor institution and a reputable representative underprice less than all the other sponsoring interaction patterns by 12.81% on average. Also, as identified in column (2), the coefficient estimate of the Reputable Sponsor * Non-reputable Rep indicator is negative and significant, confirming that IPO firms managed by a reputable sponsor institution and a non-reputable sponsor representative underprice less than the other potential interplay patterns (exclusive of the interplay of both being reputable entities) by 32.28% on average. For the last specification, as revealed in column (3), I find that the use of a reputable sponsor representative but a non-reputable sponsor institution (Non-reputable Sponsor * Reputable Rep) has little impact on the market-adjusted initial return.

Collectively, these results confirm my previous certification hypotheses for sponsoring entities, and the results of the interaction analyses also imply that a prestigious sponsor institution contributes more to mitigating IPO underpricing than individual sponsor representatives. This is probably true in practice, where the individual representative is the main person in charge of performing due diligence and creating IPO admission documents, and the sponsor institution is responsible for reviewing and tracking the representative's work, and ultimately decides if the candidate firm can be "certified" to apply for IPO.

Table 3.10: Interaction effects of sponsor institution and sponsor representative

This table presents the estimates of ordinary least squares regressions that examine the interaction impacts of sponsor institutions' and sponsor representatives' reputations on the market-adjusted initial returns of Chinese IPOs under the sponsorship system. The median value of the primary reputation measures of the sponsoring entities (i.e. 5 for SponsorDate and 4 for RepDate) is used to split the IPO firms into reputable and non-reputable sponsoring-entity groups. The indicator variable, Reputable Sponsor * Reputable Rep, is an interaction of the reputable sponsor and the reputable representative, which equals 1 if an IPO firm backed by both a reputable sponsor and a reputable representative. Likewise, the indicator variable, Reputable Sponsor * Non-reputable Rep, is an interaction of the reputable sponsor and the non-reputable representative, which equals 1 if an IPO firm backed by a reputable sponsor and a non-reputable representative, and 0 otherwise (exclusive of 448 IPO firms that are affected by the interplay of both being reputable entities). The indicator variable, Non-reputable Sponsor * Reputable Rep, is an interaction of the non-reputable sponsor and the reputable representative, which equals 1 if an IPO firm backed by a non-reputable sponsor and a reputable representative, and 0 otherwise (exclusive of 448 IPO firms that are affected by the interplay of both being reputable entities). Definitions of all variables are discussed in detail in Subsection 3.4.2 and summarised in Appendix 2. The market-adjusted initial returns of IPO firms are winsorised at the 99th percentile. All regressions include an array of year and industry dummy variables, and an exchange listing dummy variable. The *t*-statistics, based on cluster adjusted standard errors where the observations are clustered at the sponsor level to take account of potential error dependence within each sponsor, are given in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

	Dependent variable: market-adjusted initial returns					
	(1)		(2)		(3)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Reputable Sponsor*Reputable Rep	-0.1281 ***	(-3.88)				
Reputable Sponsor*Non-reputable Rep			-0.3228 ***	(-5.98)		
Non-reputable Sponsor*Reputable Rep					0.0209	(0.30)
ROA	-1.4774 ***	(-6.42)	-1.4131 ***	(-2.99)	-1.5529 ***	(-3.19)
Ln(FirmSize)	-0.2209 ***	(-7.68)	-0.2784 ***	(-6.59)	-0.2644 ***	(-6.28)
ListingLag	0.0046 *	(1.76)	0.0027	(1.21)	0.0040 *	(1.68)
Overhang	0.0398 ***	(4.89)	0.0389 ***	(3.29)	0.0362 ***	(3.13)
LargestOwnership	0.0026 **	(1.96)	0.0034	(1.60)	0.0031	(1.47)
D_SOE	0.1375	(1.50)	0.1732	(1.19)	0.1839	(1.32)

D_BHoffer	0.2899 **	(2.02)	0.5074 ***	(2.68)	0.5423 ***	(2.98)
D_Big4	0.0428	(0.55)	-0.0984	(-0.74)	-0.0970	(-0.73)
NonTradable	0.0935	(0.85)	0.0055	(0.03)	0.0375	(0.22)
Constant	5.0654 ***	(8.55)	7.1652 ***	(8.06)	5.6094 ***	(6.78)
Exchange Indicator:	Included		Included		Included	
– SSE	0.0347	(0.73)	0.0574	(0.71)	0.0016	(0.02)
Year Indicator	Included		Included		Included	
Industry Indicator	Included		Included		Included	
No. of Observations	960		512		512	
R-squared	49.9%		54.4%		52.4%	

3.5.5.3 Bootstrap method

Previous studies show that the initial returns of IPO stocks are non-normally distributed data (e.g. Dewenter and Malatesta, 1997; Tian, 2011). Similarly, the dependent variable (market-adjusted initial returns) used in my empirical analyses is also highly skewed, and the Shapiro-Wilk tests reject the normal distribution of the market-adjusted initial returns. More importantly, the specification tests also reject residual normality for my cross-sectional OLS regressions. This implies that the use of ordinary parametric *t*-statistics to assess the significance of the coefficient estimates might not be reliable.

Although the Box and Cox (1964) transformation was employed in some empirical studies (e.g. Su and Bangassa, 2011; Su and Brookfield, 2013) to transform the non-normally distributed initial-return data into a normal distribution, this method has required that the data needs to be positive. Yet, in my sample, there are 181 IPOs that were overpriced and possessed negative market-adjusted initial returns. Alternatively, following Dewenter and Malatesta (1997) and Tian (2011), who employed bootstrap methods to address the issue of non-normality in their dataset of IPO initial returns, I reassessed the significance of the coefficient estimates of my primary variables of interest using test statistics computed with bootstrapped standard errors. According to Efron and Tibshirani (1993), the method of bootstrapping creates a bootstrapped sample distribution via random sampling with replacement so as to relax the distributional assumptions of linear regressions (e.g. normally distributed errors) and improve the accuracy of estimation.

In Appendix 3, with the bootstrap method, I re-estimated all the multivariate regressions (that were used to test Hypotheses 1 to 5) using 500 bootstrap replications with a random sampling from the OLS residual vector. As shown in Tables 3.11 to 3.15, the regression results obtained by the bootstrap method are qualitatively similar to my prior results, except that one of the coefficient estimates of the alternative sponsor reputation measure Ln(SponsorAge) changes to be insignificant (in the column [3] of Table 3.12 in Appendix 3). Overall, the main conclusions of this study are not altered under the use of the bootstrap method.

3.6 Conclusion

The empirical study in this chapter examined whether a legal or regulatory reform that moves towards private-sector oversight (i.e. sponsorship regulatory reform) contributes to the efficiency of China's IPO market. Given that the initial underpricing is a central measure of the efficiency of the IPO market (Chambers and Dimson, 2009), I demonstrated that IPO firms affected by the sponsorship regulatory system suffer from significantly less underpricing than firms that went public under the government-dominated regulatory systems. This suggests that the efficiency of China's IPO market has improved after the government partially transferred oversight to the private sector. The results obtained in this study are broadly consistent with the findings of La Porta et al. (2006), who document that purely/strictly public regulatory enforcement, which relies on the main government agency to take sole charge of supervising securities markets, is not beneficial to the development of stock markets and, in particular, for the countries with inefficient government bureaucracies.

In order to ascertain what characteristics of the sponsorship regulatory model work to explain the cross-sectional variation in IPO underpricing, I collected and investigated information/characteristics with respect to sponsoring entities, issuance sponsorship letter, IPO admission review and disciplinary actions (i.e. the features highlighted by the CSRC's (2003a, 2003b) Decrees and Securities Law II). First, I found evidence in support of the certification hypothesis for both sponsor institutions and sponsor representatives, suggesting that the reputation of sponsoring entities plays an important role in mitigating IPO underpricing if a legal or regulatory arrangement requires the public regulator to entrust IPO oversight with private-sector entities. In particular, I found that the work experience of sponsoring entities, as a measure for their reputation, has a strong explanatory power for the variation in the market-adjusted initial returns. The analysis of the interaction effect of sponsor institutions and sponsor representatives indicates that IPO firms managed by both reputable institutions and reputable representatives outperform other interaction patterns in mitigating underpricing. Second, I found a negative association between the size of risk-factor-disclosure section in the issuance sponsorship letter and IPO underpricing. This is broadly consistent with the findings of

Hanley and Hoberg (2010), suggesting that sponsoring entities tend to put more effort into premarket due diligence, reveal more information content regarding the risk of the offer and thereby better improve pricing accuracy. Third, I revealed that the IPO admission review, as a form of public enforcement by the CSRC, is negatively related to IPO underpricing, but this effect is relatively minor in terms of statistical significance. This suggests that public regulatory enforcement is unlikely to be effective in reducing the indirect cost of raising capital faced by IPO firms even when there is a change to the staff composition of the public enforcer. Finally, the results for the analyses of disciplinary actions suggest that only the imposition of penalties on sponsor institutions for weak due diligence has a significant association with the lower underpricing of their subsequent IPO client firms. This suggests that public enforcement in the form of non-criminal penalties contributes to the efficiency of China's IPO market to a certain extent. The results also confirm Polinsky and Shavell's (2000) argument that sanctions should be structured to prevent different levels of harmful acts, and thereby provide an important policy implication for the public regulator which attempts to improve the disciplinary mechanisms.

Overall, by examining the experience of the sponsorship regulatory reform in China's IPO market, the study in this chapter suggests that the form of legal or regulatory arrangements that mandate specific disclosures and facilitate private-sector oversight while relax public regulatory enforcement contribute to the efficiency of the IPO market. The empirical results obtained in this chapter have policy implications for emerging economies around the world, which are subjected to severe IPO underpricing while still empower the main government agency to take sole charge of supervising IPO markets.

Chapter 4: Partial private-sector oversight in China's A-share IPO market: An empirical study on the experience of the sponsorship system[†]

Abstract

The Chinese IPO market has moved from government-dominated systems to partial private oversight by sponsoring entities. In this chapter, I examine the performance of IPOs that are managed under a partial private-sector oversight–sponsorship system. I find that the long-run performance of IPOs is better under the sponsorship system, which uses buy-and-hold returns and Fama-French five-factor models. Additionally, I find that IPOs with a reputable sponsor institution and reputable sponsor representatives perform better. Relatedly, the China Securities Regulatory Commission (CSRC) takes a shorter time to review the admission documents prepared by a reputable sponsor institution. The regulatory actions taken by the CSRC are effective, as the number of IPO businesses has declined for the sanctioned sponsor institutions and the IPOs managed by sponsor representatives perform better once they receive a penalty.

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4.1 Introduction

Most of the major stock exchanges around the world are well regulated (e.g. the New York Stock Exchange [NYSE] and the London Stock Exchange [LSE]), which is characterized by strict and mandatory listing requirements. However, in recent years, there has been an increase in unregulated markets in which the IPO management procedure is overseen by specialist companies. This model of relatively light-touch regulation is expensive in terms of investor protection, as the companies might sell overvalued shares. While the regulated markets impose high costs in terms of compliance, with reporting on the firms, unregulated markets are expensive in terms of investor protection and screening good-quality firms from the bad ones. There are regulated markets (e.g. NYSE and LSE), unregulated markets (e.g. the Alternative Investment Market [AIM]) and partially regulated markets (e.g. China's IPO market). The performance of regulated markets is well examined. However, for unregulated markets, it is difficult to identify the performance elements that are due to a lack of regulation and those that are due to the sponsors. The Chinese market provides a unique testing ground where there is government regulation in place and partial private-sector oversight. I will exploit the unique structure of the Chinese IPO market and use this as a strategy to identify how partial private-sector oversight contributes to the performance of IPOs while government regulation is still in place.

The Chinese A-share IPO market has moved from a government-dominated system to a sponsorship system. Although China's sponsorship system follows the pattern of London's AIM regulatory approach, there are some differences between these two regulatory models (see Table 4.1 for details). The sponsorship system incorporates private-sector oversight (i.e. sponsoring entities) with mandatory listing requirements, while AIM's regulatory model adopts both private-sector oversight (i.e. nominated advisors or Nomads) and light-touch regulation (i.e. tailor-made regulation). Since the sponsorship system still belongs to the approval regime, the admission documents prepared by the sponsoring entities need to be reviewed and approved by the China Securities Regulatory Commission (CSRC). In contrast, the admission documents of Nomad-selected IPO firms do not need to be examined by the UK listing authority.

Moreover, the sponsorship system applies to all candidate firms listed on both the Main and Second Markets in China, while the regulatory approach of the Main Market in the UK is different from that for AIM. The CSRC entrusts not only the sponsor institution but also the individual sponsor representative to perform the role of oversight, whereas there is only the Nomad that is entrusted the supervisory role in the AIM. This implies that, under the sponsorship system, specific individuals (sponsor representatives) will have more concern for their reputational capital in the sponsorship-related industry. Finally, the CSRC only requires the sponsoring entities to perform IPO oversight and ongoing oversight during the two fiscal years post listing, while AIM-listed firms always need to have a Nomad. This implies that the relationship with the Nomad is long term, which creates some conflicts of interest; whereas, in the Chinese market, the relationship is short term. In this chapter, I will examine the performance of the sponsorship system (a form of partial private-sector oversight) in China's A-share IPO market. The sponsorship system has been running more than a decade, but there is an unanswered empirical question regarding whether the sponsorship regulatory model can effectively screen out low-quality firms and protect investors.

Previous literature sheds light on the importance of the quality of the legal environment, enforcement and investor protection to equity-market development (e.g. La Porta et al., 1997, 1998, 2000, 2002). La Porta et al. (2006) document that the type of legal or regulatory framework that governs the IPO market through mandating disclosure and facilitating private enforcement contributes to prevent the issuance of poor-quality company shares; furthermore, they cast considerable doubt on the efficiency of adopting either a purely private regulatory solution or a strictly public regulatory enforcement. The experiences and changes in China's securities laws and regulations give us an opportunity to compare the regulatory efficiency of the two different legal arrangements, i.e. as proposed in La Porta et al. (2006), under one country's institutional background. The first version of China's Securities Law was drafted in 1992 and formally promulgated in 1999, which largely empowered central and local government agencies or official authorities to oversee and attest to the viability of IPO candidate firms. Following the promulgation of CSRC's (2003a) decree regarding the sponsorship regulatory model, the Securities Law experienced substantial amendments in 2004 and a new version went into effect as of 2005. In this updated version, the Securities Law highlights the role of sponsor institutions and sponsor representatives in overseeing and verifying candidate firms' admission documents and information-disclosure materials (see Articles 11 and 12 of China's 2005 Securities Law), while all IPO applications still need to be approved by the financial authority (the CSRC). Therefore, I anticipate that firms that are subject to the screening and oversight of sponsoring entities and go public under the sponsorship regulatory model will have better post-IPO stock performance.

I compared the market-adjusted post-IPO return performance of IPO firms screened by the sponsorship regulatory model and that of IPO firms that went public under the quota and channel regulatory models. After controlling for the other potential factors, I find that the market-adjusted post-IPO returns of sponsoring-entity-backed IPOs outperform non-sponsoring-entity-backed IPOs. This result is robust when I drop a sample of IPO firms that went public under the channel system, and the finding is also robust when I use Fama and French's (2015) five-factor calendar-time regression. This suggests that the sponsorship regulatory model can provide a greater level of screening function than the government-dominated regulatory models.

Next, I manually collected data on several characteristics related to the sponsorship system and examined whether these factors can explain the variation in the market-adjusted post-listing return performance of IPO firms that went public under the sponsorship system. First, I investigated the impact of sponsoring entities' reputation on the market-adjusted post-IPO return performance. I find that certain characteristics of sponsoring entities, as measures for reputation, can explain the cross-sectional variation in the market-adjusted return performance of IPO firms under the sponsorship system. In particular, the work experience of sponsoring entities in a sponsorship-related industry has a strong association with the client firm's post-IPO return performance. Also, my results suggest that sponsor institution fixed effects can explain around 60% of the variation in the IPO firm's return performance, while I do not find clear patterns in sponsor representative fixed effects. Furthermore, the analysis of the interaction effects between the sponsor institution and sponsor representative indicates that the reputation of the sponsor institution performs a crucial function in the oversight and screening of candidate firms when the role of IPO oversight is given simultaneously to a sponsor institution and an individual representative. These results confirm that the reputation of the sponsoring entities does play a role in IPO screening and oversight. My findings also suggest that, under the sponsorship regulatory model, IPO firms can signal their quality by hiring a reputable sponsor. This adds to the studies of Gerakos et al. (2013), and Doukas and Hoque (2016), who are unable to separate the effect of flexible (or light-touch) regulation from the effect of ineffective Nomads on AIM firms' post-listing return performance. Specifically, the AIM regulatory model is a blend of private-sector oversight (i.e. Nomads) and flexible regulation (i.e. tailored with Nomads). Although Gerakos et al. (2013) find poor performance of AIM IPOs relative to other regulated and unregulated markets (e.g. the LSE Main Market, NASDAQ and Over-The-Counter Bulletin Board [OTCBB]), it is difficult to determine whether such a poor performance can be attributed to either the flexible regulation or the ineffective Nomads in AIM. In this regard, China's specific institutional framework under a sponsorship system provides us with a natural venue for an experiment to overcome this problem, where I provide evidence of the efficiency of the private entities (i.e. the sponsoring entities) in IPO screening and oversight in a market with stringent regulation.

Second, I examined whether information revealed by sponsoring entities in their "issuance sponsorship letter" has an association with the post-IPO stock performance of their client firms. I find that only the size of the advantage-factors section is significantly and positively related to the market-adjusted post-IPO returns, while there is no strong connection between the size of the risk-factors section and the market-adjusted post-IPO returns. This suggests that the information produced by the sponsoring entities through their premarket due diligence can signal the quality of the IPO candidate firms to a certain extent. Given that producing a large amount of informative content is a measure of premarket due diligence (Hanley and Hoberg, 2010), my finding also implies that sponsoring entities have fulfilled the role of IPO oversight by performing effective premarket due diligence.

Third, under the sponsorship system, by inspecting IPO admission documents, the public regulator (the CSRC) plays a role in reviewing the quality of the candidate firms screened by sponsoring entities. I therefore examined the extent to which the centralized regulatory review taken by the CSRC affects the post-IPO stock performance. I find that the processing times of the IPO admission review or approval, as a measure of the degree of centralized regulatory inspection on the quality of candidate firms, have a significant and negative association with the market-adjusted post-IPO return performance. This indicates that if the CSRC takes a longer time to review the admission documents, the IPO performs badly. Moreover, the analysis using Tobit regressions with respect to the relation between centralized regulatory review and private-sector oversight demonstrates that candidate firms screened by reputable sponsor institutions more quickly get approval for their IPO applications. Relatedly, IPO applications from candidate firms with higher pre-IPO return on assets (ROA) also will get faster approval by the public regulator.

Finally, I investigated the behaviour changes of sponsoring entities before and after the CSRC's disciplinary actions for their weak oversight. I find that the biggest impact of disciplinary actions on sponsoring entities is a dramatic reduction in the number of subsequent IPO client firms (relative to the number of IPOs before the penalties). I further anticipate that sponsoring entities have an incentive to rebuild their reputation after receiving disciplinary penalties (i.e. after they have suffered a loss of reputational capital in a sponsorship-related industry), and thereby they can provide a higher level of oversight in subsequent sponsoring activities. Based on the evidence on post-listing return performance, I find that sponsor representatives tend to provide a greater level of oversight after receiving penalties than before those penalties only if they were subject to a serious penalty (i.e. the suspension of sponsorship qualification). Although a light penalty (i.e. a warning) on sponsoring entities has a positive impact on their subsequent client firms' post-IPO return performance, such influence is relatively minor in terms of statistical and economic significance. These results imply that sponsoring entities may not treat the light penalty of a warning as a loss of reputational capital, while (at least based on the evidence of the sponsor representatives) they may consider the serious penalty to be a loss of reputation.

Collectively, the previous findings reinforce the results of my primary examination, which show that the sponsorship regulatory model is effective in screening out low-quality firms and protecting investors in terms of post-IPO return performance, relative to the previous government-dominated regulatory models in China's IPO market. Also, my results, which were obtained using the event-time approach, are robust with respect to the calendar-time approach employed in Fama and French's (2015) five-factor models.

The long-run underperformance of IPOs is a well-known anomaly in the US market (e.g. Ritter, 1991; Loughran and Ritter, 1995). Previous research on China's A-share IPO market also provides evidence of IPOs' underperformance at different levels across a variety of sample periods (e.g. Chen et al., 2000; Chan et al., 2004; Fan et al., 2007; Cai et al., 2008; Kao et al., 2009; Su and Bangassa, 2011; Liu et al., 2012; Chen et al., 2014; Feng and Johansson, 2015). However, among these pieces of literature, there are few studies that investigate the role of the sponsorship regulatory model and its related characteristics in explaining the long-run performance of Chinese IPOs. Liu et al. (2012) conducted multivariate comparisons of post-IPO buy-and-hold returns between firms that went public in China's IPO market from 2005 to 2007 and firms that went public from 2000 to 2004 under the quota and channel systems, and they find that there is a better post-IPO return performance for firms that went public during the period with government-dominated systems (i.e. quota and channel systems). Liu et al. (2012) attribute the good post-IPO return performance of firms selected by government agencies to the political incentive given by the central government to local government (or local officials).[98] While their research is somewhat close to mine in terms of the concerns about regulatory systems, their investigation neither focuses on the characteristics of the sponsorship regulatory model nor provides empirical evidence based on a large sample, which are the primary focuses of my research.

[98] More specifically, for the potential rewards of political promotion (or additional IPO quotas), local government has the incentive to recommend good-quality firms to central government during the periods under the quota and channel systems (Liu et al., 2012).

The empirical study in this chapter makes two important contributions to the literature. First, it is one of the first efforts to investigate the effectiveness of partial private-sector oversight in screening out low-quality firms and protecting investors by considering a different institutional environment from the pattern of London's AIM. When interpreting the poor performance of AIM's IPOs as the weak ability of private-sector oversight to protect investors, in previous research (e.g. Gerakos et al., 2013; Doukas and Hoque, 2016) it is difficult to separate out the effect of weak rules (i.e. flexible or light-touch regulation) from the effect of weak oversight (i.e. ineffective Nomads or sponsors). The analysis of China's sponsorship regulatory model in this chapter allows the researcher to clarify the contribution of the IPO oversight carried out by sponsoring entities to the performance of IPO firms under mandatory regulation. The results obtained in this chapter demonstrate that entrusting the private entities to take charge of IPO oversight does serve as an effective way to screen out low-quality firms and protect investors, in terms of post-IPO return performance. Furthermore, the study in this chapter also highlights the role of the public regulator in the practice of private-sector oversight, and suggests that reducing the force of its regulatory reviews on IPO candidate firms while intensifying its penalties against the weak oversight of the private entities helps to protect investors from overpaying on low-quality firms. An important policy implication drawn from the findings of this study is that centralized governmental oversight, in the absence of the involvement of private-sector oversight, is a less effective regulatory approach in terms of investor protection.

Second, by demonstrating the importance of the sponsorship regulatory model and its related characteristics in explaining the long-run performance of Chinese IPOs (e.g. the reputation of the sponsoring entities, the information produced by these private entities, IPO admission reviews, and the disciplinary actions taken by the public regulator), the empirical study in this chapter also contributes to the literature that investigates the puzzle of IPOs' long-run performance and related determinants (Ritter, 1991; Levis, 1993; Loughran and Ritter, 1995; Carter et al., 1998; Schultz, 2003; Chan et al., 2004; Fan et al., 2007; Su and Bangassa, 2011; Hoque and Lasfer, 2015). Furthermore, given the ongoing controversy in the literature over the measurement of the long-run underperformance of IPOs (e.g. Barber and Lyon, 1997; Brav and Gompers, 1997; Kothari and Warner, 1997; Fama, 1998; Brav et al., 2000; Loughran and Ritter, 2000; Mitchell and Stafford, 2000; Gompers and Lerner, 2003), the study in this chapter attempts to capture the long-run underperformance of IPOs by measuring event-time buy-and-hold abnormal returns (BHARs) as well as calendar-time portfolio abnormal returns. In examining an up-to-date sample of 2,518 of China's A-share IPOs from 1992 to 2012, this study shows evidence of the long-run underperformance of IPOs based on both the event-time approach and the calendar-time approach, but the long-run underperformance on the event-time basis is not persistent and disappears over an 18- to 36-month window. This lends weight to the previous arguments that the detection of long-run abnormal performance is sensitive to the methodologies used for estimating post-IPO stock returns.

The remainder of this chapter is organized as follows. Section 4.2 provides the institutional background of China's IPO market, which introduces the regulatory systems used in China, and compares the sponsor institution and sponsor representative. Section 4.3 provides a literature review and hypothesis development. Section 4.4 discusses the data, sample, methodology, construction of variables and descriptive statistics. The empirical results are reported and discussed in Section 4.5. Finally, Section 4.6 concludes the study in this chapter.

4.2 The institutional background of China's IPO market

4.2.1 Regulatory systems in China

China's stock-issuance regulatory regime has experienced two phases – the *administrative-approval regime* and the *approval regime* – since the government established the capital markets of the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE) in 1990 (see Table 4.1). In the first regime, from 1990 to 2001, under the auspices of a planned economy, the government dominated and directly engaged in the IPO selection process by the enforcement of a *quota system*. Specifically, under this system, every year, the central government[99] distribute a certain number of IPO

[99] In 1992, the CSRC took over the role of financial market regulator from the central government.

quotas to each local government (i.e. the provinces), and the local government officials must comply with the quotas to identify and recommend the candidate firms within their jurisdiction. In this manner, the local government choose the candidate firms, and the IPO applications of these candidate firms need to be further screened and approved by the regional financial regulator (i.e. the affiliate of the CSRC at the province level), the stock exchange and the central financial regulator. Under this regulatory model, the role of the underwriter is diluted, as they do not have discretion on firm selection, pricing and offering. Chen et al. (2014) point out that most underwriters are controlled by the government under the quota system, and their service quality is not important because the government controls the IPO process. In summary, the screening, selection and oversight of IPO firms largely rely on government agencies under a quota system.

Table 4.1: Comparison across regulatory systems

The central financial regulator in China is the China Securities Regulatory Commission (CSRC); the regional financial regulators in China are the CSRC's affiliates at the province or city levels. Source: CSRC (2015), Liu et al. (2013), Zhen (2013), Gerakos et al (2013) and Mendoza (2008).

	China's IPO regulatory model			**London's AIM regulatory model**
	Administrative-approval regime	*Approval regime*		
	Quota system (1990 to 2001)	Channel system (2001 to 2003)	Sponsorship system (2004 to the present)	Private-sector oversight & regulation (1995 to the present)
Role of selecting and attesting to the quality and viability of candidate firms	Local and central government agencies or officials	Underwriters ("IPO supervisors") guided by the regional regulator or inspector	Sponsor institution and sponsor representative	Nomad (institution)
Oversight period	IPO selection period	At least one year during the pre-IPO and/or IPO period	Throughout the pre-IPO and/or IPO period, and for two fiscal years after listing	All the time (in the pre- and post-IPO period)
Quota restrictions	Quotas are provided by the central regulator to local government officials	Channel quotas are provided by the central regulator to IPO supervisors	No restrictions	No restrictions
Penalties or disciplinary actions	Possible political discipline for officials, and reduction on next year quotas	Ambiguous disciplinary regulations (depending on the central regulator's judgement), and a reduction of next year's channel quotas	Clear disciplinary regulations, and punishment in the form of warnings, suspension and the withdrawal of the sponsorship qualification	Fines and lawsuits
Review of IPO admission documents, and IPO approval	Regional financial regulator, stock exchanges and central financial regulator	Regional financial regulator (provides monthly feedback on inspection), central regulator	Central financial regulator	No review
Listing regulations	Mandatory requirements: 1) In the most recent three years, the accumulated net profits of the firm shall be over 30 million RMB; 2) in the most recent three years, the accumulated operating income shall be over 300 million RMB; 3) the share capital shall be over 30 million RMB before the IPO; 4) there is no loss at the latest fiscal year end; 5) the proportion of intangible assets is less than 20%; and 6) there has been no accounting fraud in the most recent three years.	Mandatory requirements 1) In the most recent three years, the accumulated net profits of the firm shall be over 30 million RMB; 2) in the most recent three years, the accumulated operating income shall be over 300 million RMB; 3) the share capital shall be over 30 million RMB before the IPO; 4) there is no loss at the latest fiscal year end; 5) the proportion of intangible assets is less than 20%; and 6) there has been no accounting fraud in the most recent three years.	Mandatory requirements 1) In the most recent three years, the accumulated net profits of the firm shall be over 30 million RMB; 2) in the most recent three years, the accumulated operating income shall be over 300 million RMB; 3) the share capital shall be over 30 million RMB before the IPO; 4) there is no loss at the latest fiscal year end; 5) the proportion of intangible assets is less than 20%; and 6) there has been no accounting fraud in the most recent three years.	Flexible regulation (comply or explain option) The AIM Rules for Companies require that admission documents contain a statement that the company has, in its directors' opinion, sufficient working capital for at least 12 months from the date of admission. When a company has not been revenue earning or financially independent for two years, its directors and substantial shareholders are restricted from selling their shares for a period of 12 months after admission.

The approval regime is a move towards a market-oriented regulatory model, and starts with the *channel system* from 2001 to 2003. Under this regulatory system, the government empowers underwriters (which were also known as "IPO supervisors" in this period)[100] to oversee IPO candidate firms, but these underwriters are subject to the channel quotas for the number of IPO recommendations, and the CSRC monitors the process of IPO selection. Specifically, as with the method for the previous quota system, the CSRC assigns channel quotas (also known as "channels") to each lead underwriter in the channel system, and the underwriters are not allowed to recommend more than one firm at once to the central regulator (i.e. they cannot use more than one channel quota at once). Thus, there is limited incentive for competition among underwriters under a channel system (Liu et al., 2013). In addition, because the CSRC has not yet formulated clear regulations regarding how IPO supervisors work[101], the CSRC (2001) appoints regional regulators to inspect the work of IPO supervisors, and these regional officials need to provide monthly feedback on their inspections to the central regulator. In a nutshell, under the channel system, although the screening, selection and oversight of IPO firms have been partially (and informally) transferred from government agencies to the private sector, the central regulator (CSRC) is still closely involved in the process of IPO screening and oversight via its regional regulators (or regional inspectors). Due to the constraint of the channel quotas and the unsound disciplinary measures, it is ambiguous as to what extent the IPO supervisors are concerned with their own reputational capital.

In early 2004, the previous regulatory systems were replaced by a *sponsorship system*, which is a more market-oriented IPO regulatory model than the previous regulatory

[100] The name "IPO supervisory company" was used in the CSRC's (2001) Decree No. 125 for introducing the channel system. In practice, the securities companies or underwriters who got the channel quotas from the CSRC were generally called supervisory companies, and they did not need to register a supervisory qualification with the CSRC. Although it is similar to the future "sponsor institution" in name (in the CSRC's [2003a] Decree No. 18), these two roles actually imply different degrees of responsibilities, eligibility requirements, potential disciplinary actions and other regulations for securities companies.

[101] For example, Article 36 of CSRC (2001) Decree No. 125 requires that "The supervisory company should advise the client firm to establish a sound accounting and/or management system that avoids accounting fraud". However, the CSRC does not interpret how to establish such an accounting and/or management system within the client firm in terms of both qualitative and quantitative standards.

systems.[102] The sponsorship system has three main features. First, the CSRC entrusts nominated advisors (also known as the "sponsor institution and sponsor representative" or "sponsoring entities" in China) to perform the roles of IPO screening, oversight, advice and monitoring. Under the sponsorship system, the sponsoring entities are no longer subject to quota and channel constraints, and they are able to select any number of candidate firms to apply for IPO. In addition, they are responsible for attesting the quality and viability of IPO candidate firms. The CSRC no longer requires regional regulators to guide and closely monitor the process of IPO oversight (see CSRC, 2003a). Instead, the CSRC focuses on training and regulating the sponsoring entities; for example, sponsor representatives are required to regularly attend sponsorship vocational training, and the CSRC makes a series of regulatory interpretations of the sponsorship duties in its decrees (see CSRC, 2003a, 2008). Nevertheless, the CSRC still holds certain power to inspect/review the IPO admission documents produced by the sponsoring entities, and make decisions on IPO approval. In practice, if the stock-issuance-examination committee of the CSRC questioned the information in IPO admission documents during the period of admission review, the sponsoring entities need to give explanations on behalf of the client firms. In this regard, it is possible that sophisticated sponsoring entities can help to increase the probability of approval or reduce the processing times of the admission reviews.

Second, the CSRC clearly describes the potential disciplinary actions for sponsoring entities. For example, Article 72(2) of CSRC (2008) Decree No. 58 states that "if a client firm's business profits slid over 50% in the year of issuing relative to the previous year, the sponsor representative will be punished for 3–12 months of suspension of sponsorship-related activities". In this manner, most disciplinary actions are clearly related to the post-listing performance of client firms, which may incentivize the sponsoring entities to provide a high level of oversight of client firms. Moreover, the CSRC also sorts disciplinary actions into three specifications (e.g. warning, suspension

[102] Although CSRC (2003a) Decree No. 18 required that the sponsorship system was put into effect in February 2004, I treat the date of sponsor representatives' signatures initially shown on IPO prospectuses as the effective date of the sponsorship system for IPO firms in my following empirical study.

and withdrawal of sponsorship qualification) based on the degree of violation of the regulations.

Third, in addition to the IPO prospectus, the CSRC also requires the sponsoring entities to produce an issuance sponsorship letter (also known as issuance sponsorship document), which mainly contains qualitative information in the form of comments from sponsoring entities on the quality of client firms. The issuance sponsorship letter has hundreds of pages of information disclosure, including (but not limited to) assessments by sponsoring entities of the risk factors, competitive advantages, profitability and business development of candidate firms. As mandatory information-disclosure files, the sponsorship documents also need to be reviewed by the CSRC, and thereafter are made publicly available. Therefore, investors are able to evaluate the quality of IPO firms by consulting the information revealed in the sponsorship documents. Taken together, under the sponsorship system, the sponsor institution and sponsor representative are the primary entities attesting to the quality and viability of IPO firms; meanwhile, the centralized regulatory review (of the IPO admission documents) that is taken by the public regulator (the CSRC) is still in place. Hence, the features of the sponsorship system make it distinguishable from previous regulatory systems regarding the methods of IPO screening and oversight.

4.2.2 Sponsor institution vs sponsor representative

According to the CSRC (2003a, 2008), there are different eligibility requirements for sponsor institutions and sponsor representatives. The eligibility criteria for sponsor representatives are a competence examination and two to three years of work experience in an investment-banking division (IBD), while the eligibility criteria for sponsor institutions are the numbers of employed representatives (a minimum of four) and sponsorship-related personnel (a minimum of 35), and the registered capital of the company (a minimum of 100 million RMB).

In practice, the sponsor institution and sponsor representative fulfil different functions in the process of IPO oversight. Specifically, the sponsor institution needs to appoint a sponsoring team (consisting of sponsor representatives and related personnel) to conduct IPO oversight. Before submitting IPO admission documents to the CSRC, the sponsor institution needs to appoint an internal examiner to re-examine the quality of the IPO firms and admission documents. With respect to the sponsor representatives, they are mainly in charge of due diligence and producing the IPO admission documents. The responsibility of the sponsor representatives is complicated, since they are employed by the sponsor institution while they are also entrusted by the CSRC. In theory, Article 5 of CSRC (2008) Decree No. 58 states that "a sponsor representative shall be independent when fulfilling his/her duties and shall not be involved in fraudulent activities by the issuer and sponsor institution". However, in practice, it is difficult to judge if sponsor representatives fulfil their oversight role independently and are not influenced by the sponsor institution.

4.3 Literature review and hypothesis development

The empirical study of the role of the centralized or public regulation of securities issuance in investor protection stems from Stigler's (1963) investigation on the rise of the Securities and Exchange Commission (SEC) in the US market. By comparing the post-listing stock performance between the pre-SEC period and the post-SEC period, Stigler (1963) finds that there is no significant difference in the performance of IPOs between the two periods, and thereby casts considerable doubt on the ability of the SEC's regulation to protect investors and screen out low-quality firms. In subsequent studies, some academics (e.g. Benston, 1973; Chow, 1983; Jarrell, 1981; Simon, 1989) reach a similar conclusion, based on comparisons of the post-listing returns across various control samples.

Proponents of public regulation nevertheless criticize the conclusion drawn by Stigler (1963), and they argue that the SEC is a valuable and effective agency for regulating the market (e.g. Friend and Herman, 1964; Friend and Herman, 1965; Peltzman, 1976; Seligman, 1983). Relatedly, Deakin (1976) provides empirical evidence that there is a significant upward shift in market returns following the implementation of the SEC's regulation. Furthermore, in examining the implication of the public regulation on firms listed in the OTCBB, Bushee and Leuz (2005) find that firms that complied with the SEC's regulation experience significantly higher returns and liquidity levels than those without the regulatory compliance. Likewise, Greenstone et al. (2006) and Ferrell (2003) document positive returns and decreases in stock volatility for firms in the over-the-counter market under the influence of the SEC's regulation.

For evidence outside the US market, recent studies track the regulatory changes over a long time horizon to investigate how the quality of IPO firms varies with the force of centralized regulation. For example, Cattaneo et al. (2015), using Italian data, reveal that the government tends to tighten the regulation during the periods of weak investor protection, which improves the survival rates of IPO firms, whereas the easing of listing requirements harms the survival rates. Takahashi and Yamada (2015) provide different consequences of relaxing the listing requirements by analysing the effects of serial deregulations in the Japanese IPO market[103]. They confirm that the deregulation process enables potential high-growth firms (i.e. in terms of their profitability and productivity before IPO) to access public equity, and it improves job creation (i.e. grow in number of employees after IPO) rather than making low-quality firms flock to the market.

It is far from clear whether the public-sector regulation and enforcement can protect investors from overpaying on low-quality firms; however, there is no doubt that the centralized regulatory approach imposes high compliance costs on the affected firms (see Stigler, 1963; Bushee and Leuz, 2005; Cattaneo et al., 2015). In fact, it is difficult for the financial regulator to identify an appropriate regulatory framework that strikes a balance between investor protection and the costs of raising capital (Cattaneo et al., 2015). To some extent, the public regulator seems to be caught in a dilemma: regulatory tightening may be capable of screening bad-quality firms to protect investors, yet it creates costly barriers for some firms (especially small firms) to go public; and regulatory easing enables more firms to access capital equity, while it may bring low-quality firms into market. Given the drop in foreign listings in the US market due to the Sarbanes-Oxley

[103] The Japanese IPO market experienced a series of deregulations over 20 years, which was a way of overcoming the long-term economic recession adopted by the government (Takahashi and Yamada, 2015).

Act (e.g. Piotroski and Srinivasan, 2008) and the flourishing of London's AIM in drawing foreign listings relative to the other major markets (e.g. Nielsson, 2013), both policymakers and academics have started to revisit the public-sector regulation versus private-sector regulation.

More recently, some empirical studies have examined the effectiveness of private-sector regulation (i.e. AIM's regulatory model) in screening low-quality firms and protecting investors. Gerakos et al. (2013) compare the post-listing stock performance of AIM firms with the traditionally centralized regulated markets (e.g. NASDAQ, OTCBB and the LSE Main Market) and the unregulated market (e.g. the US Pink Streets). They find that AIM firms perform worse than the regulated markets and even slightly worse than the unregulated market. That means the AIM's regulatory structure has a limited ability to protect investors relative to the traditional regulatory model.[104] Since the screening function of AIM's model depends on the quality of Nomads' oversight (i.e. private-sector oversight), Gerakos et al. (2013) further assess whether the reputation of Nomads can explain the cross-sectional variation in firm's post-listing stock performance, and their conclusion varies based on the use of reputation measures. By employing a composite measure of reputation that is based on several characteristics of Nomads, Espenlaub et al. (2012) find that a Nomad's reputation has a significant impact on the survival of AIM's IPOs. Moreover, Vismara et al. (2012) study the European main markets versus its second markets, and they report the pronouncedly poor performance of London's AIM IPOs relative to the IPO firms listed on the Main Market (in terms of returns and liquidity). Doukas and Hoque (2016) analyse the motivations of some firms that meet the stringent listing requirements of the LSE Main Market, but which still choose to list on the AIM. They find that the selection of the listing destination is closely related to the differences in firm characteristics (at IPO) and subsequent corporate actions (i.e. mergers and acquisitions [M&A] versus seasoned equity offering [SEO]), which means that the market choice is a self-selection decision. Consistent with the previous conclusion of the poor

[104] An additional test, in Gerakos et al. (2013), on the return performance of retail investors' holdings indicates that the AIM firms with higher proportions of retail ownership suffer more serious underperformance.

performance of AIM's new listings, Doukas and Hoque (2016) document that the post-IPO operating performance of AIM listings is worse than the new listings in the LSE Main Market, while the AIM firms that meet the LSE Main Market's requirements perform slightly better than those that do not meet such standards. Their findings imply that the AIM's regulatory model may be not suitable for protecting investors.

Because China's financial authority, the CSRC (2003a, 2008), claims that a sponsorship system is used for improving IPO firm quality and investor protection relative to the previous government-dominated regulatory systems (e.g. the quota system and channel system), my primary variable of interest is the market-adjusted post-IPO return performance across these systems. Prior research on China's IPO regulation, such as Tian (2011), explains that the quota system or quota regulatory model promotes rent-seeking activities and leads ultimately to a failure in pricing. Du and Xu (2009) conclude that the early administrative regulatory models might have helped to jump-start China's stock market, while the models such as the quota system would be not effective in the long run. Also, considering the experience of using Nomads for IPO oversight in London's AIM (e.g. Mendoza, 2008; Espenlaub et al., 2012; Gerakos et al., 2013), I anticipate that IPO firms screened using a sponsorship regulatory model (or sponsoring entities) has a better market-adjusted post-IPO return performance than IPO firms selected using the previous regulatory models.

Hypothesis 1: Sponsoring-entity-backed IPO firms experience a better market-adjusted post-listing stock performance than non-sponsoring-entity-backed IPO firms.

Most of the studies related to the Chinese IPO market view political participation as an explanation of the post-IPO underperformance in the A-share market. Fan et al. (2007) find that the IPO firms with politically connected chief executive officers (CEOs) significantly underperform the firms with non-connected CEOs, whereas Liu et al. (2012) and Liu et al. (2013) document the positive impact of firms' politically connected CEOs on post-IPO stock performance. Moreover, Liu et al. (2013) suggest that underwriters with politically connected CEOs help to increase the probability of IPO approval, but there is no significant difference in post-listing return performance for IPO firms managed by underwriters with and without politically connected CEOs. By contrast, in a recent study, Chen et al. (2017) reveal that underwriters with a political connection have a negative impact on the IPO firms' post-listing return performance. Piotroski and Zhang (2014) document that IPO firms under China's political-promotion period underperform the IPO firms that are outside the political-promotion period, in terms of post-listing return performance.

Unlike those studies, I attempted to examine whether the sponsorship-system-related factors/characteristics can help to provide insight into the causes of China's A-share IPO underperformance. Since sponsor institutions and sponsor representatives are the primary entities that attest to the quality of candidate firms, it is interesting to determine whether the cross-sectional variation of post-IPO stock performance is driven by the type of sponsoring entities chosen. Under the AIM's light-touch regulatory environment, Gerakos et al. (2013) show that reputable Nomads have a limited influence on mitigating the post-IPO return underperformance of new listings. Relatively speaking, based on China's sponsorship regulatory model, I was able to examine the effectiveness of sponsoring entities in IPO oversight when the regulatory rules are stringent. Instead of focusing on stock performance, Espenlaub et al. (2012) study IPO survival in the AIM, and demonstrate that Nomads compete for their reputational capital in the AIM because reputable Nomads have a significantly positive association with IPO survival. Motivated by these studies, I developed an array of reputation measures for sponsoring entities based on their sponsorship-related characteristics in China's IPO market setting (see Subsection 4.4.2.3). Following Carter et al. (1998), Jain and Kini (1999), Chan et al. (2008) and Dong et al. (2011), I anticipated that reputable sponsoring entities can provide a higher level of oversight and screening of candidate firms, and thereby a better post-IPO stock performance:

Hypothesis 2a: Sponsor-institution reputation has a positive impact on the market-adjusted post-IPO stock performance.

***Hypothesis 2b*:** Sponsor-representative reputation has a positive impact on the market-adjusted post-IPO stock performance.

Beatty and Welch (1996), Bhabra et al. (2003), Arnold et al. (2010), and Hanley and Hoberg (2010) suggest that some of the information content in IPO prospectuses (to be precise, the risk-factors section) is informative and related to the aftermarket stock performance. Under the sponsorship system, in addition to the IPO prospectus, the CSRC also requires the sponsoring entities to make comments and/or disclosures on the client firm's quality in the issuance sponsorship letter.[105] These disclosures of firm's risk factors and advantage factors may provide certain negative and positive information signals to investors. If some of the information content is related to the post-IPO return performance, the sponsoring entities should be effective in performing premarket due diligence and delivering informative signals to investors. Therefore, I anticipated that the size of the risk-factors section in the sponsorship letter provides caution/negative signals about a candidate firm, and it has a negative association with post-IPO return performance, while the size of the advantage-factors section has a positive connection with the post-IPO return performance:

Hypothesis 3a: The market-adjusted post-IPO stock performance is negatively related to the size of the risk-factors section in the issuance sponsorship letter.
Hypothesis 3b: The market-adjusted post-IPO stock performance is positively associated with the size of the advantage-factors section in the issuance sponsorship letter.

Another feature that is different in China's sponsorship regulatory model compared to the AIM regulatory model is that the IPO admission documents need to be reviewed by the listing authority (the CSRC). In this manner, the CSRC inspects the quality of the candidate firms that are selected/screened by the sponsoring entities. However, it is unclear how such a centralized admission review is related to the post-listing return

[105] I have not performed a similar analysis for the IPO prospectus, because I have focused on the sponsorship-related determinants of the post-IPO return performance in this chapter, and an IPO firm's prospectus may not be solely produced by the sponsoring entity (e.g. IPO prospectus could be produced together by lead- and co-underwriters).

performance of sponsoring-entity-managed IPOs. Because the sponsoring entities are entrusted by the CSRC to perform the role of IPO oversight and screening, I expected that certain sponsoring entities would have a tendency to substitute the function of the CSRC in controlling firm quality. More specifically, when reputable (or high-quality) sponsoring entities attest to the quality of candidate firms, the CSRC may need to scrutinize them less. To this extent, I anticipated a negative relationship between the degree of the CSRC's admission review and the candidate firms' post-IPO return performance. In practice, because it is difficult to directly measure the level of the CSRC's admission review (or the centralized regulatory review), I used the processing times of the CSRC's review of the IPO admission documents as a proxy for the degree of centralized regulatory review. I address this in the following hypotheses:

Hypothesis 4a: The market-adjusted post-IPO stock performance is negatively related to the processing times of the CSRC's regulatory review of IPO admission documents.

Hypothesis 4b: The reputation of sponsoring entities is negatively related to the processing times of the CSRC's admission review.

It is an interesting question as to whether the authority's disciplinary actions have any implications in terms of changing the behaviour of the sponsoring entities after they receive penalties. As there are some instances of disciplinary actions being taken against sponsoring entities in China's IPO market, I wanted to examine the behaviour shifts of sponsoring entities after these penalties. In theory, as repeat players in the market, sponsoring entities survive on their reputations. The number of IPOs managed by sponsor institutions and sponsor representatives should decline after a penalty from the CSRC. They should become more concerned about their reputation after getting penalties, and hence the sponsoring entities have an incentive to rebuild their reputation in their subsequent sponsoring activities. Therefore, I expected that, after receiving penalties, the sponsoring entities would provide a higher level of due diligence or oversight of candidate firms than before their penalties. As a result, IPO firms screened by sponsoring entities after those entities have received penalties should be better in terms of post-IPO stock performance than IPO firms selected by these sponsoring entities before their punishment. Thus, the last set of hypotheses is developed as follows:

Hypothesis 5a: The number of IPOs managed by sponsor institutions and sponsor representatives decline after they receive a penalty from the CSRC.

Hypothesis 5b: IPO firms screened by sponsor institutions after the institutions have received a penalty have a positive association with the market-adjusted post-IPO return performance.

Hypothesis 5c: IPO firms screened by sponsor representatives after the representatives have received a penalty have a positive association with the market-adjusted post-IPO return performance.

4.4 Data, methodology and descriptive statistics

4.4.1 Data and sample description

I collected data on all the IPOs in China's A-share IPO market between January 1992 and October 2012. The sample ended in 2012 because the CSRC suspended A-share IPO activity in November 2012. After eliminating 16 issuances that have missing returns data, the overall sample consists of 2,518 IPOs. In fact, my sample covers 98.86% of the IPOs that went public from the beginning of China's stock market to the recent IPO moratorium, of which IPOs under a sponsorship system have a coverage rate of 98.78%.

To split the sample precisely into sponsoring-entity-backed IPOs and non-sponsoring-entity-backed IPOs, I manually collected the names of the sponsor institutions and sponsor representatives from the IPO prospectuses. A firm can be identified as having a sponsoring-entity-backed IPO only if its prospectus contains the signatures of the sponsoring entities (or the relevant information of the sponsoring entities). Hence, starting from 1st June 2004, there are 1,230 IPOs backed by sponsoring entities. I dropped 15 IPOs from the sponsoring-entity-backed sample due to them having incomplete returns data, ultimately leaving 1,215 sponsoring-entity-backed IPOs to examine Hypotheses 2 to 5.

With respect to the data for calculating the key independent variables, I manually collected the profiles of the sponsoring entities, the penalties on sponsoring entities and the CSRC review times (in days) for the admission documents from the CSRC website. In addition, the numbers of IPO risk factors and advantage factors were manually collected from the issuance sponsorship letters[106]. The stock returns and financial data are from the China Security Market and Accounting Research (CSMAR) database. The remaining data for determining the control variables were collected either from the IPO prospectuses or from the CSMAR database.

Table 4.2 provides the overall sample description. As shown in Panel A, the number of sponsoring-entity-backed IPOs (48.25% of the total sample) is close to the number of non-sponsoring-entity-backed IPOs (51.75% of the total sample). Since the channel system is a temporary transitional system, there are only 220 firms that went public under this system. A noticeable pattern is the uneven distribution of IPO numbers across the sponsorship period, such as the lowest volume being in 2005 (14 IPOs) and the highest number in 2010 (349 IPOs). A possible explanation for this is the frequent IPO moratoriums by the CSRC. For instance, the CSRC suspended IPOs in 2005 due to the split-share structure reform on state-owned enterprises (SOEs), which directly led to there only being a few issuances in that year. The CSRC suspended IPOs again between September 2008 and June 2009 due to the financial crisis. Thus, some firms that intended to go public in 2008 and 2009 postponed their listings to 2010.

[106] Issuance sponsorship letters are disclosure documents for investors that can be collected from the CNINFO website. The CNINFO website is authorized by the CSRC to disclose IPO information for public investors.

Table 4.2: IPO sample distribution: full sample

This table presents the full IPO sample distribution by year (Panel A), by industry (Panel B) and by listed market/board (Panel C), and it also presents the accumulative distributions of annually registered sponsor institutions and sponsor representatives (Panel A). For brevity, in Panel A, the year distribution of IPO firms before the sponsorship system (June 2004 – October 2012) is presented for two subsamples: Quota System (January 1992 – March 2001) and Channel System (March 2001 – May 2004). The industry categorization is based on the CSRC's Guidelines for the Industry Classification of Listed Companies (2012 Revision).

Panel A: Distribution of IPOs and registered sponsoring entities by year

Year	Number of IPO Firms	%	Cumulative Number of Sponsors	Cum %	Cumulative Number of Representatives	Cum %
Quota System	1083	43.01	0	0	0	0
Channel System	220	8.74	0	0	0	0
2004	61	2.42	39	60.94	517	38.35
2005	14	0.56	47	73.44	555	41.17
2006	65	2.58	50	78.13	607	45.03
2007	126	5.00	55	85.94	785	58.24
2008	77	3.06	57	89.06	899	66.69
2009	99	3.93	62	96.88	997	73.96
2010	349	13.86	63	98.44	1173	87.02
2011	279	11.08	64	100	1323	98.15
2012	145	5.76	64	100	1348	100
Total	2518	100	64	100	1348	100

Panel B: Distribution of IPOs by industry

Industry (Code)	Number of IPO Firms	%
Agriculture, Forestry, Farming & Fishery (A)	45	1.79
Mining (B)	73	2.90
Manufacturing (C)	1572	62.43
Energy (D)	85	3.38
Construction (E)	69	2.74
Wholesale & Retail (F)	147	5.84
Transportation (G)	83	3.30
Lodging & Catering (H)	11	0.44
Information Technology (I)	129	5.12
Finance (J)	44	1.75
Real Estate (K)	133	5.28
Leasing & Commercial Services (L)	22	0.87
Scientific Research & Technical Services (M)	11	0.44
Environment & Utilities (N)	25	0.99
Community Services, Repair Services and Others (O)	0	0
Education (P)	1	0.04
Social Services & Health Care (Q)	4	0.16
Culture, Entertainment & Sport (R)	31	1.23
Others (S)	33	1.31
Total	2518	100

Panel C: Distribution of IPOs by listed market/board

Market/Board	Number of IPO Firms	%
SHSE & SZSE Main Market	1475	58.58
Small and Medium Enterprises (SME)	699	27.76
Growth Enterprise Market (GEM)	344	13.66
Total	2518	100

Table 4.2 Panel A also presents the cumulative distribution of annually registered sponsors and sponsor representatives during the sponsorship-system period. In each year (except 2005), the number of IPOs is greater than the cumulative number of sponsors. This implies that, on average, each sponsor institution needs to oversee more than one IPO firm in any given year. While the cumulative number of representatives is far greater than the number of IPOs in each year, the CSRC requires that each firm needs to be overseen by two representatives, and each representative is only allowed to monitor two candidate firms simultaneously.

Panels B and C of Table 4.2 present the distribution of the sample IPOs by industry[107] and by listed market, respectively. As shown in Panel B, A-share IPOs are highly concentrated in the manufacturing sector (62.43% of the entire sample), as, in past decades, China has been one of the world's leading manufacturing countries. In addition to the manufacturing sector, IPOs also are concentrated in the wholesale and retail industry (5.84%), the real-estate industry (5.28%), and the information-technology industry (5.12%). Panel C shows that there are 58.58% A-share IPOs listed on the main market and the rest of firms went public in China's second market (i.e. small and medium enterprises [SMEs] and Growth Enterprise Market [GEM]). In the multivariate analysis, I control for those potential year, industry and market-listing effects using an array of dummy variables.

4.4.2 Methodology and construction of variables

4.4.2.1 Event-time approach

This study employs an event-time approach as the primary measure of post-IPO stock return performance by calculating the market-adjusted BHARs. The results of this study are mainly based on the one-year (12-month) and three-year (36-month) post-IPO market-adjusted BHARs. In particular, each post-IPO event year is defined as having 243 trading days, exclusive of the day of the initial listing. As shown in Equation (4.1), the market-adjusted BHAR for IPO stock *i* at event day *t* is calculated as the difference between the

[107] The categorization of industry is based on Guidelines for the Industry Classification of Listed Companies by CSRC (2012 Revisions).

buy-and-hold return of the IPO stock and the buy-and-hold return of the market benchmark:

$$BHAR_{i,t} = \left[\prod_{t=1}^{T}(1 + r_{i,t}) - 1\right] - \left[\prod_{t=1}^{T}(1 + r_{m,t}) - 1\right] \tag{4.1}$$

Where $r_{i,t}$ is the daily post-IPO return for stock *i* at event day *t*, and $r_{m,t}$ is the daily return on the market benchmark of the tradable shares value weighted index *m* for all A-share stocks at event day *t*. Moreover, the average equal-weighted market-adjusted BHAR on the portfolio *p* with *n* IPOs for a holding period of *T* is calculated as in Equation (4.2):

$$BHAR_{p,T} = \frac{1}{n}\sum_{i=1}^{n} BHAR_{i,T} \tag{4.2}$$

Hereafter, the market-adjusted BHAR on the A-share IPO portfolio for the 12-month and 36-month holding periods are abbreviated as BHAR12 and BHAR36, respectively. Following Ritter (1991), and Loughran and Ritter (1995), I also calculated the wealth relatives (WR) to interpret the performance of the holding-period returns, as shown in Equation (4.3):

$$WR = \frac{1 + average\ return\ for\ T\ holding\ period\ on\ IPO\ portfolio}{1 + average\ return\ for\ T\ holding\ period\ on\ market\ benchmark} \tag{4.3}$$

Where if WR is greater than 1, it means the IPO portfolio outperforms the benchmark portfolio; if WR is less than 1, it indicates the IPO portfolio underperforms the benchmark portfolio.

The primary method used to examine my hypotheses is the cross-sectional ordinary least squares (OLS) regression. A baseline regression model is shown in Equation (4.4):

$$BHAR_i = \alpha + \beta_1 * [Key\ Independent\ Variables]_i + \sum_{j=1}^{12} \nu_j * [Control\ Variables]_{j,i} + \sum_k [Market\ listing\ Dummies]_{k,i} + \sum_l [Year\ Dummies]_{l,i} + \sum_m [Industry\ Dummies]_{m,i} + \varepsilon_i \quad (4.4)$$

Where the dependent variables are market-adjusted BHAR12 and BHAR36. All key independent variables and control variables are defined in detail in Subsection 4.4.2.3. As previously mentioned, in order to control for the potential year, industry and market-listing effects, I included an array of dummy variables in all of the regressions as proxies for these effects.

4.4.2.2 Calendar-time approach

For measuring long-run abnormal performance, Fama (1998), and Mitchell and Stafford (2000) argue against the event-time BHAR approach due to the dependence problem arising from the cross-correlation of individual-event-firm returns, and strongly advocate a monthly calendar-time portfolio approach.[108] Hence, as robustness checks for the empirical results of the event-time approach, I employed Fama and French's (2015) five-factor time-series regressions on the calendar-time returns of the IPO portfolios. Like Loughran and Ritter (1995), and Ritter and Welch (2002), for each calendar month between February 1992 and October 2013 (261 months), I developed both equal-weighted and value-weighted portfolios, which include IPO firms that went public during the previous 12 months and 36 months. Following Fama and French (2015), I constructed the factors using all A-share stocks listed on the SSE and SZSE (including main, SME and GEM boards in these two exchanges) using 2x3 sorts. The Fama-French five-factor time-series regression is displayed in Equation (4.5), where I also include the lagged factors, as in Ritter and Welch (2002).

$$R_{pt} - R_{ft} = \alpha_p + b_t(R_{mt} - R_{ft}) + b_{t-1}(R_{mt-1} - R_{ft-1}) + s_t SMB_t + s_{t-1} SMB_{t-1} + h_t HML_t + h_{t-1} HML_{t-1} + \gamma_t RMW_t + \gamma_{t-1} RMW_{t-1} + c_t CMA_t + c_{t-1} CMA_{t-1} + \varepsilon_{pt} \quad (4.5)$$

[108] Researchers have long debated the pros and cons of the event-time approach and calendar-time approach (e.g. Barber and Lyon, 1997; Brav and Gompers, 1997; Kothari and Warner, 1997; Brav et al., 2000; Loughran and Ritter, 2000; Gompers and Lerner, 2003).

Where the dependent variable $R_{pt} - R_{ft}$ is the excess return of the calendar-time IPO portfolio; R_{pt} is either the equal-weighted or the value-weighted returns on a portfolio of IPOs in calendar month *t*; R_{mt} is the return on the value-weighted index of all A-shares in month *t*; R_{ft} is the three-month Chinese deposit rate (quoted by the Central Bank of China) in month *t*; SMB_t is the return difference between the small-cap stock portfolio and big-cap stock portfolio in month *t*; HML_t is the return difference between the high B/M stock portfolio and the low B/M stock portfolio in month *t*; RMW_t is the return difference between the robust (high) operating profitability stock portfolio and the weak (low) operating profitability stock portfolio in month *t*; and CMA_t is the return difference between the conservative (low) investment firm portfolio and the aggressive (high) investment firm portfolio in month *t*.

The intercept α_p obtained from the estimation of the Fama-French five-factor regression models is used to evaluate the risk-adjusted long-run performance of IPOs. Specifically, if the estimated intercept is significant and negative, it is evidence of IPO long-run underperformance after accounting for the five factors; and if the estimated intercept is significant and positive, it is evidence of IPO long-run overperformance after accounting for the five factors.

Perhaps unfortunately, there is no right or wrong decision in the choice of factor models. A judgement for the relative performance of factors models (e.g. CAPM, 3-factor model, 4-factor model and 5-factor model) needs to be based on rigorous tests. In this study, I have two reasons for using the Fama-French 5-factor model instead of the other factor models. First, Fama and French’s (2015) 5-factor model was the most recent one when I conducted this research, which arguably means it has a better explanatory power regarding the common variation in stock returns than the other factor models. Second, as a calendar-time approach, there is a lack of the application of the 5-factor model in studying China’s IPO markets. Hence, the use of the 5-factor model in this study to analysing the performance of the sponsorship regulatory system also aims to enrich the relevant empirical evidence.

4.4.2.3 Construction of variables

I used a number independent variables to test Hypotheses 1 to 5. To control the other potential impacts on the post-IPO stock performance, I used a dozen control variables that are found to have explanatory power on the cross-sectional variation of post-IPO returns in previous research. A summary of the definitions of these variables is in Appendix 4.

For Hypothesis 1, I defined a regulatory dummy variable (*D_SPONSOR*) that takes a value of 1 if the IPO firm is backed by sponsoring entities (i.e. under the sponsorship system), and 0 otherwise. I anticipated a positive coefficient on D_SPONSOR, which means a better post-IPO return performance for the sponsoring entities-backed IPOs than the non-sponsored ones.

To test Hypothesis 2a, I used five proxies to measure the reputation (or quality) of the sponsor institutions with relation to the IPO oversight, which are constructed based on the observable characteristics of the sponsor institutions, as follows:

1) *SponsorDate* is the year difference between the registration date of the sponsor institution (with the CSRC) and the offering date of its managed IPO firm. It measures the number of years that a sponsor institution engaged in sponsoring activities prior to the offering date of the IPO firm. It is reasonable to expect that sponsor institutions with longer "work experience" in the sponsorship industry have more resources available to inspect (or monitor) candidate firms and are more concerned with their reputational capital, and thus are able to provide a greater level of screening and oversight.

2) *SponsorCapital* is the registered capital of the sponsor institution. This is a measure of the capital (or size) of the sponsor institution when a securities company is registered with the CSRC to be an IPO sponsor institution. The previous research about underwriter reputation suggests that a bigger underwriter (in terms of capital) is associated with more-severe consequences of lost reputation (Michaely and Shaw, 1994). Therefore, it is possible that a sponsor with a larger amount of capital has more reputational concerns, and therefore gives better screening and oversight to the candidate firms.

3) *SponsorPersonnel* is the number of employees (including the sponsor representatives and related personnel) hired by the sponsor institution. This is another way to measure the capital (or size) of a sponsor institution, which is in terms of human capital. To some extent, if a sponsor institution can engage a large number of sponsorship-related professionals/experts, then it should be a reputable institution. For the sake of their reputation, a sponsor institution with a larger number of experts would provide a higher level of oversight and screening of potential listings. In addition, as mentioned earlier, the entire procedure of IPO oversight not only depends on sponsor representatives but also relates to the sponsoring team and the internal examination team (which is organized by the sponsor institution). In this regard, sponsor institutions with more personnel would have more human resources available to handle their clients (e.g. premarket due diligence) and function better in IPO oversight.

4) *SponsorAge* is the difference in the number of years between the incorporation date of the sponsor institution and the offering date of its managed IPO firm; Ln(SponsorAge) is the natural logarithm of this value. Unlike the measure of SponsorDate, the age of the sponsor institution accounts for its experience in the IBD prior to being an IPO sponsor. In examining the reputation of Nomads in the AIM, Espenlaub et al. (2012) also use the age of the sponsor institution as a proxy of reputation.

5) *D_TOP10* is a measure of ranking. According to the annual ranking of securities companies (in terms of the number of issuances they have managed in each year) announced by the Securities Association of China (SAC), I defined a reputational dummy variable that takes a value of 1 if the sponsor institution is placed in the top 10 in the year of it managing the IPO firm, and 0 otherwise.[109] In China's IPO market, there is no specific ranking for the sponsor role played by securities companies. Since securities companies typically play the role of both underwriter and sponsor under the sponsorship

[109] It should be noted that the ranking for 2012 is unavailable. By checking the previous three-year rankings, I found there are no significant changes in the Top-10 rankings. Therefore, I just used the ranking for 2011 as the ranking for 2012.

system, I attempted to use the ranking of the securities companies as an alternative. The top-ranking securities companies should be more concerned with their reputations, and thus would be able to provide more stringent oversight and screening of IPO firms when they play the role of sponsor.

Taken together, for the reputation proxies that are used to test Hypothesis 2a, of which the primary one is SponsorDate, I anticipated that they would have a positive association with the post-listing stock performance of IPO firms if the reputation of the sponsor institutions does play a role in screening out low-quality firms and protecting investors.

To test Hypothesis 2b, based on several characteristics of the sponsor representatives, I developed four proxies to measure the reputation (or quality) of sponsor representatives with relation to the IPO oversight:

1) *RepDate* is a measure of the number of years that an individual sponsor representative has engaged in sponsoring activities (or in the sponsorship industry) prior to the offering date of his/her managed IPO firm. At least two possibilities exist with regard to the relation between the RepDate and the quality of the sponsor representative's oversight. First, it is possible that the longer the sponsor representatives have engaged in sponsoring activities, the more experience and reputational concerns they possess, and the greater level of screening and oversight they can provide. Given that the experience related to sponsorship in China's A-share market not only includes the oversight of IPO firms but also contains the oversight of seasoned equity offerings and convertible corporate bonds, the RepDate of the sponsor representatives is a reasonable measure to capture the work experience they have gained from these activities as a whole. Second, in order to renew the qualification of sponsorship, sponsor representatives must attend sponsorship-related training sessions organized by the SAC every year. If the representatives fail to pass the exams in the training sessions, then their sponsorship qualification will be revoked. Hence, it is possible that sponsor representatives who hold the qualification longer are better able to comply with professional ethics and are more sophisticated in conducting due diligence on clients.

2) *RepIBDExp* is a measure of the number of years that a sponsor representative has worked in the IBD prior to the offering date of his/her managed IPO firm.[110] According to the CSRC's requirements, sponsor representatives must have around three years of work experience in the IBD before getting qualified. This is because, in practice, sponsor representatives not only act as IPO overseers but also serve as underwriters in most cases. Hence, representatives with more years' work in the IBD presumably perform better in due diligence, and thus are able to provide a greater level of oversight and screening of candidate firms.

3) *RepAge* is the age of the sponsor representative at the IPO date. I anticipated that an IPO firm screened by more mature sponsor representatives will be a signal of its high quality and be associated with better post-listing stock performance. Ln(RepAge) is the natural logarithm of this value.

4) *D_RepEdu* is a dummy variable for measuring the education level of the sponsor representative, which takes a value of 1 if the sponsor representative holds a master's degree or PhD, and 0 otherwise. I attempted to relate the education level to the reputation of the sponsor representative, and I expected that representatives with a higher education level will be able to do better in IPO oversight.

In China's IPO market, each candidate firm is required to be managed by two sponsor representatives. In the cross-sectional analysis, by assuming that the level of oversight depends on the most reputable sponsor representative in a team of two sponsor representatives, I only selected the highest value of each reputation proxy between two sponsor representatives as the key independent variable. Among the reputation measures for sponsor representatives, I treat RepDate as the primary measure of the reputation (or quality) of sponsor representatives. According to Hypothesis 2b, if the reputation of sponsor representatives enhances the screening out of low-quality firms and protecting

[110] I excluded the work experience or years that are not related to new-share issuance; for example, experience as an M&A, stockbroker or other occupations.

investors, I expected that the reputation measures would have a positive association with the post-listing stock performance of IPO firms.

To test Hypotheses 3a and 3b, I define *RISK* and *ADVANTAGE* as the numbers of risk factors and advantage factors revealed in the issuance sponsorship letter, respectively. Specifically, the advantage factors take both the competitive advantages and the good growth/development prospects into account, which reflect the sponsoring entities' positive comments on the future development of the candidate firms. Therefore, I anticipated that there would be a positive relationship between ADVANTAGE and the post-IPO stock performance in the regression analysis. The number of risk factors represents the level of uncertainty regarding the firm's prospects as reported by the sponsoring entities. Thus, I expected that there would be a negative connection between RISK and the post-IPO stock performance in the regression analysis.

To test Hypothesis 4, I used the processing times or length of the CSRC's regulatory review/approval on IPO admission documents (*ApprovalCSRC*) as a proxy to measure the degree of centralized governmental inspection of the quality of IPO candidate firms, where the proxy variable ApprovalCSRC is calculated using the net working days between the submission date of the IPO admission documents and the approval date of this submission. Since the CSRC has transferred IPO oversight to the private sector (to be done by sponsoring entities), except for its final review of the admission documents, the degree of centralized regulatory intervention for the control of firm quality will be reduced if the sponsoring entities can provide a higher level of IPO oversight. Thus, I anticipated that the length of the CSRC's regulatory review would be negatively related to the post-listing stock performance of the IPO firms screened by the sponsoring entities.

Finally, I employed two dummy variables (*D_PENALTY1* and *D_PENALTY2*) to examine Hypotheses 5b and 5c, respectively. D_PENALTY1 takes a value of 1 for IPOs occurring after the sponsor institutions' disciplinary proceedings, otherwise the dummy variable takes a value of 0 for IPOs happening before the sponsor institutions' disciplinary proceedings. I expected that the sponsor institutions would provide a greater level of oversight and screening after getting penalties from the CSRC, and thus there would be a positive coefficient for D_PENALTY1. Likewise, D_PENALTY2 is set for the sponsor representatives to distinguish the IPOs that are managed before and after the representatives' disciplinary proceedings. I also anticipated that a positive sign on D_PENALTY2 would mean the CSRC's penalty could be against the dereliction of duty of sponsor representatives.

In addition to the aforementioned key independent variables, I included a dozen control variables that are identified as affecting the post-IPO stock performance in the previous literature. Ritter (1991) documents that IPO firms with higher initial returns and a smaller offering size tend to have worse long-run stock performances, which is in support of the overreaction hypothesis. Similar empirical evidence is reported by Cai et al. (2008) for China's A-share IPOs listed on the SSE. Therefore, I used *IR* (initial returns)and *OfferSize* to measure the level of IPO underpricing and the size of the gross proceeds, respectively, which aimed to control the potential effect of the market overreaction at the initial offering. Moreover, Ritter (1991) finds a strong (positive) relation between the IPO firm's age and the aftermarket stock performance, and regards the firm's age as a proxy of the *ex ante* risk of the candidate firm (i.e. young firms are riskier than older ones). However, the A-share IPO studies (e.g. Chen et al., 2000; Piotroski and Zhang, 2014; Chen et al., 2015) report a negative connection when they use the firm's age as a control variable. I also included the IPO firm's age (*AGE*) in the model as a control variable. The additional firm-specific variable of the total assets at the pre-IPO fiscal year end (*FirmSize*) is widely used as a control variable in the previous studies of A-share post-IPO stock performances (e.g. Chen et al., 2000; Fan et al., 2007; Liu et al., 2013; Chen et al., 2015).

Previous studies suggest that the operating performance, as a proxy for the quality of an IPO firm, plays a role in explaining the cross-sectional variation of post-IPO returns; therefore, I also included three control variables regarding the IPO firms' operating performances. Su and Bangassa (2011) explain that the A-share IPO firms with higher pre-IPO earnings per share have a better post-IPO stock performance. Accordingly, I defined the control variable *EPS* as the IPO firm's average earnings per share in the three fiscal years prior to the offering. A firm's Tobin's Q ratio reflects the investors' valuation of the potential growth of the firm with the current level of resources (Nielsson, 2013). Feng et al. (2014) confirm a positive connection between the A-share post-IPO stock performance and the firm's Tobin's Q ratio. I calculated the control variable *TobinQ* as the sum of the market value of equities (at the end of the initial trading month) and the difference between the total assets and the book equities, all divided by the firm's total assets. The final control variable of operating performance is leverage ratio (*Leverage*) which is calculated as the firm's total liabilities over total assets at the pre-IPO fiscal year end. Most of the studies on China's A-share IPO market include Leverage in the model. Fan and Wong (2005) suggest that, for the emerging East Asian markets, the prestigious external auditors (the Big Four[111]) can serve a corporate governance role in attesting to the firm's accounting information quality. Such an oversight role by the Big Four auditors has been verified to be effective in monitoring the quality of the AIM's IPO firms (Gerakos et al., 2013). Therefore, I create a dummy variable (*D_Big4*), which takes a value of 1 if the IPO is backed by the Big Four auditors, and 0 otherwise, to control the potential effect of reputable auditors on the post-IPO stock performance.

In my IPO sample, there is a certain amount of cross-listing of firms (i.e. they have also issued B-shares or/and H-shares). It is possible that those cross-listing firms that meet the listing requirements of multiple markets have a higher quality, and thus have better post-IPO stock performances. Cai et al. (2008) find that, in the SSE, the IPOs with both A- and B-share offerings have better post-IPO stock performance than the single A-share IPOs. Therefore, I created a dummy variable (*D_B/Hoffer*) that takes a value of 1 if the firm also issues B- or/and H-shares either before its A-share IPO or within three years after its A-share IPO, and 0 otherwise.

The last three control variables are related to the IPO firm's ownership structure. Previous A-share IPO studies suggest that the post-listing stock performance of SOEs is better than

[111] The Big Four auditors are PwC, KPMG, Deloitte and EY; this does not include Arthur Anderson (making it the Big Five) because it went bankrupt before the A-share sponsorship system.

the private firms (e.g. Liu et al., 2012; Chen et al., 2015). In theory, it is possible that SOEs have outstanding performances, because SOEs with politically connected CEOs may get special resources from the government (Liu et al., 2013), and SOEs are normally in the industries with government protection and monopolies (Aharony et al., 2000), and executives of SOEs (i.e. government officials) may have political-promotion incentives to provide good governance of the firms. Therefore, I used a dummy variable (*D_SOE*) to distinguish between the IPOs of private firms and SOEs, which takes a value of 1 if the firm is an SOE, and 0 otherwise. However, SOEs always hold a certain proportion of non-tradable shares that may result in low liquidity and high agency costs[112], and ultimately depress the firm's post-IPO stock performance. Karpoff and Rice (1989) argue that the firms with restrictions on the freely transferrable shares are likely to suffer from poor financial performance and shareholder disagreement. Therefore, I created a control variable (*NonTradable*) to measure the ratio of the firm's non-tradable shares to total shares at the IPO. Feng et al. (2014) find that if a higher percentage of firm's shares is retained by the largest shareholder, this leads to more aggressive expropriation, and thus a worse post-IPO stock performance. Hence, I also included the control variable *LargestOwnership*, which measures the proportion of firm's shares held by the largest shareholder at the time of listing.

4.4.3 Descriptive statistics and post-IPO stock performance

Table 4.3 presents the evaluations of post-listing stock return performance using both the event-time approach and calendar-time approach on 2,518 of China's A-share IPOs from 1992 to 2012. As shown in Panel A, the average market-adjusted BHARs have significant and negative values from the post-IPO 5-month event window (BHAR5 = -3.972%) to the 15-month event window (BHAR15 = -3.203%)[113], which indicate that China's A-

[112] The conflicts of interest between politically connected CEOs and shareholders arise from bureaucrats pursuing social objectives or rent-seeking at the expense of the shareholders (Fan et al., 2007). Hence, it is possible that the more severe conflicts of interest arise when there are more non-tradable shares held by the CEOs of SOEs. In contrast with previous findings, Fan et al. (2007) state that the firm's post-IPO stock performance is worse if its CEO is politically connected.
[113] Using the bootstrapped skewness-adjusted t-statistics (from 1,000 resamples) in Lyon et al. (1999) to test the null hypothesis that the average BHAR is zero at the 1%, 5% or 10% significance level, I find that the mean BHARs from the 1-month to 4-month event windows, as well as from the 16-month to 19-month event windows are statistically indistinguishable from zero.

share IPO firms underperform compared to their market benchmark in terms of post-listing return performance. In particular, at the post-IPO 12-month event window, the underperformance of IPO firms reaches the worst level (BHAR12 = -5.357%). These results are in line with the phenomenon of post-IPO stock underperformance reported by Ritter (1991), and Loughran and Ritter (1995). Nevertheless, the underperformance disappears when the post-IPO event window extends beyond 18 months, which is broadly consistent with the results of Liu et al. (2013) and Cheng (2015) regarding the long-run performance of China's A-share IPOs. The WR ratio reported in Panel A also confirms that there is modest underperformance of China's IPO firms relative to the market benchmark at 17 months after listing (e.g. from a low of 0.950 to a high of 0.994), and thereafter these IPO firms outperform their market benchmark (e.g. from a low of 1.000 to a high of 1.144).

Table 4.3: Post-listing stock return performance of China's A-share IPOs from 1992 to 2012

This table presents the evaluations of post-listing stock return performance for the A-share IPOs over the period from 1992 to 2012. Panel A presents the results of the event-time approach that assesses the post-IPO stock performance by calculating the average market-adjusted BHARs ($BHAR_{p,T} = BHR_{p,T} - BHR_{m,T}$) on the entire IPO sample (consisting of 2,518 IPOs) over the post-listing event months 1–36, where $BHR_{p,T}$ is the average buy-and-hold return on a portfolio of IPO firms exclusive of the initial return, and $BHR_{m,T}$ is the average buy-and-hold return on the market benchmark. Panel A also reports the bootstrapped skewness-adjusted *t*-statistics of Lyon et al. (1999) with the null hypothesis that the average $BHAR_{p,T}$ is zero, and the wealth relative (WR) ratio between one plus $BHR_{p,T}$ and one plus $BHR_{m,T}$. Panel B and Panel C present the estimates of Fama and French's (2015) five-factor OLS regressions on the equal-weighted and the value-weighted monthly returns of the calendar-time IPO portfolio that includes IPOs went public during the previous 12 months and the previous 36 months. All regressions in Panel B contain 261 observations from calendar-month IPO portfolios from February 1992 to October 2013; all regressions in Panel C contain 285 observations from calendar-month IPO portfolios from February 1992 to October 2015. Following Ritter and Welch (2002), the regressions in every even row include the lagged factors. *t*-statistics are reported in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

$$R_{pt} - R_{ft} = \alpha_p + b_t(R_{mt} - R_{ft}) + b_{t-1}(R_{mt-1} - R_{ft-1}) + s_t SMB_t + s_{t-1} SMB_{t-1} + h_t HML_t + h_{t-1} HML_{t-1} + \gamma_t RMW_t + \gamma_{t-1} RMW_{t-1} + c_t CMA_t + c_{t-1} CMA_{t-1} + \varepsilon_{pt}$$

Panel A: Event-time approach

Post-IPO event month	$BHAR_{p,T}$(%)	$BHR_{p,T}$(%)	$BHR_{m,T}$(%)	WR	Bootstrapped skewness-adjusted *t*-stat of $BHAR_{p,T}$
1	-1.758	-0.830	0.928	0.983	(-0.78)
2	-1.574	-0.214	1.360	0.984	(-0.35)
3	-1.956	0.047	2.003	0.981	(-0.26)
4	-2.424	0.488	2.911	0.976	(-0.29)
5	-3.972	0.107	4.080	0.962	(-5.42) ***
6	-4.315	0.285	4.600	0.959	(-6.01) ***
7	-4.173	0.858	5.031	0.960	(-5.27) ***
8	-5.124	0.643	5.767	0.952	(-5.67) ***
9	-5.171	1.720	6.891	0.952	(-5.21) ***
10	-4.719	2.881	7.600	0.956	(-4.23) ***
11	-4.796	2.725	7.521	0.955	(-4.64) ***
12	-5.357	2.383	7.740	0.950	(-4.90) ***
13	-4.757	2.948	7.705	0.956	(-4.05) ***
14	-4.395	2.963	7.359	0.959	(-3.99) ***
15	-3.203	3.068	6.271	0.970	(-2.78) ***
16	-1.312	4.115	5.427	0.988	(-1.13)
17	-0.636	4.954	5.590	0.994	(-0.56)
18	0.036	4.850	4.814	1.000	(-0.03)
19	1.168	5.144	3.976	1.011	(1.02)
20	2.544	5.801	3.257	1.025	(2.15) **
21	3.284	6.491	3.207	1.032	(2.79) ***

22	4.140	7.281	3.141	1.040	(3.54) ***
23	4.987	8.748	3.761	1.048	(4.02) ***
24	5.356	10.097	4.741	1.051	(4.00) ***
25	6.992	12.314	5.322	1.066	(4.98) ***
26	7.583	13.936	6.353	1.071	(5.66) ***
27	9.024	16.863	7.839	1.084	(6.22) ***
28	10.481	19.961	9.480	1.096	(6.61) ***
29	11.890	23.320	11.429	1.107	(7.39) ***
30	14.988	29.031	14.042	1.131	(8.77) ***
31	16.011	33.384	17.373	1.136	(9.11) ***
32	16.435	38.123	21.688	1.135	(8.72) ***
33	16.718	41.786	25.069	1.134	(8.37) ***
34	18.416	46.520	28.103	1.144	(9.58) ***
35	18.373	49.464	31.091	1.140	(8.76) ***
36	19.450	54.300	34.851	1.144	(9.39) ***

Penal B: Calendar-time approach *(monthly portfolios include IPOs during the previous 12 months)*

	α_p	b_t	b_{t-1}	s_t	s_{t-1}	h_t	h_{t-1}	γ_t	γ_{t-1}	c_t	c_{t-1}	Adj.R^2
(1) Equal-weighted returns of IPO portfolio	-0.0311***	0.986***		0.726***		-0.239**		0.198*		-0.111*		88.5%
	(-10.85)	(33.02)		(9.34)		(-2.53)		(1.84)		(-1.72)		
(2) Equal-weighted IPO portfolio (with lagged factors)	-0.0305***	0.986***	-0.00942	0.749***	-0.0723	-0.219**	-0.0331	0.216**	-0.203*	-0.131**	0.0275	88.7%
	(-10.32)	(32.33)	(-0.32)	(9.40)	(-0.91)	(-2.24)	(-0.35)	(2.01)	(-1.89)	(-2.00)	(0.41)	
(3) Value-weighted returns of IPO portfolio	-0.0317***	1.122***		0.188**		-0.0540		0.527***		-0.0286		89.1%
	(-10.81)	(36.77)		(2.37)		(-0.56)		(4.81)		(-0.44)		
(4) Value-weighted IPO portfolio (with lagged factors)	-0.0302***	1.102***	0.00417	0.225***	-0.139*	-0.0432	-0.0376	0.560***	-0.0935	-0.00273	-0.0813	89.2%
	(-9.92)	(35.09)	(0.14)	(2.74)	(-1.70)	(-0.43)	(-0.38)	(5.05)	(-0.84)	(-0.04)	(-1.18)	

Panel C: Calendar-time approach *(monthly portfolios include IPOs during the previous 36 months)*

	α_p	b_t	b_{t-1}	s_t	s_{t-1}	h_t	h_{t-1}	γ_t	γ_{t-1}	c_t	c_{t-1}	Adj.R^2
(5) Equal-weighted returns of IPO portfolio	-0.0255***	1.007***		0.849***		-0.316***		0.0439		-0.176***		92.9%
	(-11.25)	(42.75)		(12.89)		(-4.52)		(0.47)		(-3.09)		
(6) Equal-weighted IPO portfolio (with lagged factors)	-0.0244***	1.003***	0.0107	0.881***	-0.141**	-0.308***	0.0488	0.0446	-0.204**	-0.209***	0.00523	93.2%
	(-10.40)	(43.16)	(0.46)	(12.89)	(-2.16)	(-4.37)	(0.70)	(0.48)	(-2.21)	(-3.65)	(0.09)	
(7) Value-weighted returns of IPO portfolio	-0.0239***	1.050***		0.351***		-0.331***		0.0401		-0.210***		92.9%
	(-11.11)	(47.11)		(5.64)		(-5.01)		(0.45)		(-3.88)		
(8) Value-weighted IPO portfolio (with lagged factors)	-0.0233***	1.044***	0.0342	0.390***	-0.112*	-0.323***	0.0732	0.0585	-0.133	-0.222***	-0.0411	93.2%
	(-10.39)	(47.16)	(1.55)	(5.98)	(-1.80)	(-4.81)	(1.11)	(0.66)	(-1.51)	(-4.07)	(-0.72)	

As shown in Panel B and Panel C of Table 4.3, I checked the robustness of the results of the IPOs long-run performance using Fama and French's (2015) five-factor time-series regressions, where the dependent variables are the equal-weighted and value-weighted monthly excess returns on portfolios of IPO firms that went public during the previous 12 months and 36 months. Following Ritter and Welch (2002), I also included lagged factors in the regressions. The intercepts (i.e. the Fama-French alphas) are the measures of risk-adjusted post-IPO stock performance after controlling for the market, size, value, profitability and investment factors. As shown in Panel B, for regressions on the monthly returns of the calendar-time portfolios that include the IPO firms that went public during the previous 12 months, all estimated intercepts (α_p) are negative and significant at the 1% level, which confirms the findings of IPO underperformance under the event-time approach (at the 12-month event window in particular). From the results revealed in Panel C, I also find strong evidence of IPO underperformance when examining the monthly returns of the calendar-time portfolios that include IPO firms that went public during the previous 36 months. This is inconsistent with the conclusion drawn from the event-time approach (at the 36-month event window in particular). Hence, my findings imply that the measurement of IPOs long-run underperformance is sensitive to the methodologies used for estimating the post-IPO abnormal returns, which is consistent with the arguments of Fama (1998), and Loughran and Ritter (2000).

Moreover, from the results of the Fama-French five-factor calendar-time regressions in Table 4.3, I find that the market factor plays an important role in explaining the variation of the excess returns of the IPO portfolio across all regression specifications, in terms of both economic and statistical significances (e.g. coefficient estimates b_t from 0.986 to 1.122, with *t*-statistics from 32.33 to 36.77). Also, the profitability and size factors provide a crucial function in describing the average excess return of the IPO portfolio, suggesting that the small issuers with high operating profitability should have a high average market-adjusted excess return. Unlike the results in Ritter and Welch (2002), most coefficients of lagged factors are insignificant. Consistent with Fama and French (2015), for the results in columns (3) and (4), I find that value factor (HML) tends to be a redundant factor for describing the average return after introducing profitability and investment factors into the model.[114]

Table 4.4 presents the descriptive statistics for the variables. Panel A shows that there are significant differences in firm- and offer-level characteristics between the sponsoring-entity-backed IPOs and non-sponsoring-entity-backed IPOs. First, the average underpricing level (IR) of the non-sponsoring-entity-backed IPO firms (231.694%) is more serious than for the IPO firms backed by sponsoring entities (61.104%). To some extent, this result implies that the launch of the sponsorship system with sponsoring entities contributed to reducing the level of asymmetric information and improved pricing efficiency at the IPO. Second, the IPO firms selected by sponsoring entities on average are significantly larger in both offer size and firm size, and have a higher company age than the non-sponsoring-entity-backed firms; Ritter (1991) confirms that large firms with an advanced age are likely to be associated with a better post-IPO stock return performance. Third, IPO firms screened by sponsoring entities have better pre-IPO operating performances (on average, with a higher EPS 56.902%, a ROA of 14.588% and lower leverage ratio of 51.275%) than non-sponsoring-entity-backed firms. If the pre-IPO operating performance is a proxy of the *ex ante* quality of candidate firms, then these results imply that sponsoring entities tend to choose good-quality firms to go public. In other words, sponsoring entities appear to play a better function in screening the quality of candidate firms than the governmental agencies or overseers did in the previous regulatory systems. By contrast, the last row of Panel A indicates that governmental overseers prefer to select SOEs to go public, where the dummy variable for SOEs (D_SOE) has a coverage rate of 62.7% in the group of non-sponsoring-entity-backed IPOs. As expected, due to there being a high proportion of SOEs in this group, non-sponsoring-entity-backed firms on average retain a high percentage of non-tradable shares (37.545%) and a large proportion of firms' shares (47.803%) for the largest

[114] I replicated the regressions in Panel B and Panel C of Table 4.3 using Fama and French's (1993) three-factor model (for brevity, I have not tabulated these results), and I find that the estimated coefficients of the HML factor are significant, with relatively greater *t*-statistics than the ones in the five-factor model. Also, my findings of IPO long-run underperformance are robust to using the traditional three-factor model.

shareholders. This may lead to a reduction in liquidity, an increase in agency costs, and, ultimately, a worse post-IPO stock return performance.

In Panel B of Table 4.4, I report the delisting rates[115] and caution rates of delisting risk (i.e. special treatment [ST] tags) on both sponsoring-entity-backed IPO firms and non-sponsoring-entity-backed IPO firms. To some extent, these rates reflect the poor performance of IPO firms after going public. The group of IPO firms handled by the sponsoring entities apparently has a lower delisting rate (0.329%), and lower rates for the ST tag caution (0.741%) and *ST tag caution (3.045%) than the group of non-sponsoring-entity-backed IPOs (which are 6.293%, 27.014% and 32.080%, for the delisting rate, the ST tag caution rate and *ST tag caution rate, respectively).[116] Given the low "failure rates" of the sponsoring-entity-backed IPOs, the sponsoring entities appear to be effective in screening and overseeing IPO candidate firms.

Panel C of Table 4.4 presents the summary statistics of the key independent variables. With respect to the number of years for the sponsoring entities that engaged in sponsorship-related activities prior to the offering date of the IPO firms they managed, the sponsor institutions (SponsorDate=4.746 years) on average have a slightly longer work experience than the sponsor representatives (RepDate=4.016 years). In addition, the sponsor representatives on average have approximately 10 years of work experience in the IBD (RepIBDExp) (the median is also 10 years). This suggests that most sponsor representatives were experts in underwriting new-share issuance before being qualified. With respect to the length of the CSRC's regulatory review of IPO admission documents, I determine that the average processing time of IPO applications is quite long (215 net working days) and more than half of the sample's IPO firms are subject to the CSRC's regulatory review for at least 177 net working days. Panel C also shows the low coverage rates of D_PENALTY1 and D_PENALTY2 (18.6% and 31.9%, respectively), which suggest that there is a pronounced decline in the number of IPO firms managed by sponsoring entities after the entities' disciplinary actions. For example, the number of IPOs managed by sponsor institutions before their penalties is 371 [=456*(1-18.6%)],

[115] Due to data unavailability, I did not sort the delisted firms by the reasons for delisting.
[116] The use of the ST tag on stocks as a caution started to in April 1998 in China.

while this number dramatically declines to 85 [=456*18.6%] after the sponsor institutions' penalties. A possible interpretation of this result is that it is due to the damage to reputation caused by the disciplinary actions.[117]

[117] In order to confirm the non-existence of multicollinearity in this study, I have conducted the analysis of VIFs. The overall value of the VIFs across all multivariate regressions never exceeded 3.0, and the individual VIFs for the measures included in the regression models never exceeded 10. Hence, I judge that multicollinearity does not appear to be a problem in this study.

Table 4.4: Descriptive Statistics

This table presents the descriptive statistics of the sample of China's A-share IPOs, where N indicates the number of observations. Panel A presents the results of the comparison of firm- and offer-characteristics (i.e. the control variables) between sponsoring-entity-backed IPOs and non-sponsoring-entity-backed IPOs. Panel B reports the delisting rates of the IPO stocks, and the caution rates of the delisting risk of the IPO stocks which have been labelled with *Special Treatment (ST)* and * *Special Treatment (*ST)* tags by stock exchanges (i.e. the stocks trade on the risk-alert board). The *ST tag* represents a risk admonition/caution on the listing stocks that have suffered losses for two consecutive years; the **ST tag* represents a risk admonition/caution (close to the delisting risk) on the listing stocks that have suffered losses for three consecutive years or more. Panel C reports the descriptive statistics for the characteristics related to the sponsorship system (i.e. the key independent variables). The definitions of all variables are discussed in Subsection 4.4.2.3 and summarized in Appendix 4. OfferSize (i.e. gross proceeds) and FirmSize (i.e. pre-IPO total assets) are measured in Chinese Yuan (RMB) in terms of the purchasing power from the year 2000 using China's gross domestic product (GDP) deflator. To test the difference in the variables (non-dummy variables) between the group of sponsoring-entity-backed IPOs and the group of non-sponsoring-entity-backed IPOs, the significance levels in Panel A are based on *t*-statistics (mean difference) and Wilcoxon-Mann-Whitney test (median difference). ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A: Firm- and offer-specific characteristics (control variables)

	Pooled Sample			Non-Sponsoring-Entities-Backed IPOs			Sponsoring-Entities-Backed IPOs		
Variable	N	Mean	Median	N	Mean	Median	N	Mean	Median
IR (%)	2518	149.380	78.147	1303	231.694	123.810	1215	61.104***	37.278***
OfferSize (¥m)	2518	1240	443	1303	379	232	1215	2160***	881***
AGE (year)	2518	5.229	4	1303	2.841	2	1215	7.790***	7***
FirmSize (¥m)	2373	22400	566	1161	1780	388	1212	42100**	787***
EPS (%)	2407	45.198	38.630	1243	34.239	29.939	1164	56.902***	52.317***
ROA (%)	2210	13.562	12.027	1002	12.324	10.681	1208	14.588***	13.158***
TobinQ	2373	1.555	1.192	1161	1.660	1.227	1212	1.455***	1.154**
Leverage (%)	2343	54.005	55.490	1135	56.910	59.602	1208	51.275***	51.976***
NonTradable (%)	2518	25.285	6.051	1303	37.545	43.129	1215	12.137***	0***
LargestOwnership (%)	2473	43.420	42.500	1258	47.803	49.120	1215	38.881***	37.749***
D_Big4	2518	0.048	0	1303	0.039	0	1215	0.058	0
D_B/Hoffer	2518	0.061	0	1303	0.085	0	1215	0.035	0
D_SOE	2518	0.408	0	1303	0.627	1	1215	0.174	0

Panel B: Delisting Report

	Pooled Sample			Non-Sponsoring-Entities-Backed IPOs			Sponsoring-Entities-Backed IPOs		
	N	Delisting/Caution Numbers	Delisting/Caution Rates (%)	N	Delisting/Caution Numbers	Delisting/Caution Rates (%)	N	Delisting/Caution Numbers	Delisting/Caution Rates (%)
Delisting	2518	86	3.415	1303	82	6.293	1215	4	0.329
ST tag	2518	361	14.337	1303	352	27.014	1215	9	0.741
*ST tag	2518	455	18.070	1303	418	32.080	1215	37	3.045

Panel C: Characteristics related to sponsorship regulatory system (Key Independent Variables)

	Sponsoring-Entities-Backed IPOs				
Variable	N	Min	Max	Mean	Median
RepDate (year)	1125	0	8	4.016	4
RepIBDExp (year)	1106	2	18	10.483	10
RepAge (year)	1106	25	49	37.763	38
D_RepEdu	1106	0	1	0.914	1
SponsorDate(year)	969	0	8	4.746	5
SponsorCaptial(¥m)	969	100	11016.900	4589.043	5000
SponsorPersonnel	969	36	664	284.954	260
SponsorAge	969	0	24	12.579	14
D_TOP10	1156	0	1	0.483	0
RISK	1156	0	35	6.644	5
ADVANTAGE	1156	0	30	6.889	7
ApprovalCSRC (day)	1131	5	1007	215.441	177
D_PENALTY1	456	0	1	0.186	0
D_PENALTY2	116	0	1	0.319	0

4.5 Empirical results

4.5.1 Comparison of post-IPO returns across regulatory systems

I compared the post-IPO return performance between the sponsoring-entity-backed IPO firms (i.e. firms that went public under the sponsorship regulatory system) and the non-sponsoring-entity-backed IPO firms (i.e. firms that went public under the quota and/or channel systems). Table 4.5 Panel A reports the multivariate regression results for the comparisons of 12-month and 36-month post-IPO market-adjusted BHARs across regulatory systems using a pooled sample of A-share IPOs from 1992 to 2012. As expected, the estimated coefficients of the D_SPONSOR indicator are positive and significant after controlling for the other specific factors, which suggests that the IPO firms under the sponsorship system outperformed the IPO firms under the quota and channel systems in terms of market-adjusted post-listing returns. To be precise, in the first year after flotation, the IPO firms screened with the sponsorship regulatory model outperformed IPO firms that went public under the government-dominated models by 19.03 percentage points, and in the three years after flotation this outperformance was by 38.31 percentage points. Thus, it appears that IPO firms performed even better if the government or public regulator partially entrusted oversight and the selection of candidate firms to the private sector.[118]

A potential concern regarding the influence of the sample of IPOs related to the channel system from 2001 to 2003 might arise when comparing the performance of IPOs between the sponsorship regulatory system and government-dominated systems. As a transitional regulatory model, IPO oversight and selection in the channel system are provided by governmental overseers and *interim* private advisors (known as "IPO supervisors") together. In other words, the channel system is neither a strict government-dominated regulatory model nor a formalized (or standardized) private-sector oversight model, because it involves the role of *interim* private advisors in the IPO oversight and selection.

[118] Partially entrusting oversight to the private sector means the financial authority (the CSRC) still holds certain power for the IPO approval that controls firm quality by inspecting the admission documents. I empirically address the issue of private-sector oversight and governmental reviews with respect to firm quality in Subsection 4.5.4.

Thus, for the IPO firms under the channel system, it is difficult to exactly distinguish which form of oversight has impacted their post-listing return performance.

As a robustness test, as shown in Table 4.5 Panel B, I re-estimated the preceding regressions after excluding firms that went public during the period of the channel regulatory model. The estimated coefficients of the D_SPONSOR indicator variable remain positive and significant, indicating that firms handled by sponsoring entities under the sponsorship system outperform firms mainly screened by government agencies under the quota system, in terms of both the 12-month and 36-month post-IPO market-adjusted BHARs. More importantly, for this specification, the economic magnitude of the outperformance for sponsoring-entity-backed IPO firms relative to non-sponsoring-entity-backed ones (by 52.12 and 60.16 percentage points, respectively) is greater than the estimates reported in Panel A. This provides clear evidence that IPO firms with the involvement of partial private-sector oversight perform much better than IPO firms that are in the sole charge of government agencies. Therefore, the sponsorship regulatory model can provide a greater level of screening than the government-dominated regulatory model.

Table 4.5: Post-IPO stock returns across regulatory systems

This table presents the estimates of ordinary least squares (OLS) regressions that compare the market-adjusted post-IPO buy-and-hold returns for IPO firms screened by the sponsorship regulatory system with those of the IPO firms screened by the quota regulatory system and/or channel regulatory system. Panel A presents the results using a pooled IPO sample that includes IPO firms under both the quota and channel systems in comparison with the return performance of IPO firms under the sponsorship system. Panel B presents the results after removing the sample of IPOs screened by the channel system and then directly comparing the return performance of IPO firms under the sponsorship system with IPO firms under the quota system. The dependent variables are the 12-month and 36-month market-adjusted buy-and-hold stock returns (i.e. BHAR12 and BHAR36) following the firm's IPO, exclusive of the initial returns (IR). The key independent variable (for Hypothesis 1) is indicator variable D_SPONSOR, which equals 1 if the firm's IPO is managed by a sponsor entity under the sponsorship system and 0 otherwise. The definitions of all other variables are discussed in Subsection 4.4.2.3 and summarized in Appendix 4. To address the potential endogeneity issue of control variable IR in the regression models, this table shows the second-stage regression of two-stage least squares regressions, where $\widehat{\text{IR}}$ is the predicted value of the initial returns obtained from the first-stage regression. The *t*-statistics (in parentheses) are based on (heteroscedasticity) robust standard errors using the Huber-White sandwich estimator of variance (Huber, 1967; White, 1980). ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Panel A: Sponsorship vs Quota & Channel IPOs				Panel B: Sponsorship vs Quota System IPOs			
	BHAR12		BHAR36		BHAR12		BHAR36	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
D_SPONSOR	0.1903***	(3.36)	0.3831*	(1.66)	0.5212*	(1.76)	0.6016***	(2.64)
$\widehat{\text{IR}}$	-0.0199***	(-2.96)	-0.0064	(-0.51)	-0.0213***	(-3.06)	-0.0040	(-0.31)
Ln(AGE)	-0.0108	(-0.73)	0.0161	(0.60)	-0.0087	(-0.56)	0.0154	(0.55)
D_SOE	-0.0052	(-0.20)	0.0076	(0.17)	0.0004	(0.01)	0.0216	(0.45)
D_B/Hoffer	0.0022	(0.04)	-0.0962	(-1.09)	-0.0036	(-0.05)	-0.1104	(-1.20)
D_Big4	0.0137	(0.26)	0.0687	(0.72)	0.0015	(0.02)	0.0779	(0.71)
EPS	0.1490***	(3.43)	0.2163***	(2.66)	0.1567***	(3.38)	0.2076**	(2.45)
NonTradable	-0.0385	(-0.84)	0.0233	(0.30)	-0.0354	(-0.70)	0.0402	(0.49)
TobinQ	-0.0275***	(-3.10)	-0.0802***	(-4.14)	-0.0251**	(-2.46)	-0.0792***	(-3.80)
Ln(FirmSize)	-0.0352**	(-2.55)	-0.1540***	(-6.39)	-0.0452***	(-2.90)	-0.1749***	(-6.72)

LargestOwnership	0.0003	(0.64)	0.0007	(0.71)	0.0003	(0.49)	0.0006	(0.56)
Leverage	-0.0654	(-0.90)	-0.0009	(-0.01)	-0.0512	(-0.66)	0.0168	(0.13)
Constant	0.4713	(1.29)	3.2016***	(5.45)	0.7302	(1.44)	3.4001***	(6.65)
Market Indicators	Included		Included		Included		Included	
Year Indicators	Included		Included		Included		Included	
Industry Indicators	Included		Included		Included		Included	
No. of Observations	2126		2126		1915		1915	
R-squared	0.251		0.205		0.261		0.209	

With respect to the control variables, I find that the average three-year pre-IPO EPS of candidate firms is positively and significantly related to the market-adjusted buy-and-hold returns, which is consistent with the results of Su and Bangassa (2011). Given that the EPS of the sponsoring-entity-selected IPO firms (as a proxy for the firms' pre-IPO quality) on average is higher than that of non-sponsoring-entity-selected IPO firms (see Table 4.4), the finding of a positive relationship between EPS and post-listing return performance also implies that sponsoring entities provide a better screening function than governmental agencies when selecting candidate firms to go public.[119] However, not all measures of pre-IPO operating performance are related to the post-listing stock performance. In line with Fan et al. (2007) and Liu et al. (2013), I do not find a significant connection between the level of the leverage ratio and the market-adjusted post-IPO returns. With respect to the rest of firm- and offer-specific control variables, the coefficient estimates of the Ln(FirmSize) and the predicted value of IR are negative and significant, which is consistent with the findings of Liu et al. (2013) and Chen et al. (2015) in China's IPO market;[120] however, the significant and negative coefficient of Tobin's Q is inconsistent with the findings of Feng et al. (2014). In addition, I confirm that the market-adjusted post-IPO returns are significantly higher for the firms that listed on the main market (known as the main board in China). This suggests that the strict and high listing requirements work to screen out low-quality candidate firms.

Overall, the multivariate regression results show the sponsorship regulatory model has a strong positive effect on the market-adjusted post-IPO return performance, after controlling for the other specific factors. In comparison to the period when the government agencies took sole charge of the IPO oversight and selection, firms have a better post-listing stock performance when going public under the oversight of private-

[119] For a robustness test, I re-ran the regressions, replacing the control variable EPS with the firms' pre-IPO ROA. This variable is also significantly positive and does not affect my key findings. As indicated in Table 4.4, relative to the non-sponsoring entities, the sponsoring entities on average also have a tendency to choose firms with a higher ROA to go public. Thus, my inference still holds.

[120] Since the IR control variable is not determined inside the model, endogeneity may exist in my regression models. To address this potential endogeneity issue, I used two-stage least square regressions. Specifically, I first estimated the first-stage regression model using the endogenous variable of IR as the dependent variable in Equation (4.4) and then used the predicted value of IR in the second-stage regression.

sector entities. This confirms my Hypothesis 1 and empirically supports the claim of the CSRC (2003a, 2008) that "the sponsorship system is set for improving investor protection and IPO firm quality". To check the robustness of my findings, in forthcoming subsections, I detail my further investigation of whether the characteristics I have identified for the sponsorship regulatory model can explain the cross-sectional variation in the market-adjusted return performance of the IPO firms under the sponsorship system.

4.5.2 Effect of sponsoring entities' reputation on post-IPO stock performance

Like the Nomads of AIM, the nominated sponsor institutions and sponsor representatives are the unique features of the sponsorship regulatory approach. It is possible that the post-listing stock performance of IPO firms under the sponsorship system varies based on certain characteristics of these sponsoring entities (as proxies for their reputation). First, the sponsoring entities are presumably different in terms of aspects of their ability to perform IPO screening and oversight, such as due diligence, advice during information disclosure and monitoring compliance with listing requirements. Second, under the sponsorship system, the sponsoring entities are no longer subject to the quotas from the central and local government. In other words, they are free to select firms to be IPO candidates and oversee them going public. As repeat players, the sponsoring entities compete for the opportunities for subsequent sponsorship-related businesses, and therefore they have an incentive to maintain and/or develop their reputation by providing a higher level of screening and oversight of client firms.

In fact, it is difficult to define *ex ante* what would distinguish the reputable or high-quality sponsoring entities (Gerakos et al., 2013), so I developed an array of reputation measures for sponsoring entities (see Subsection 4.4.2.3) by identifying the sponsoring entities' characteristics from their profiles or resumes (which are supplied by the SAC and the CSRC). In my opinion, China's financial authority discloses and updates sponsoring-entity-related information to the public that aims to allow investors and client firms to assess the quality of those sponsoring entities before making an investment.

Table 4.6 Panel A presents the estimates of the fixed effects regressions and least squares dummy variable (LSDV) regressions for the impact of sponsor-institution reputation on the 12-month market-adjusted post-IPO return performance. The results of the fixed effects regressions are given in columns (1) to (4), and I find strong sponsor fixed effects in terms of statistical significance (for most fixed effects, p-value < 0.0001). Specifically, the results in column (2) reveal that sponsor institution fixed effects can explain 60.08% of the variation in the market-adjusted return performance. In column (4), when I include all reputation measures together in the regression, more than half of the variation in the post-IPO return performance can still be explained by the sponsor institution fixed effects. These results suggest that certain classes of sponsor institutions could differentiate themselves in the IPO screening and oversight.

Nevertheless, the fixed effects model removes two variables of interest that are the within-group-constant variables: SponsorCapital and SponsorPersonnel. I therefore replicated the analyses using the LSDV model,[121] the results of which are displayed in columns (5) to (10), which includes an array of sponsor indicators. For brevity, I have not reported the estimated coefficients (and t-statistics) of those sponsor-institution indicators. Consistent with the finding of sponsor institution fixed effects, I find that most coefficients of the sponsor indicators are significant at the 1% level.

Most importantly, in columns (1) and (5), the significant and positive coefficients of SponsorDate suggest that the IPO firms screened by sponsor institutions that have longer work experience in a sponsorship-related industry are associated with better market-adjusted post-listing return performance. This confirms my Hypothesis 2a, which implies that reputable sponsors can provide a greater level of IPO oversight on their client firms and thereby facilitate a better post-IPO stock performance. For a robustness test, I also examined the hypothesis by using alternative reputation measures based on the other characteristics of sponsor institutions. In column (6), the coefficient of SponsorCapital is

[121] The LSDV model allowed me to perform an estimate of the two reputation measures of SponsorCapital and SponsorPersonnel, which are constant within sponsor groups, and it also takes account of sponsor institution fixed effects by including an array of sponsor indicators.

positive and significant, which suggests that sponsor institutions with a larger size in terms of registered capital (a marginal contribution in millions of Chinese RMB) can provide a higher level of screening and oversight of candidate firms, in terms of the better market-adjusted post-IPO return performance of these firms. Also, as shown in column (7), the positive and significant coefficient of SponsorPersonnel indicates that sponsor institutions with more human capital provide better oversight of client firms in terms of the better market-adjusted post-IPO return performance of their client firms. Nevertheless, regarding economic significance, the magnitudes of the coefficient estimates of both SponsorCapital (<0.0001) and SponsorPersonnel (=0.0024) indicate that the effect of sponsor reputation is relatively minor when using a sponsor institution's registered capital and human capital as reputation measures. In columns (2) and (8), the coefficients of Ln(SponsorAge) are positive and significant, which suggests that sponsor institutions with a longer history can play a better role in IPO oversight in terms of the better market-adjusted post-IPO return performance of their client firms. The results in columns (3) and (9) suggest that the top-10 securities companies (based on the SAC's annual rankings) are not necessarily good at the role of sponsor, because the estimated relationship between D_TOP10 and the market-adjusted post-IPO return performance is positive but insignificant. Finally, in columns (4) and (10), I introduced all the reputation measures or characteristics of sponsor institutions into the regression.[122] For this specification, SponsorDate is the most significant measure (in terms of both statistical and economic significance) for explaining the cross-sectional variation in the market-adjusted return performance of IPOs under sponsorship system.

[122] Because the measures SponsorCapital and SponsorPersonnel are highly correlated with each other and with the other measures, I have not included them together in the LSDV model.

Table 4.6: Effect of sponsoring entities' reputation on post-IPO stock performance

This table presents the regression results for the impact of sponsoring entities' reputation on market-adjusted post-IPO stock performance. Panels A and B present the estimates of sponsor institution fixed effects regressions and least squares dummy variable (LSDV) regressions (which include an array of dummy variables for sponsor institution fixed effects) using a range of sponsor reputation measures as the key independent variables, where the dependent variables are the 12-month and 36-month market-adjusted buy-and-hold stock returns (BHAR12 and BHAR36, respectively). Panels C and D present the estimates of the sponsor representative fixed effects regressions and pooled ordinary least squares (OLS) regressions using a range of representative reputation measures as the key independent variables, where the dependent variables are BHAR12 and BHAR36, respectively. The definitions of all variables are discussed in Subsection 4.4.2.3 and summarized in Appendix 4. To address the potential endogeneity issue of control variable IR (initial returns) in the regression models, this table shows the second-stage regression of two-stage least squares regressions, where $\widehat{IR}$ is the predicted value of the initial returns obtained from the first-stage regression. The stock returns of IPO firms are winsorized at the 99th percentile. The *t*-statistics (in parentheses) are based on robust standard errors, where the observations are clustered at the sponsor level to take account of the potential error dependence within each sponsor. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A: Examine the effect of sponsor institution reputation										
	Dependent variable: One-year market-adjusted buy-and-hold returns (BHAR12)									
	Fixed effects model (FE)				Least square dummy variable model (LSDV)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
SponsorDate	0.1770***			0.1659***	0.1770***					0.1659***
	(12.31)			(10.20)	(4.38)					(4.09)
SponsorCapital						0.0000***				
						(3.49)				
SponsorPersonnel							0.0024***			
							(13.66)			
Ln(SponsorAge)		0.5660***		0.1058				0.5660***		0.1058
		(6.24)		(1.07)				(2.77)		(1.08)
D_TOP10			0.1110	0.1484					0.1110	0.1484
			(1.08)	(1.53)					(1.15)	(1.50)
$\widehat{IR}$	1.3760***	0.4948***	0.6110***	1.3609***	1.3760***	0.1508	0.1421	0.4948	0.6110**	1.3609***
	(7.53)	(2.89)	(3.69)	(7.49)	(2.66)	(0.50)	(0.48)	(1.36)	(2.29)	(2.68)
Ln(AGE)	0.0085	-0.0021	0.0247	0.0085	0.0085	-0.0030	-0.0037	-0.0021	0.0247	0.0085
	(0.33)	(-0.08)	(0.92)	(0.33)	(0.30)	(-0.11)	(-0.14)	(-0.08)	(1.07)	(0.30)
D_SOE	-0.2351***	-0.1538**	-0.1569**	-0.2257***	-0.2351**	-0.1521	-0.1512	-0.1538	-0.1569*	-0.2257**

	(-3.46)	(-2.15)	(-2.20)	(-3.32)	(-2.30)	(-1.60)	(-1.59)	(-1.65)	(-1.81)	(-2.25)
Ln(OfferSize)	1.2588***	0.5741***	0.6739***	1.2421***	1.2588***	0.3099	0.3030	0.5741*	0.6739***	1.2421***
	(8.03)	(3.82)	(4.81)	(7.98)	(2.79)	(1.09)	(1.07)	(1.72)	(2.66)	(2.81)
D_B/Hoffer	0.2732**	0.1625	0.1892	0.2512**	0.2732	0.1436	0.1434	0.1625	0.1892	0.2512
	(2.45)	(1.38)	(1.57)	(2.25)	(1.54)	(1.02)	(1.01)	(1.14)	(1.29)	(1.46)
D_Big4	0.1507*	0.0177	-0.0239	0.1672**	0.1507	-0.1105	-0.1123	0.0177	-0.0239	0.1672
	(1.83)	(0.20)	(-0.27)	(2.00)	(1.27)	(-1.04)	(-1.06)	(0.16)	(-0.21)	(1.42)
NonTradable	0.1297	0.0263	-0.0377	0.1166	0.1297	0.0191	0.0182	0.0263	-0.0377	0.1166
	(1.16)	(0.22)	(-0.31)	(1.04)	(0.89)	(0.15)	(0.14)	(0.21)	(-0.30)	(0.83)
TobinQ	-0.6708***	-0.2981***	-0.3499***	-0.6646***	-0.6708***	-0.1455	-0.1414	-0.2981	-0.3499**	-0.6646***
	(-7.80)	(-3.61)	(-4.50)	(-7.77)	(-2.71)	(-0.96)	(-0.94)	(-1.65)	(-2.57)	(-2.74)
Ln(FirmSize)	-0.9285***	-0.4377***	-0.4623***	-0.9191***	-0.9285***	-0.2274	-0.2222	-0.4377*	-0.4623**	-0.9191***
	(-8.09)	(-3.96)	(-4.71)	(-8.05)	(-2.77)	(-1.11)	(-1.08)	(-1.78)	(-2.58)	(-2.78)
LargestOwnership	0.0011	0.0015	0.0019*	0.0009	0.0011	0.0021**	0.0021**	0.0015*	0.0019**	0.0009
	(1.18)	(1.44)	(1.81)	(0.97)	(1.31)	(2.61)	(2.64)	(1.78)	(2.39)	(1.05)
Leverage	0.1949*	0.0133	-0.0962	0.1848*	0.1949*	-0.0573	-0.0589	0.0133	-0.0962	0.1848
	(1.77)	(0.12)	(-0.82)	(1.67)	(1.70)	(-0.49)	(-0.50)	(0.12)	(-0.77)	(1.59)
EPS	0.3599***	0.2011***	0.2389***	0.3574***	0.3599***	0.1304	0.1286	0.2011**	0.2389***	0.3574***
	(5.38)	(2.92)	(3.46)	(5.36)	(3.53)	(1.57)	(1.54)	(2.41)	(3.11)	(3.57)
Constant	-7.7028***	-4.3313***	-4.6090***	-7.8378***	-6.8258**	-1.9195	-3.2536*	-2.8206	-4.7221***	-6.5978***
	(-6.98)	(-3.84)	(-4.05)	(-7.01)	(-2.64)	(-1.17)	(-1.96)	(-1.49)	(-2.88)	(-2.74)
Sponsor FE:					Included	Included	Included	Included	Included	Included
– Prob. (F-stat)	0.0000	0.0001	0.0812	0.0000	–	–	–	–	–	–
– rho	0.5096	0.6008	0.3169	0.5594	–	–	–	–	–	–
Market Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Year Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Observations	969	969	1137	969	969	969	969	969	1137	969
R-squared	0.239	0.144	0.120	0.239	0.308	0.188	0.188	0.223	0.200	0.309

(continued on next page)

Table 4.6 (continued)

Panel B: Examine the effect of sponsor institution reputation										
	Dependent variable: Three-year market-adjusted buy-and-hold returns (BHAR36)									
	Fixed effects model (FE)				Least square dummy variable model (LSDV)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
SponsorDate	0.2997***			0.2610***	0.2997***					0.2610***
	(4.21)			(3.57)	(3.42)					(2.86)
SponsorCapital						0.0000**				
						(2.35)				
SponsorPersonnel							0.0020***			
							(3.32)			
Ln(SponsorAge)		0.4416*		0.4613*				0.4416		0.4613*
		(1.71)		(1.79)				(1.11)		(1.72)
D_TOP10			0.9001***	0.7908***					0.9001**	0.7908**
			(3.66)	(3.16)					(2.53)	(2.34)
$\widehat{IR}$	0.7894	1.4975***	2.8660***	0.8433	0.7894	1.6676	1.6800	1.4975	2.8660***	0.8433
	(1.38)	(2.73)	(5.16)	(1.43)	(0.79)	(1.57)	(1.58)	(1.38)	(3.17)	(0.79)
Ln(AGE)	0.0333	0.0423	0.0686	0.0335	0.0333	0.0443	0.0438	0.0423	0.0686	0.0335
	(0.51)	(0.64)	(1.07)	(0.51)	(0.42)	(0.56)	(0.56)	(0.53)	(1.03)	(0.43)
D_SOE	-0.2107	-0.2303	-0.1793	-0.1845	-0.2107	-0.2570	-0.2567	-0.2303	-0.1793	-0.1845
	(-1.22)	(-1.32)	(-1.06)	(-1.07)	(-0.83)	(-0.97)	(-0.97)	(-0.87)	(-0.77)	(-0.73)
Ln(OfferSize)	0.7571	1.3146***	2.2818***	0.7824	0.7571	1.4536	1.4698	1.3146	2.2818***	0.7824
	(1.59)	(2.86)	(5.18)	(1.60)	(0.91)	(1.62)	(1.63)	(1.44)	(3.11)	(0.88)
D_B/Hoffer	0.1829	0.2810	0.4520	0.0876	0.1829	0.3225	0.3294	0.2810	0.4520	0.0876
	(0.63)	(0.96)	(1.54)	(0.30)	(0.51)	(0.85)	(0.86)	(0.77)	(1.23)	(0.26)
D_Big4	0.0466	0.1843	0.5080**	0.1265	0.0466	0.1552	0.1482	0.1843	0.5080**	0.1265
	(0.21)	(0.83)	(2.21)	(0.57)	(0.24)	(0.74)	(0.72)	(0.91)	(2.17)	(0.64)

NonTradable	0.2621	0.2033	-0.0001	0.2091	0.2621	0.2148	0.2031	0.2033	-0.0001	0.2091
	(0.91)	(0.70)	(-0.00)	(0.73)	(0.62)	(0.49)	(0.47)	(0.46)	(-0.00)	(0.50)
TobinQ	-0.5144*	-0.8398***	-1.4022***	-0.5407**	-0.5144	-0.9131*	-0.9186*	-0.8398	-1.4022***	-0.5407
	(-1.94)	(-3.30)	(-5.65)	(-1.98)	(-1.10)	(-1.80)	(-1.81)	(-1.62)	(-3.24)	(-1.07)
Ln(FirmSize)	-0.7447**	-1.1590***	-1.7500***	-0.7677**	-0.7447	-1.2466*	-1.2541*	-1.1590*	-1.7500***	-0.7677
	(-2.13)	(-3.46)	(-5.69)	(-2.15)	(-1.22)	(-1.89)	(-1.90)	(-1.73)	(-3.35)	(-1.19)
LargestOwnership	0.0025	0.0022	0.0019	0.0015	0.0025	0.0025	0.0025	0.0022	0.0019	0.0015
	(1.02)	(0.89)	(0.78)	(0.61)	(0.83)	(0.81)	(0.83)	(0.73)	(0.64)	(0.48)
Leverage	0.0389	0.1610	0.0392	-0.0129	0.0389	0.1799	0.1662	0.1610	0.0392	-0.0129
	(0.13)	(0.55)	(0.14)	(-0.04)	(0.17)	(0.75)	(0.69)	(0.66)	(0.15)	(-0.05)
EPS	0.3442*	0.4957***	0.7855***	0.3627**	0.3442	0.5274**	0.5335**	0.4957**	0.7855***	0.3627
	(1.89)	(2.77)	(4.36)	(1.97)	(1.45)	(2.22)	(2.22)	(2.08)	(4.00)	(1.47)
Constant	-0.9805	-4.3955	-11.9818***	-2.3710	-1.1563	-4.8389	-6.0263	-3.7294	-12.0396**	0.3827
	(-0.31)	(-1.41)	(-3.58)	(-0.73)	(-0.22)	(-0.88)	(-1.15)	(-0.65)	(-2.46)	(0.07)
Sponsor FE:					Included	Included	Included	Included	Included	Included
– Prob. (F-stat)	0.0030	0.0523	0.0066	0.0014	–	–	–	–	–	–
– rho	0.4081	0.3241	0.2979	0.5181	–	–	–	–	–	–
Market Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Year Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Observations	969	969	1137	969	969	969	969	969	1137	969
R-squared	0.260	0.248	0.268	0.270	0.315	0.302	0.302	0.304	0.322	0.324

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Table 4.6 (continued)

Panel C: Examine the effect of sponsor representative reputation									
	Dependent variable: One-year market-adjusted buy-and-hold returns (BHAR12)								
	Fixed effects model (FE)				Pooled OLS				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RepDate	0.5370**			0.4872**	0.0243***				0.0197***
	(2.48)			(2.47)	(3.94)				(3.23)
RepIBDExp		0.1239***		0.0788**		0.0113***			0.0039
		(2.82)		(2.44)		(3.41)			(0.83)
Ln(RepAge)			1.5604***	0.5669			0.2808**		0.1347
			(2.66)	(1.15)			(2.52)		(0.96)
D_RepEdu								-0.0279	-0.0434
								(-0.59)	(-0.87)
$\widehat{IR}$	-1.5614	-0.7336	-0.7998	-1.5571	0.4751***	0.4915***	0.4969***	0.4965***	0.4955***
	(-1.18)	(-0.72)	(-0.75)	(-1.19)	(3.34)	(3.27)	(3.32)	(3.29)	(3.31)
Ln(AGE)	-0.1492***	-0.1759***	-0.1728***	-0.1758***	-0.0342	-0.0350	-0.0314	-0.0337	-0.0316
	(-2.79)	(-2.70)	(-2.62)	(-2.75)	(-1.19)	(-1.33)	(-1.18)	(-1.25)	(-1.13)
D_SOE	0.1129	-0.0643	-0.0380	0.0615	-0.1348*	-0.1310*	-0.1356*	-0.1327*	-0.1321*
	(0.48)	(-0.35)	(-0.20)	(0.29)	(-1.90)	(-1.79)	(-1.84)	(-1.79)	(-1.80)
Ln(OfferSize)	-1.2743	-0.5060	-0.5184	-1.3081	0.5662***	0.5745***	0.5840***	0.5847***	0.5832***
	(-1.04)	(-0.53)	(-0.54)	(-1.07)	(4.23)	(4.09)	(4.18)	(4.16)	(4.16)
D_B/Hoffer	-0.1033	0.2115	0.3393	-0.0742	0.2505**	0.2535**	0.2592**	0.2556**	0.2472**
	(-0.32)	(0.77)	(1.23)	(-0.25)	(2.29)	(2.32)	(2.43)	(2.35)	(2.30)
D_Big4	-0.1771	-0.0572	-0.0744	-0.1903	-0.0416	-0.0418	-0.0471	-0.0507	-0.0406
	(-0.51)	(-0.19)	(-0.24)	(-0.57)	(-0.43)	(-0.44)	(-0.48)	(-0.51)	(-0.43)
NonTradable	-0.1534	-0.0409	-0.0727	-0.2080	0.0712	0.0492	0.0487	0.0439	0.0510
	(-0.52)	(-0.15)	(-0.26)	(-0.70)	(0.65)	(0.44)	(0.43)	(0.38)	(0.46)

TobinQ	0.7473	0.3046	0.3421	0.7385	-0.2694***	-0.2747***	-0.2789***	-0.2771***	-0.2793***
	(1.08)	(0.57)	(0.62)	(1.08)	(-3.63)	(-3.54)	(-3.61)	(-3.56)	(-3.62)
Ln(FirmSize)	0.8701	0.3446	0.3435	0.8972	-0.4192***	-0.4204***	-0.4253***	-0.4238***	-0.4263***
	(0.95)	(0.48)	(0.47)	(0.99)	(-3.98)	(-3.85)	(-3.91)	(-3.88)	(-3.94)
LargestOwnership	0.0035	0.0012	0.0017	0.0030	0.0016*	0.0015*	0.0016*	0.0016*	0.0017**
	(1.54)	(0.64)	(0.85)	(1.35)	(1.91)	(1.81)	(1.92)	(1.88)	(1.99)
Leverage	0.0223	-0.0156	0.0570	-0.0613	0.1483	0.1739	0.1741	0.1699	0.1713
	(0.12)	(-0.08)	(0.29)	(-0.33)	(1.25)	(1.39)	(1.39)	(1.36)	(1.39)
EPS	-0.3569	-0.1934	-0.2255	-0.3338	0.1679***	0.1718***	0.1767***	0.1749***	0.1787***
	(-1.02)	(-0.63)	(-0.70)	(-0.97)	(2.74)	(3.08)	(3.08)	(3.05)	(3.10)
Constant	6.2450	1.7892	-2.5519	3.9146	-3.4861***	-3.8123***	-4.8122***	-3.8248***	-4.1664***
	(1.11)	(0.42)	(-0.66)	(0.67)	(-3.74)	(-3.72)	(-4.56)	(-3.77)	(-3.85)
Representative FE:					–	–	–	–	–
– Prob. (F-stat)	0.9762	0.9993	0.9999	0.9300	–	–	–	–	–
– rho	0.6626	0.4656	0.3825	0.6952	–	–	–	–	–
Market Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included
Year Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included
Observations	1125	1106	1106	1105	1125	1106	1106	1106	1105
R-squared	0.274	0.231	0.211	0.299	0.181	0.181	0.180	0.177	0.187

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Table 4.6 (continued)

Panel D: Examine the effect of sponsor representative reputation									
	Dependent variable: Three-year market-adjusted buy-and-hold returns (BHAR36)								
	Fixed effects model (FE)				Pooled OLS				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RepDate	0.2625***			0.2391**	0.0595***				0.0457**
	(2.81)			(2.54)	(3.06)				(2.24)
RepIBDExp		0.0927*		0.0626		0.0259**			0.0021
		(1.88)		(1.19)		(2.26)			(0.17)
Ln(RepAge)			0.7335	0.1051			0.8447**		0.5375
			(0.67)	(0.09)			(2.44)		(1.37)
D_RepEdu								-0.1288	-0.1734
								(-0.99)	(-1.31)
$\widehat{IR}$	3.7846	4.6556	4.5333	3.8007	0.6123	0.6236	0.6064	0.7109	0.5506
	(0.88)	(1.05)	(1.02)	(0.86)	(1.38)	(1.42)	(1.38)	(1.59)	(1.28)
Ln(AGE)	0.0411	0.0563	0.0512	0.0323	0.0861	0.0982	0.1037*	0.1147*	0.0830
	(0.22)	(0.26)	(0.24)	(0.15)	(1.50)	(1.64)	(1.74)	(1.89)	(1.40)
D_SOE	-0.7852**	-0.8434***	-0.8182***	-0.7970**	-0.2511	-0.2761	-0.2846	-0.2910	-0.2580
	(-2.34)	(-2.66)	(-2.60)	(-2.54)	(-1.42)	(-1.58)	(-1.62)	(-1.62)	(-1.44)
Ln(OfferSize)	3.1785	3.8981	3.8355	3.1542	0.7031*	0.7189*	0.7116*	0.8196**	0.6477*
	(0.88)	(1.05)	(1.04)	(0.86)	(1.81)	(1.86)	(1.84)	(2.08)	(1.73)
D_B/Hoffer	0.4871	0.5293	0.6266	0.4221	0.1251	0.1278	0.1465	0.1196	0.1378
	(0.83)	(0.89)	(1.05)	(0.71)	(0.57)	(0.57)	(0.66)	(0.53)	(0.63)
D_Big4	0.8060	0.9029	0.8839	0.7672	-0.1727	-0.1948	-0.2071	-0.2113	-0.1881
	(0.83)	(0.93)	(0.90)	(0.79)	(-0.85)	(-0.95)	(-1.02)	(-1.05)	(-0.93)
NonTradable	0.9048**	0.8944**	0.8756**	0.8633**	0.2406	0.2170	0.2177	0.1918	0.2277
	(2.08)	(2.04)	(1.98)	(1.98)	(0.82)	(0.74)	(0.74)	(0.65)	(0.76)
TobinQ	-1.8542	-2.2762	-2.2137	-1.8700	-0.4468**	-0.4548**	-0.4506**	-0.4997**	-0.4202**
	(-0.91)	(-1.09)	(-1.06)	(-0.90)	(-2.07)	(-2.14)	(-2.12)	(-2.31)	(-2.02)

Ln(FirmSize)	-2.4573	-2.9193	-2.8819	-2.4123	-0.6380**	-0.6326**	-0.6266**	-0.6840**	-0.5981**
	(-0.93)	(-1.09)	(-1.07)	(-0.90)	(-2.17)	(-2.19)	(-2.17)	(-2.34)	(-2.11)
LargestOwnership	-0.0000	-0.0009	-0.0005	-0.0004	0.0022	0.0021	0.0022	0.0022	0.0024
	(-0.00)	(-0.23)	(-0.15)	(-0.10)	(1.00)	(0.94)	(1.02)	(0.99)	(1.07)
Leverage	-0.2991	-0.2651	-0.2140	-0.3369	-0.0354	-0.0059	0.0034	-0.0412	0.0313
	(-0.67)	(-0.56)	(-0.45)	(-0.70)	(-0.13)	(-0.02)	(0.01)	(-0.15)	(0.11)
EPS	1.0024	1.1889	1.1387	1.0323	0.4913***	0.5141***	0.5199***	0.5445***	0.5098***
	(0.95)	(1.10)	(1.06)	(0.96)	(2.68)	(2.81)	(2.84)	(2.98)	(2.80)
Constant	-15.6827	-21.4312	-22.7451	-16.9834	-0.6916	-1.1609	-3.9431	-1.7914	-2.1651
	(-0.74)	(-0.98)	(-1.09)	(-0.80)	(-0.29)	(-0.47)	(-1.40)	(-0.71)	(-0.81)
Representative FE:					–	–	–	–	–
– Prob. (F-stat)	0.2243	0.3594	0.4221	0.2738	–	–	–	–	–
– rho	0.5241	0.4893	0.4761	0.5394	–	–	–	–	–
Market Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included
Year Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included
Observations	1125	1106	1106	1105	1125	1106	1106	1106	1105
R-squared	0.317	0.307	0.302	0.320	0.211	0.206	0.206	0.203	0.213

In Panel B of Table 4.6, I replicate the preceding analysis of the sponsor institutions' reputation using the 36-month market-adjusted post-IPO return performance as the dependent variable. As shown in columns (1) to (4), the results of the fixed effects regression for the sponsor institution (for most fixed effects, p-value < 0.01) indicate that sponsor institution fixed effects also play an important role in explaining the cross-sectional variation in the 36-month post-IPO return performance; for example, in column (4) the magnitude of the sponsor institution fixed effects reaches 51.81%. In order to estimate the two within-group-constant variables, SponsorCapital and SponsorPersonnel, I then ran LSDV models, for which the results are displayed in columns (5) to (10). In either case (for the fixed effects model or LSDV model), my results for sponsor institutions' reputation are little changed in terms of signs and significance, except that the estimated coefficient of D_TOP10 becomes significant in the three-year event window. Thus, it appears that high-ranking securities companies do better in attesting to the long-run viability of IPO candidate firms.

Since the CSRC entrusts IPO oversight not only to sponsor institutions but also to specific individuals (sponsor representatives), it is also of interest to investigate whether the performance of IPOs under the sponsorship system varies based on certain sponsor representatives' characteristics and reputation. By doing so, I will enrich the previous research that only examines the impact of Nomad institutions' characteristics and reputation on post-IPO performance (e.g. Gerakos et al., 2013; Espenlaub et al. 2012).

Table 4.6 Panel C presents the fixed effects and pooled OLS estimates for the effect of sponsor-representative reputation on the 12-month market-adjusted post-IPO return performance. As revealed in columns (1) to (4), I firstly estimated the fixed effects regressions for sponsor representatives, where the fixed effects p-values (between 0.9300 and 0.9999) indicate that there are no sponsor representative fixed effects.[123] I then chose and estimated the pooled OLS regressions, which are shown in the rest of the columns.

[123] For robustness tests, I also estimated least square dummy variable regressions where included an array of representative indicators. Most of representative indicators were insignificant. This confirms my result fixed effects model.

As my primary investigation of interest, as revealed in column (5), the positive and significant coefficients of RepDate suggest that IPO firms handled by sponsor representatives that have longer work experience in a sponsorship-related industry are associated with better market-adjusted post-listing return performance. This confirms my Hypothesis 2b, which indicates that reputable sponsor representatives also play an important role in IPO screening and oversight. By comparison, the economic magnitude of the coefficient estimate of RepDate (the primary measure for representative reputation) is relatively smaller than the estimate of SponsorDate (the primary measure for sponsor reputation). As a robustness tests for the hypothesis, I replicated the analysis using several alternative measures for representatives' reputation based on their other characteristics. As shown in column (6), the coefficient of RepIBDExp is positive and significant, which suggests that sponsor representatives that have longer work experience in the IBD (exclusive of work experience unrelated to stock issuance) can provide better screening and oversight of candidate firms, in terms of the better market-adjusted post-IPO return performance of these firms. In column (7), the displayed estimated coefficient of Ln(RepAge) is positive and significant, which implies that firms managed by mature sponsor representatives have better stock performance after listing. In other words, mature representatives are able to provide a higher level of screening and oversight on potential listings. The result given in column (8) indicates that the quality of IPO oversight (in terms of return performance) is not related to the education level of the sponsor representatives, where the estimated coefficient of D_RepEdu indicator is negative and insignificant.[124] Finally, in column (9), I included all the reputation measures or characteristics of sponsor representative in the regression. Of the four measures examined, RepDate is the most significant measure for explaining the cross-sectional variation in market-adjusted return performance of IPOs under the sponsorship system.

As shown in Panel D of Table 4.6, I replicated the analysis of sponsor representatives' reputation using the 36-month market-adjusted post-IPO return performance as the

[124] I also re-run the regression using the re-defined D_RepEdu indicator which takes a value of one if sponsor representatives hold PhD degree. However, the effect of education levels is still insignificant.

dependent variable. Consistent with the results based on the 12-month event window, I do not find clear patterns of sponsor representative fixed effects, as evidenced by the fixed effects *p*-values (from 0.2243 to 0.4221) in columns (1) to (4). Then, I estimated the pooled OLS regressions, for which the results are reported in the rest of the columns. As shown by the coefficient estimates of the reputation measures of sponsor representatives, my results for sponsor representatives' reputation are little changed in terms of signs and significance.

In summary, the previous empirical results indicate a strong positive connection between the reputation of sponsoring entities (both sponsor institutions and sponsor representatives) and the market-adjusted post-listing return performance of IPO firms. This suggests that sponsoring entities do play a role in improving both investor protection and the screening function under the sponsorship regulatory model. In previous studies on the effectiveness of oversight carried out by Nomads, it is difficult to separate the effect of flexible regulation from the effect of Nomads' oversight due to the institutional nature of London's AIM. In this regard, the results obtained in this subsection also imply that the use of private-sector entities (i.e. Nomads or sponsors) to oversee the IPO market is an effective way to screen out low-quality firms and protect investors in an institutional environment where stringent public regulation is still in place.

To confirm my previous conjecture that sponsoring entities are inclined to select pre-IPO high-quality firms to go public, where those high-quality firms also perform well in terms of post-IPO returns. As shown in Panel A of Table 4.7, I carried out univariate analyses to compare and examine the performance of IPO firms screened by sponsoring entities with different levels of reputation. As expected, comparing across three reputation groups (low, medium and high), I find strong monotonous patterns between the level of sponsoring entities' reputation and the performance of the IPO firms they selected, suggesting that reputable sponsoring entities (for both sponsor institutions and sponsor representatives) have a tendency to select pre-IPO high-quality firms (in terms of pre-IPO operating performance) to go public, and also are associated with better post-IPO return performance. For example, the average pre-IPO EPS and ROA of the candidate firms selected by high-reputation sponsor institutions (0.6836 and 0.1566, respectively) / sponsor representatives (0.6649 and 0.1554, respectively) are significantly greater than those selected by low-reputation sponsor institutions (0.4903 and 0.1231, respectively) / sponsor representatives (0.5207 and 0.1358, respectively). Panel B of Table 4.7 illustrates that the aftermarket performance of IPO firms becomes better (i.e. with a higher BHAR12 and BHAR36, and a lower IR) as the reputation level of sponsor institutions and representatives increases. These results reinforce my conclusion that sponsoring entities fulfil their role of IPO oversight, and, in particular, more reputable private entities tend to provide a better screening function.

Table 4.7: Comparisons of the performance of IPO firms screened by sponsoring entities with different levels of reputation

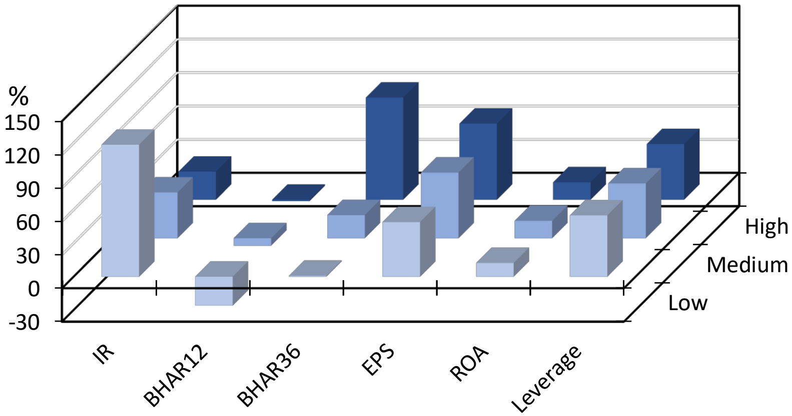
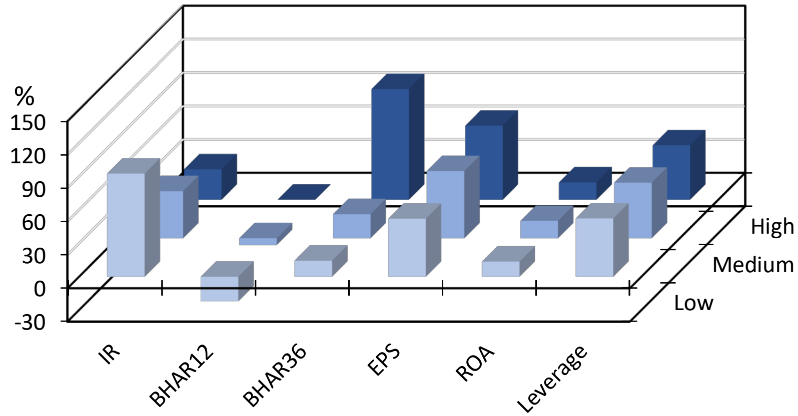
This table presents the univariate analyses that compare the type of candidate firms (in terms of pre-IPO operating performance) screened by the sponsoring entities across different reputation groups, and the post-IPO return performance of candidate firms screened by the sponsoring entities across different reputation groups. Panel A presents the comparisons in means and difference in means test for IPO firms' performance across three reputation groups of sponsor institutions and sponsor representatives. Panel B plots the mean values of IPO firms' performance across the three reputation groups. Based on the primary reputation measures (i.e. SponsorDate for sponsor institutions, and RepDate for sponsor representatives), I sorted the IPO firms into three groups: the low-reputation group consists of IPO firms selected/managed by sponsoring entities with sponsorship-related experiences between zero and three years; the medium-reputation group consists of IPO firms selected/managed by sponsoring entities with sponsorship-related experiences between four and six years; and the remainder forms the high-reputation group (i.e. sponsorship-related experiences equal to and above seven years). BHAR12 is the 12-month market-adjusted buy-and-hold stock returns following a firm's IPO, exclusive of the initial return. For brevity, the comparison to the 36-month market-adjusted buy-and-hold stock returns (BHAR36) is illustrated in Panel B rather than being reported in Panel A. The IR is the initial return of the IPO firms (i.e. the underpricing level). The EPS is the firm's average earning per share in the three fiscal years prior to the IPO. The ROA is the firm's return on assets at the pre-IPO fiscal year end. Leverage is the firm's total liabilities over its total assets at the pre-IPO fiscal year end. The parametric test statistics (*t*-stat) and nonparametric test statistics (Kruskal-Wallis chi-squared χ^2) for the difference in means test across the reputation groups are given in parentheses under the mean values. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Panel A: Post- and pre-IPO performance of candidate firms screened by sponsoring entities with different levels of reputation

	Sponsor institution						Sponsor representative					
		Return performance		Pre-IPO operating performance				Return performance		Pre-IPO operating performance		
Reputation groups sorted by primary reputation measure (x)	N	BHAR12	IR	EPS	ROA	Leverage	N	BHAR12	IR	EPS	ROA	Leverage
***L**ow ($x \leq 3$)*	275	-25.94%	118.48%	0.4903	0.1231	0.5504	493	-22.02%	92.59%	0.5207	0.1358	0.5233
t-stat (L vs. M)		(4.70) ***	(14.68) ***	(5.12) ***	(5.40) ***	(4.81) ***		(4.48) ***	(10.43) ***	(4.93) ***	(3.80) ***	(2.45) **
chi-squared χ^2 (L vs. M)		(6.70) ***	(159.86) ***	(30.28) ***	(30.43) ***	(25.45) ***		(11.89) ***	(81.18) ***	(33.32) ***	(10.14) ***	(7.51) ***
***M**edium ($4 \leq x \leq 6$)*	501	-6.67%	41.04%	0.5894	0.1564	0.4922	503	-6.07%	42.26%	0.6024	0.1558	0.4981
t-stat (M vs. H)		(2.05) **	(4.61) ***	(3.88) ***	(0.04)	(1.64)		(2.01) **	(3.48) ***	(2.24) **	(0.04)	(0.60)
chi-squared χ^2 (M vs. H)		(2.82) *	(20.75) ***	(14.05) ***	(0.01)	(1.82)		(4.87) **	(17.45) ***	(2.53)	(0.05)	(0.04)
***H**igh ($x \geq 7$)*	193	-1.24%	25.21%	0.6836	0.1566	0.4996	129	0.25%	27.31%	0.6649	0.1554	0.4885
t-stat (H vs. L)		(3.95) ***	(12.28) ***	(7.58) ***	(4.61) ***	(5.32) ***		(3.39) ***	(7.40) ***	(5.31) ***	(2.59) ***	(2.14) **
chi-squared χ^2 (H vs. L)		(10.32) ***	(166.42) ***	(58.18) ***	(22.94) ***	(26.82) ***		(16.66) ***	(77.24) ***	(26.74) ***	(5.65) **	(3.64) *

Full sample	969	-11.06%	59.87%	0.5801	0.1470	0.5042	1125	-12.34%	62.60%	0.5738	0.1470	0.5081

Panel B: Plotting the performance of IPO firms across the three reputation groups of sponsoring entities

Sponsor institution	Sponsor representative
	

4.5.2.1 Analysis of the interaction effects between sponsor institution and sponsor representative

In addition to examining the reputation effects of sponsor institutions and sponsor representatives separately, it is also of interest to investigate the interaction of reputable and non-reputable sponsoring entities. I examined three interaction effects, in practice, for those firms managed by 1) both a reputable sponsor and a reputable representative, 2) a reputable sponsor and a non-reputable representative, or 3) a non-reputable sponsor and a reputable representative. Based on the median values of the primary reputation measures (i.e. 5 for SponsorDate and 4 for RepDate), I split the sponsoring entities into reputable and non-reputable groups, which were used to create the interaction indicators to address the interaction effects.

Table 4.8 presents the estimates of OLS regressions that examine the effect of sponsoring entities' reputation on the market-adjusted post-IPO stock performance using the three indicators of interaction between sponsor institution and sponsor representative, in which the dependent variables are the 12-month and 36-month market-adjusted buy-and-hold stock returns (BHAR12 and BHAR36). As shown in column (1), the estimated coefficient of the indicator variable for the interaction between a reputable sponsor institution and a reputable sponsor representative is positive and significant, which suggests that IPO firms managed by both a reputable sponsor institution and a reputable sponsor representative outperform firms with all the other interaction patterns by 14.63 percentage points. Also, as stated in column (2), I find that IPO firms managed by a reputable sponsor institution and a non-reputable sponsor representative perform significantly better than firms with the other two potential interaction patterns (i.e. a non-reputable sponsor institution and a reputable sponsor representative, and both sponsoring entities being non-reputable)[125]. The results in column (3) indicate that the use of sponsoring entities where there is an interaction of a non-reputable sponsor institution and a reputable sponsor representative is positively, but insignificantly related to the post-IPO return performance. Lastly, as shown in columns (4) to (6), I replicated the analysis of the interaction effects using the

[125] For this specification, I have not included the interaction pattern of both reputable sponsor institution and sponsor representative in the "other sponsoring interaction patterns".

BHAR36 as the dependent variable. As indicated by the estimated coefficients of the three interaction indicators, my results are little changed in terms of signs and significance.

In a nutshell, the results obtained from the analysis of the interaction effects in this subsection suggest that, when the role of IPO oversight is played simultaneously by a sponsor institution and individual sponsor representative, the reputation of the sponsor institution determines whether there will be a higher level of screening and oversight of client firms.

Table 4.8: Effect of reputation concerning the interactions between the sponsor institution and sponsor representative

This table presents the estimates of ordinary least squares (OLS) regressions that examine the effect of sponsoring entities' reputation on the market-adjusted post-IPO stock performance using indicators of the interaction between the sponsor institution and sponsor representative, in which the dependent variables are the 12-month and 36-month market-adjusted buy-and-hold stock returns (BHAR12 and BHAR36, respectively). The median values of the primary reputation measures (five for SponsorDate, and four for RepDate) are used to split the sponsor institutions and sponsor representatives into groups of reputable and non-reputable sponsor institutions and sponsor representatives, respectively. The indicator variable Reputable Sponsor * Reputable Representative represents the interaction between a reputable sponsor institution and a reputable sponsor representative, which equals 1 if the IPO firm is backed by both a reputable sponsor institution and a reputable sponsor representative. Likewise, the indicator variables Reputable Sponsor (or Representative) * Non-reputable Representative (or Sponsor) represent the interaction patterns that equal 1 if the IPO firm is backed by either a group consisting of a reputable sponsor institution and a non-reputable sponsor representative or group consisting of a non-reputable sponsor and a reputable sponsor representative, and 0 otherwise (exclusive of 448 IPO firms backed by both a reputable sponsor institution and a reputable sponsor representative). The definitions of all other variables are discussed in Subsection 4.4.2.3 and summarized in Appendix 4. All regressions also include an array of listed market, year and industry dummies. To address the potential endogeneity issue of control variable IR (initial returns) in the regression models, this table shows the second-stage regression of two-stage least squares regressions, where $\widehat{IR}$ is the predicted value of the initial returns obtained from the first-stage regression. The stock returns of IPO firms are winsorized at the 99th percentile. The *t*-statistics (in parentheses) are based on robust standard errors, where the observations are clustered at the sponsor level to take account of the potential error dependence within each sponsor. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Dependent variable: BHAR12						Dependent variable: BHAR36					
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Reputable Sponsor*Reputable Rep.	0.1463***	(5.51)					0.1892**	(2.12)				
Reputable Sponsor*Non-reputable Rep.			0.2021***	(3.12)					0.3100**	(2.27)		
Non-reputable Sponsor*Reputable Rep.					0.0290	(0.57)					0.0285	(0.18)
$\widehat{IR}$	0.3720***	(4.10)	0.2094	(1.10)	0.1664	(0.84)	0.2138	(1.18)	0.1530	(0.42)	0.0905	(0.25)
Ln(AGE)	0.0519*	(1.84)	0.0483	(1.23)	0.0502	(1.22)	0.1077	(1.35)	0.0753	(0.67)	0.0785	(0.68)
D_SOE	-0.1718**	(-2.17)	-0.1452	(-1.49)	-0.1542	(-1.55)	-0.1537	(-0.83)	-0.4018*	(-1.71)	-0.4168*	(-1.75)
Ln(OfferSize)	0.5352***	(5.06)	0.3674**	(2.49)	0.3634**	(2.38)	0.4182**	(2.46)	0.2834	(1.11)	0.2807	(1.11)
D_B/Hoffer	0.1708	(1.56)	0.0347	(0.21)	0.0457	(0.27)	0.1223	(0.41)	-0.0040	(-0.01)	0.0120	(0.04)
D_Big4	-0.0588	(-0.52)	-0.0467	(-0.29)	-0.0713	(-0.43)	-0.2891	(-1.26)	-0.5550**	(-2.53)	-0.5933**	(-2.56)
NonTradable	0.1101	(0.85)	-0.0052	(-0.03)	-0.0269	(-0.14)	0.0301	(0.12)	0.0655	(0.16)	0.0333	(0.08)

TobinQ	-0.2737***	(-4.76)	-0.1857**	(-2.11)	-0.1793*	(-1.93)	-0.3138***	(-3.10)	-0.2379	(-1.35)	-0.2296	(-1.32)
Ln(FirmSize)	-0.4133***	(-4.70)	-0.2808***	(-3.19)	-0.2874***	(-3.16)	-0.4851***	(-3.67)	-0.3059*	(-1.75)	-0.3173*	(-1.82)
LargestOwnership	0.0014*	(1.81)	0.0014	(0.94)	0.0020	(1.37)	0.0019	(0.72)	0.0019	(0.48)	0.0028	(0.73)
Leverage	-0.0605	(-0.68)	-0.0231	(-0.12)	-0.1015	(-0.56)	-0.0449	(-0.18)	0.0638	(0.18)	-0.0523	(-0.15)
EPS	0.2196***	(3.40)	0.3385***	(3.17)	0.3242***	(3.03)	0.3703**	(2.26)	0.6367***	(2.69)	0.6171***	(2.68)
Constant	-2.1049***	(-2.69)	-2.1970	(-1.40)	-1.7234	(-1.04)	3.0747*	(1.67)	0.2966	(0.10)	1.1365	(0.39)
Market Indicators	Included		Included		Included		Included		Included		Included	
Year Indicators	Included		Included		Included		Included		Included		Included	
Industry Indicators	Included		Included		Included		Included		Included		Included	
No. of Observations	960		512		512		960		512		512	
R-squared	0.193		0.311		0.296		0.199		0.199		0.191	

4.5.3 Analysis of information disclosure in the issuance sponsorship letter

As a key document of information disclosure outside the IPO prospectus, the issuance sponsorship letter [126], which is produced by the sponsoring entities through their premarket due diligence, mainly contains qualitative information (also known as soft information[127]) about IPO candidate firms. Previous literature (e.g. Beatty and Welch, 1996; Arnold et al., 2010; Hanley and Hoberg, 2010) reveals that some of the information content in prospectuses (especially for the section of risk factors) is informative and related to the aftermarket stock performance. Therefore, if the content revealed by the sponsoring entities in the issuance sponsorship letter is informative, I anticipated that certain blocks of information in the sponsorship letter will be associated with the market-adjusted post-IPO return performance.

To identify the nature of the information content (i.e. positive or negative information signals) in the sponsorship letter, I divided the content of the sponsorship letter into its two most important sections – advantage factors and risk factors. Thus, the degree of disclosures with respect to positive information signals can be measured by the size of the advantage-factors section, and the negative information signals can be measured using the size of the risk-factors section.

Panel A of Table 4.9 presents the estimates of the multivariate regressions that were used to investigate the connection between the degree of information disclosure in the risk- and advantage-factors sections of the issuance sponsorship letter and the market-adjusted post-IPO return performance. As shown in column (1), I only introduced the size of the risk-factors section along with the control variables into regression, where the insignificant estimated coefficient of RISK suggests that the negative information signals provided by sponsoring entities have little association with the client firm's post-IPO return performance. Column (2) reports a similar result from when I introduced

[126] The "issuance sponsorship letter" is the English nomenclature given to this document by the CSRC, while it is known as "fa xing bao jian shu" in Chinese. In fact, it is not a "letter" with just a few pages; like the IPO prospectus, the sponsorship letter has hundreds of pages of qualitative information.
[127] This is the terminology used in the study of Arnold et al. (2010) to describe the textual information in the IPO prospectus.

sponsoring entities' reputation measures and the RISK measure into regression simultaneously; nevertheless, the coefficient estimates of SponsorDate and RepDate remain positive and significant, which are consistent with my previous findings. Although the estimated sign of the RISK measure turns negative in columns (5) and (6), after including the ADVANTAGE measure in the regressions, the RISK estimates are still insignificant. These results reject my Hypothesis 3a. Therefore, there is no significant connection between the negative tone of texts revealed by the sponsoring entities and the market-adjusted post-IPO return performance. According to Loughran and McDonald (2011), such an insignificant relationship might be caused by the negative words having different dictionary meanings to their meanings in a financial contexts (e.g. in my case, it is possible that not all risk factors highlighted by the sponsoring entities have a negative meaning). Nevertheless, the method of textual analysis introduced in the study of Loughran and McDonald (2011) is difficult to follow in the linguistic environment other than English linguistics.[128]

[128] In the study of McDonald and Loughrun (2011), they introduce the "word list" and "term weighting" methods to perform textual analysis in financial documents, while they also remind the reader that these methodologies are based on English linguistics. In my opinion, their method is not suitable to use for analysing financial documents with Chinese linguistics.

Table 4.9: Analyses of information disclosure by sponsoring entities and centralized regulatory review by CSRC

This table presents the estimates of ordinary least squares (OLS) regressions that investigate the following: i) in Panel A, the connection between the size of the risk- and advantage-factors sections in the issuance sponsorship letter and the market-adjusted post-IPO stock performance; and ii) in Panel B, the relation between the degree of centralized regulatory review of the IPO admission documents (using the processing times of the IPO applications as a proxy) and the market-adjusted post-IPO stock performance. The dependent variables are the 12-month and 36-month market-adjusted buy-and-hold stock returns following the firms' initial public offering (BHAR12 and BHAR36, respectively), exclusive of the initial returns. The definitions of all variables are discussed in Subsection 4.4.2.3 and summarized in Appendix 4. To address the potential endogeneity issue of control variable IR (initial returns) in the regression models, this table shows the second-stage regression of two-stage least squares regressions, where $\widehat{\text{IR}}$ is the predicted value of the initial returns obtained from the first-stage regression. The stock returns of IPO firms are winsorized at the 99th percentile. The *t*-statistics (in parentheses) are based on robust standard errors, where the observations are clustered at the sponsor level to take account of the potential error dependence within each sponsor. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Panel A: Analysis of information produced by sponsoring entities							Panel B: Analysis of CSRC's regulatory review			
	Dependent variable: BHAR12						BHAR36	Dependent variable: BHAR12			BHAR36
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
RISK	0.0004	0.0006			-0.0008	-0.0007	0.0026			-0.0017	0.0030
	(0.16)	(0.22)			(-0.31)	(-0.26)	(0.33)			(-0.73)	(0.39)
ADVANTAGE			0.0048*	0.0052*	0.0050**	0.0053*	0.0175***			0.0048*	0.0166***
			(1.80)	(1.72)	(2.03)	(1.91)	(2.84)			(1.75)	(2.76)
ApprovalCSRC								-0.0005***	-0.0005***	-0.0005***	-0.0005*
								(-3.35)	(-3.71)	(-3.79)	(-1.77)
SpoonsorDate		0.0414*		0.0429*		0.0427*	0.1075***		0.0398*	0.0407*	0.1002***
		(1.90)		(1.93)		(1.92)	(3.07)		(1.90)	(1.91)	(3.05)
RepDate		0.0209***		0.0212***		0.0213***	0.0199*		0.0259***	0.0262***	0.0207*
		(3.17)		(3.22)		(3.20)	(1.79)		(3.91)	(3.94)	(1.87)
$\widehat{\text{IR}}$	0.4767***	0.4477***	0.4708***	0.4424***	0.4718***	0.4431***	0.6625*	0.4579***	-0.3839	-0.3783	0.5200
	(3.31)	(2.87)	(3.29)	(2.84)	(3.28)	(2.84)	(1.73)	(3.41)	(-1.07)	(-1.05)	(1.28)
Ln(AGE)	-0.0382	-0.0289	-0.0391	-0.0294	-0.0392	-0.0296	0.0619	-0.0334	-0.0544	-0.0548*	0.0538
	(-1.44)	(-0.95)	(-1.50)	(-0.98)	(-1.51)	(-0.99)	(0.88)	(-1.38)	(-1.63)	(-1.68)	(0.79)
D_SOE	-0.1300*	-0.1634**	-0.1314*	-0.1651**	-0.1317*	-0.1655**	-0.1733	-0.1255*	-0.0911	-0.0939	-0.1782

	(-1.81)	(-2.07)	(-1.82)	(-2.09)	(-1.83)	(-2.11)	(-0.93)	(-1.67)	(-1.23)	(-1.28)	(-0.90)
Ln(OfferSize)	0.5582***	0.5215***	0.5490***	0.5129***	0.5496***	0.5134***	0.4694	0.5304***	-0.1792	-0.1788	0.3379
	(4.16)	(3.56)	(4.09)	(3.48)	(4.08)	(3.48)	(1.36)	(4.28)	(-0.65)	(-0.64)	(0.96)
D_B/Hoffer	0.2749**	0.2502*	0.2693**	0.2436*	0.2698**	0.2441*	0.1911	0.2497**	0.1826	0.1775	0.1120
	(2.54)	(1.97)	(2.46)	(1.92)	(2.47)	(1.93)	(0.72)	(2.12)	(1.48)	(1.44)	(0.43)
D_Big4	-0.0502	-0.0357	-0.0466	-0.0296	-0.0464	-0.0297	0.1163	-0.0383	-0.1747**	-0.1676**	0.1711
	(-0.53)	(-0.33)	(-0.50)	(-0.28)	(-0.49)	(-0.28)	(0.63)	(-0.38)	(-2.11)	(-2.06)	(0.96)
NonTradable	0.0588	0.1652	0.0606	0.1713	0.0613	0.1717	0.2021	0.0931	0.2190	0.2254	0.2645
	(0.52)	(1.27)	(0.54)	(1.31)	(0.55)	(1.32)	(0.80)	(0.73)	(1.52)	(1.57)	(1.04)
TobinQ	-0.2660***	-0.2540***	-0.2621***	-0.2510***	-0.2627***	-0.2515***	-0.5075***	-0.2599***	0.1246	0.1222	-0.4409**
	(-3.54)	(-3.15)	(-3.51)	(-3.12)	(-3.51)	(-3.13)	(-2.68)	(-3.73)	(0.83)	(0.80)	(-2.29)
Ln(FirmSize)	-0.4120***	-0.4062***	-0.4045***	-0.3992***	-0.4048***	-0.3993***	-0.6190**	-0.3961***	0.1071	0.1079	-0.5195**
	(-3.93)	(-3.45)	(-3.87)	(-3.40)	(-3.87)	(-3.40)	(-2.46)	(-4.08)	(0.60)	(0.59)	(-2.00)
LargestOwnership	0.0014*	0.0015**	0.0014*	0.0015**	0.0014*	0.0015**	0.0021	0.0016*	0.0020**	0.0020**	0.0019
	(1.66)	(2.08)	(1.67)	(2.08)	(1.66)	(2.08)	(0.87)	(1.90)	(2.41)	(2.44)	(0.74)
Leverage	0.1495	0.1919	0.1484	0.1890	0.1481	0.1888	-0.0082	0.1205	0.0674	0.0651	-0.0521
	(1.23)	(1.61)	(1.20)	(1.56)	(1.20)	(1.56)	(-0.03)	(1.01)	(0.54)	(0.51)	(-0.23)
EPS	0.1531***	0.1464**	0.1519***	0.1459**	0.1525***	0.1462**	0.5326***	0.1801***	0.0078	0.0103	0.5271***
	(2.71)	(2.42)	(2.78)	(2.52)	(2.79)	(2.52)	(3.21)	(3.21)	(0.09)	(0.12)	(3.11)
Constant	-3.4044***	-2.9809***	-3.4959***	-2.9662***	-3.4095***	-2.9712***	4.1612*	-3.2071***	0.9853	0.9502	5.0005**
	(-3.63)	(-2.98)	(-3.48)	(-2.94)	(-3.61)	(-2.93)	(1.68)	(-3.33)	(0.50)	(0.48)	(2.18)
Market Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Year Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Industry Indicators	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included
Observations	1137	960	1137	960	1137	960	960	1112	949	949	949
R-squared	0.171	0.181	0.173	0.183	0.173	0.183	0.224	0.188	0.199	0.202	0.230

In regard to the advantage-factors section, as displayed in column (3) of Table 4.9 Panel A, I find that the estimated coefficient of ADVANTAGE is positive and significant. This suggests that positive information signals provided by the sponsoring entities in their sponsorship letter have positive association with the client firm's post-IPO return performance. This result was found to be robust when I introduced sponsoring entities' reputation measures into the regression in column (4) and when I included the RISK measure in the regression in column (5). Furthermore, as given in column (6), I introduced both RISK and ADVANTAGE measures, plus the sponsoring entities' reputation measures and control variables into regression, and the coefficient of ADVANTAGE remains positive and significant. Lastly, I replicated the regression analysis of this specification using 36-month post-IPO market-adjusted BHARs as the dependent variable, as shown in column (7). After controlling for other factors that affect long-run stock performance, the estimated coefficient of ADVANTAGE is still positive and significant, whereas the coefficient of RISK remains insignificant. Therefore, those results confirm my Hypothesis 3b, implying that the advantage-factors section of the issuance sponsorship letter is informative. Given that informative content can be treated as a proxy for the quality of premarket due diligence (Hanley and Hoberg, 2010), my findings in this subsection also suggest that (at least based on the evidence of the ADVANTAGE measure) sponsoring entities have fulfilled the role of IPO oversight by performing effective premarket due diligence.

4.5.4 IPO admission review

Although neither China's government nor its financial authority (the CSRC) are still directly involved in the process of IPO firm selection and oversight under the sponsorship system[129], the authority still holds the power to inspect IPO admission documents and makes the decisions for IPO approvals to control the quality of sponsoring-entity-selected firms. This is a different feature to the form of private-sector oversight in AIM (e.g. Mendoza, 2008; Gerakos et al., 2013) that allows Nomad-selected firms into the market without being inspected by the listing authority. Therefore, in this subsection, I will

[129] As mentioned earlier, before sponsorship regulatory model, central governments were planning and allocating IPOs, and local governments worked together with a few state-controlled securities companies to recommend local firms to central financial authority.

explore some patterns of relationships regarding the degree of the CSRC's centralized regulatory review, the level of sponsoring entities' oversight and the market-adjusted post-IPO return performance. I anticipated that, if the form of partial private-sector oversight has a tendency to substitute the oversight or inspection undertaken by the financial authority, the authority would relax the inspection of the IPO firm's admission documents when candidate firms are backed by high-quality sponsoring entities.

Because the proceedings of the CSRC's regulatory reviews of IPO admission documents are non-public, it is difficult to determine the judgements of the listing authority on the quality of the candidate firms. Instead, I used the processing times of the IPO application (ApprovalCSRC) as a proxy for the degree of admission review by the financial authority, where a long processing time means a stringent centralized control of the quality of candidate firms, and a short processing time means relaxed centralized control of the quality of candidate firms.

In Table 4.9, Panel B presents the results of the multivariate regressions that were used to investigate the connection between the degree of the CSRC's admission review and the market-adjusted post-IPO return performance. As shown in column (8), as expected, the coefficient estimate of ApprovalCSRC is negative and significant, which suggests that a shorter processing time for the IPO application by the CSRC is associated with a better post-IPO return performance. The magnitude of the coefficient estimate implies that the influence of the CSRC's admission review (a marginal contribution in net working days) on firms' return performances is relatively small in terms of economic significance. The results given in column (9) confirm the robustness of my findings, after having introduced the sponsoring entities' reputation measures into the regression along with the measure of the CSRC's processing times. Furthermore, as revealed in column (10), I included all previous measures (i.e. RISK, ADVANTAGE, the primary reputation measures of SponsorDate and RepDate, and ApprovalCSRC) in the regression. For this specification, the coefficient estimates of these key measures are consistent with my previous results, and, in particular, the coefficient of ApprovalCSRC remains negative and significant. As shown in the last column (11), I replicated the regression analysis of this specification using 36-month post-IPO market-adjusted BHARs as the dependent variable. While the estimated coefficient of ApprovalCSRC becomes significant at the 10% level, my main conclusion remains unchanged. These results confirm my Hypothesis 4a, which implies that the degree of centralized regulatory review taken by the CSRC (which is proxied by the processing times of the IPO admission review) helps to signal the disparity in the quality of candidate firms. In particular, the CSRC spending a short time on an inspection or review of IPO admission documents (i.e. the less involvement the CSRC has in the admission review) can signal that the candidate firm is better quality in terms of its post-IPO stock performance.

While the previous regression results predict a negative connection between the quality of sponsoring-entity-selected firms (in terms of their post-IPO return performance) and the CSRC's processing times, it is still unclear whether the variation in the CSRC's processing times is driven by certain characteristics of the sponsoring entities and/or firm- and offer-specific factors. Thus, as indicated in Table 4.10, I further investigated the determinants of the CSRC's processing times using Tobit regressions, in which the dependent variable is ApprovalCSRC (processing times). As shown in column (1), I included two primary reputation measures of the sponsoring entities along with the control variables (exclusive of the variables related to aftermarket performance) in the regression. For this specification, in terms of my examination of interest, the negative and significant coefficient estimate of SponsorDate suggests that the CSRC's review of admission documents will be shorter if IPO candidate firms are screened by a reputable sponsor institution. In other words, the degree of centralized governmental inspection on the quality of candidate firms will be relaxed if the firms are handled by sponsor institutions that have many years of experience in a sponsorship-related industry, while this impact of the sponsor reputation is small in terms of economic significance. In contrast, I do not find a significant coefficient of RepDate, which suggests that the financial authority (the CSRC) values the reputation of the sponsor institutions more than the reputation of the sponsor representatives when it evaluates the client firms' admission documents.

Table 4.10: Tobit analysis for the determinants of the processing times of the CSRC's admission reviews

This table presents the estimates of the Tobit regressions that investigate the determinants of the processing times of the CSRC's admission reviews of IPO applications (i.e. reviews of IPO admission documents). In each regression, the dependent variable (ApprovalCSRC) is the processing time of an IPO application (net working days) between the submission date of the IPO admission documents and the date of the CSRC's approval for the IPO application. The definitions of all other variables are discussed in Subsection 4.4.2.3 and summarized in Appendix 4. The *t*-statistics (in parenthesis) are based on robust standard errors, where the observations are clustered at the sponsor level to take account of the potential error dependence within each sponsor. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	(1) ApprovalCSRC (processing times)		(2) ApprovalCSRC (processing times)	
	Coef.	t-stat	Coef.	t-stat
SponsorDate	-4.5136*	(-1.70)	-8.0037**	(-2.03)
RepDate	1.4598	(0.82)	1.9928	(1.01)
SponsorPersonnel			0.0192	(1.02)
SponsorAge			1.5486	(1.57)
D_TOP10			-3.9664	(-0.59)
RepIBDExp			0.5064	(0.39)
RepAge			-0.7011	(-0.60)
D_RepEdu			-13.3737	(-1.49)
ROA	-85.8386**	(-2.10)	-83.2510*	(-1.92)
AGE	-0.0504	(-0.03)	-0.1001	(-0.07)
D_SOE	17.5458	(1.16)	19.5313	(1.26)
OfferSize	0.0005	(0.29)	0.0003	(0.14)
D_B/Hoffer	-14.5527	(-0.49)	-16.9159	(-0.56)
D_Big4	31.2043*	(1.70)	34.8941*	(1.88)
FirmSize	-0.0002	(-0.75)	-0.0002	(-0.71)
LargestOwnership	0.3552	(1.30)	0.3211	(1.19)
Leverage	-28.6098	(-0.88)	-29.2701	(-0.87)
Constant	222.5977	(5.99)	255.2323	(4.59)
Market Indicators	Included		Included	
Year Indicators	Included		Included	
Industry Indicators	Included		Included	
No. of Observations	949		938	
Pseudo R^2	0.0245		0.0247	

With respect to the control variables for the results shown in column (1) of Table 4.10, the coefficient estimate of ROA is negative and significant, which implies that the CSRC is likely to give priority in IPO approval to those candidate firms that have a better return on assets in the pre-IPO period. In terms of the economic magnitude, if a candidate firm's pre-IPO ROA increased by 1 percentage point, the expected processing time for its IPO application will decrease by 86 days (while holding the other variables in the model constant). To some extent, this implies that the sponsoring entities (to be precise, the reputable sponsoring entities) contribute to reducing the processing times of client firms' IPO applications, because, as I have presented (see Table 4.7), the patterns show that reputable sponsoring entities tend to choose firms with higher ROAs to apply for going public. In the results given in column (2) of Table 4.10, I additionally included the other reputation measures of sponsoring entities in the regression. For this specification, while the coefficient estimates of the two primary reputation measures and all other control variables are consistent with the results in column (1), the estimated coefficients of all the other characteristics of sponsoring entities that I am interested in are insignificant. Thus, the CSRC appears to value the quality of the sponsors in terms of their experience in a sponsorship-related industry more than the other sponsorship-related characteristics when it inspects the sponsor-backed client firms' admission documents. Taken together, the results obtained in this subsection lend support to Hypothesis 4b, which implies that the reputation of the sponsoring entities (especially sponsor institutions) does play a role in lowering the processing times of the CSRC's admission reviews of candidate firms (i.e. the degree of centralized regulatory review).

4.5.5 Effect of the CSRC's disciplinary actions

In contrast with the limited punishment on Nomads in AIM (e.g. Gerakos et al., 2013)[130], there is a certain number of sponsoring entities (e.g. 11 sponsors and 68 representatives) that have been punished by the CSRC. In practice, the CSRC makes the disciplinary actions and related reasons publicly available, although most descriptions of the reasons for sanctions are quite simple: I find that most sanctions on sponsoring entities are related to "minimal due diligence", "misrepresentations in admission documents" or

[130] In Appendix B of Gerakos et al. (2013), they identify seven penalties related to AIM Nomads.

“insufficient disclosure”.[131] In theory, if the sponsoring entities are subject to disciplinary actions or sanctions, they will lose their reputation in the IPO market to a certain extent. As indicated in Table 4.4 (i.e. in the descriptive results), the low mean values of the D_PENALTY1 and D_PENALTY2 indicators suggest that the number of client firms has dramatically declined after sponsoring entities have received disciplinary actions. This result supports Hypothesis 5a, and it implies a loss of reputation for the sponsoring entities in the IPO-sponsorship-related industry. As repeated players in the market, sponsoring entities are concerned with and struggle to gain their reputational capital (Espenlaub et al., 2012). Therefore, I anticipated that sponsoring entities have an incentive to rebuild their reputation after disciplinary actions and thus provide a higher level of oversight on the subsequent client firms.

[131] Several sanctions on Nomads are related to a “huge decline in client firm’s post-IPO operating performance” and “untruthful updates of entities’ profiles”.

Table 4.11: Comparison across disciplinary actions on sponsor institutions and sponsor representatives

This table presents the estimates of ordinary least squares (OLS) regressions that compare the market-adjusted post-IPO stock performance of the IPO firms screened by sponsoring entities after the sponsoring entities' disciplinary actions and the IPO firms screened by the sponsoring entities before the sponsoring entities' disciplinary actions. Panel A presents the multivariate regression results for the comparisons of the return performance of the IPO firms screened by sponsor institutions after disciplinary action with the return performance before the sponsor institutions' disciplinary actions. Since there was only one sponsor institution that was punished by suspension (before its suspension, this sponsor managed only one IPO; after its penalty, this sponsor also managed one IPO), the regression analysis did not further split the disciplinary actions into suspensions and warnings for sponsor institutions. Panel B presents the multivariate comparisons of post-IPO return performances across disciplinary actions on sponsor representatives, where representatives' disciplinary actions are sorted into suspensions (i.e. a serious penalty) and warnings (i.e. a mild penalty). The dependent variables are 12-month and 36-month market-adjusted buy-and-hold stock returns following the firms' initial public offering (BHAR12 and BHAR36, respectively), exclusive of the initial returns. The definitions of all variables are discussed in Subsection 4.4.2.3 and summarized in Appendix 4. To address the potential endogeneity issue of control variable IR (initial returns) in the regression models, this table shows the second-stage regression of two-stage least squares regressions, where $\widehat{\text{IR}}$ is the predicted value of the initial returns obtained from the first-stage regression. The stock returns of IPO firms are winsorized at the 99$^{\text{th}}$ percentile. The *t*-statistics (in parentheses) are based on robust standard errors, where the observations are clustered at the sponsor level to take account of the potential error dependence within each sponsor. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Panel A: Penalties on sponsor institution and related IPOs' performance		Panel B: Penalties on sponsor representatives and related IPOs' performance					
	(1) All disciplinary actions (on 11 sponsor institutions)		(2) All disciplinary actions (on 68 representatives)		(3) Suspension classification (on 18 representatives)		(4) Warning classification (on 46 representatives)	
	BHAR12	BHAR36	BHAR12	BHAR36	BHAR12	BHAR36	BHAR12	BHAR36
D_PENALTY1	0.0552	0.1479						
	(1.10)	(1.06)						
D_PENALTY2			0.0231	0.0181	0.6303*	1.8235*	0.0787	-0.1404
			(0.28)	(0.09)	(1.94)	(1.91)	(0.76)	(-0.51)
$\widehat{\text{IR}}$	-0.0984	1.5783***	-0.0480	-1.0418*	-0.1301	1.4179	0.1587	1.7812
	(-0.33)	(10.47)	(-0.22)	(-1.83)	(-0.40)	(0.81)	(0.72)	(1.65)
Ln(AGE)	-0.0598**	-0.0863	-0.0233	0.1090	0.0398	0.2360	0.0005	0.1646
	(-2.37)	(-1.10)	(-0.34)	(0.56)	(0.38)	(0.80)	(0.01)	(0.82)
D_SOE	0.0558	-0.2081	-0.0329	-0.7106*	0.4571	1.8487	0.0119	-0.8430*
	(0.50)	(-0.84)	(-0.36)	(-1.84)	(0.57)	(0.90)	(0.09)	(-1.99)

Ln(OfferSize)	-0.0231	1.5366***	0.0897	-1.1850	0.1618	1.1064**	0.3107	1.6199
	(-0.08)	(7.41)	(0.44)	(-1.52)	(0.29)	(2.32)	(1.35)	(1.46)
D_Big4	-0.0818	0.6172	0.0716	-1.4622	–	–	0.0509	-0.9824
	(-0.57)	(1.75)	(0.52)	(-1.24)			(0.49)	(-0.96)
NonTradable	-0.1878	-0.6274*	-0.4208**	1.1437	-1.0073	-2.2254	-0.3891**	2.0552*
	(-1.55)	(-2.05)	(-2.09)	(1.14)	(-1.68)	(-1.16)	(-2.09)	(1.90)
TobinQ	0.0332	-1.1050***	-0.0759	0.6888	0.2583	-0.4032	-0.2963*	-1.6015*
	(0.19)	(-6.99)	(-0.44)	(1.36)	(0.92)	(-0.63)	(-1.80)	(-1.82)
Ln(FirmSize)	-0.0035	-1.5952***	-0.0734	0.9055	0.1673	-0.3389	-0.3180*	-1.6282*
	(-0.02)	(-9.02)	(-0.39)	(1.24)	(0.54)	(-0.96)	(-1.76)	(-1.73)
LargestOwnership	0.0009	0.0029	0.0014	0.0020	0.0069	-0.0074	-0.0007	0.0111
	(0.74)	(0.88)	(0.46)	(0.25)	(1.15)	(-0.31)	(-0.20)	(1.17)
D_B/Hoffer	0.2491	0.6861	0.1027	0.8241	–	–	0.1490	1.3456
	(1.10)	(1.35)	(0.43)	(0.61)			(0.85)	(1.08)
Leverage	0.1742	0.3727	-0.1915	-0.5189	0.8649	0.8863	-0.2589	-2.2098**
	(1.73)	(0.81)	(-0.58)	(-0.51)	(1.03)	(1.01)	(-1.05)	(-2.13)
EPS	0.0460	0.5498***	-0.0436	-0.9029**	-0.1443	-0.5299	-0.0213	-0.3607
	(0.31)	(3.14)	(-0.42)	(-2.41)	(-1.09)	(-0.82)	(-0.16)	(-0.67)
Constant	0.4373	3.2895	0.4219	4.0714	-7.7604	-15.5480	0.6810	2.4286
	(0.28)	(1.35)	(0.29)	(0.97)	(-1.33)	(-1.30)	(0.48)	(0.60)
Market Indicators	Included	Included	Included	Included	–	–	Included	Included
Year Indicators	Included	Included	Included	Included	–	–	Included	Included
Industry Indicators	Included	Included	Included	Included	–	–	Included	Included
No. of Observations	456	456	116	116	27	27	89	89
R-squared	0.321	0.244	0.692	0.284	0.515	0.422	0.824	0.344

Table 4.11 Panel A presents the results of the multivariate regressions that compare the 12-month and 36-month market-adjusted post-listing return performances for IPO firms screened by sponsor institutions after these sponsor institutions' disciplinary actions with the values from before the disciplinary actions. Column (1) presents the comparison results that take into account all types of disciplinary actions (i.e. including both suspension and warning sanctions), where the coefficient estimates of D_PENALTY1 are positive but insignificant for both the BHAR12 and BHAR36 specifications. These results suggest that, although disciplinary actions taken by the CSRC have a positive effect on sponsor institutions (i.e. they spur them on to provide a higher level of oversight on subsequent client firms), such an effect is relatively weak in terms of statistical significance. These results reject my Hypothesis 5b. Furthermore, as shown in column (2) of Panel B, I replicated the analysis using the sample of IPO firms screened by the sponsor representatives that have been punished. Consistent with the results for sponsor institutions, the coefficient estimates of D_PENALTY2 are positive but insignificant for both the BHAR12 and BHAR36 specifications, which suggests that there is no significant difference in the degree of IPO oversight carried out by sponsor representatives on client firms after and before these sponsor representatives' disciplinary actions. Collectively, based on the examination of the uncategorized disciplinary actions, I do not find convincing evidence that the CSRC's (i.e. the public regulator's) sanctions are binding on sponsoring entities and facilitate an improvement in IPO oversight for their subsequent client firms.

Next, as shown in the rest of the columns, I further evaluated whether different classifications of disciplinary actions have an impact on the quality of IPO oversight provided by the sponsoring entities. I anticipated that the sponsoring entities are more sensitive to more-severe sanctions (e.g. sorted by severity, these are withdrawal of sponsorship qualification > suspension > warning). In other words, if sponsoring entities are subject to more-severe sanctions, then they will provide a higher level of screening and oversight on subsequent IPO firms. Due to sponsoring entities being unable to engage in sponsorship-related activities once their qualification has been revoked (i.e. withdrawn), I do not observe the impact of withdrawal. Moreover, since there was only one sponsor institution that was punished with a suspension, I did not conduct an analysis of the penalty classification for sponsor institutions.

The results in column (3) of Table 4.11 show that the coefficient estimates of D_PENALTY2 are positive and significant for both the BHAR12 and BHAR36 specifications, which suggests that the use of sponsor representatives that have been punished by suspension is associated with better market-adjusted post-IPO performance. This lends support to my Hypothesis 5c. These results imply that sponsor representatives are sensitive to more-severe sanctions, and are motivated to provide a higher level of oversight of their subsequent client firms after being punished by suspension. By contrast, as shown in column (4), the coefficient estimates of D_PENALTY2 are positive but insignificant for both the BHAR12 and BHAR36 specifications, suggesting that sanctions in the form of a warning have little impact on sponsor representatives in terms of improving the quality of their IPO oversight. It is possible that sponsor representatives may not see a warning from the CSRC as a loss of their reputation. Therefore, in order to stimulate sponsor representatives to enhance the quality of their screening and oversight of IPO candidate firms, my results suggest that mild sanctions such as warnings do not go far enough; instead, the public regulator needs to impose severe sanctions on sponsor representatives.

Overall, the empirical results obtained in this subsection indicate that disciplinary actions imposed by the public regulator (the CSRC) on sponsoring entities can affect the stock return performance of IPO firms under the sponsorship regulatory model to a certain extent. At least, based on the evidence on the sponsor representatives, my findings show that the reaction of these private entities to disciplinary actions varies with the intensity of sanctions carried out by the public regulator.

4.5.6 Calendar-time factor model regressions

As a robustness check for my previous findings, which are based on event-time returns, I also estimated Fama and French’s (2015) five-factor model using calendar-time portfolio returns. Following Ritter and Welch (2002), I also included lagged factors in the regression. Using the method introduced in Subsection 4.4.2.2, I ran time-series OLS regressions for Equation (4.5), and the results are given in Table 4.12, in which Panels A and B report the estimates of the equal- and value-weighted returns of the IPO portfolios that include firms that went public during the 12 months prior to the current month. Panels C and D present the estimates of the equal- and value-weighted returns of the IPO portfolios that include firms that went public during the 36 months prior to the current month.[132] Based on the median value of the key independent variables, I formed a series of calendar-time portfolios corresponding to my hypotheses by splitting the IPO firms into specific groups.[133]

As shown in Table 4.12, all estimated intercept terms (alphas) are significant and negative, which are consistent with the evidence of long-run underperformance drawn from the full IPO sample. By comparing the results in columns (1) and (2) in each panel, I find that the estimated intercepts for the calendar-time portfolio of sponsoring-entity-backed IPOs are greater than those on the portfolio of non-sponsoring-entity-backed IPOs. For example, in the first two columns of Panel B – after controlling for market, size, value, profitability and investment factors – the average monthly abnormal returns for IPOs screened by the sponsorship system (with sponsoring entities) is –2.99%, compared to –4.47% for IPOs under government-dominated systems (with government agencies). Likewise, as shown in Panel D, when I allow a window of 36 months, the intercept term of monthly abnormal returns for IPOs handled by sponsoring entities is –1.82%, while the average monthly abnormal returns of IPOs screened by government agencies is –3.06%. These results confirm that IPO firms screened using the sponsorship regulatory model perform better than IPO firms that went public under government-dominated models, which is consistent with Hypothesis 1, as previously demonstrated by the event-time approach.[134]

[132] I alternatively run WLS regressions as Gompers and Lerner (2003) that weight each month by the square root of the number of IPOs in monthly portfolio to address the potential issue of the measured performance correlated with the number of firms in my calendar-time portfolios. These WLS regression results are similar with the ones by OLS regressions in Table 4.12. Also, my findings are robust to the use of traditional Fama and French (1993) three-factor model. For brevity, I do not tabulate these results.

[133] If the key independent variable is an indicator variable, I directly split IPO firms into two groups.

[134] For the comparisons of the results between the columns/groups in the Table 4.12, the mean differences *t*-test between the intercepts of different groups are highly statistically significant. For

As shown in columns (3) to (6), based on the median value of the primary reputation measures of the sponsoring entities (i.e. SponsorDate and RepDate), I split the sample's IPO firms into the calendar-time portfolios of reputable-sponsoring-entity-managed IPOs and non-reputable-sponsoring-entity-managed IPOs. As shown in columns (3) and (4) in each panel, the intercept term of the monthly abnormal returns for reputable-sponsor-institution-managed IPO firms (e.g. –2.89% in the third column of Panel A) is higher than for non-reputable-sponsor-institution-managed IPO firms (e.g. –3.46% in the fourth column of Panel A). Likewise, by comparing the estimated intercepts in columns (5) and (6) in each Panel, I find that the average monthly abnormal returns for IPOs managed by reputable sponsor representatives is higher than for IPOs managed by non-reputable sponsor representatives. These results confirm my previous evidence for Hypothesis 2a and 2b, which suggests that IPO firms screened by reputable sponsoring entities perform better than firms managed by non-reputable sponsoring entities.

Next, I further assessed whether my previous findings on the interaction effects between reputable and non-reputable sponsoring entities are robust to the calendar-time approach. As shown in each panel of Table 4.12, by comparing the intercept terms in columns (7) to (9), I find that the average monthly abnormal returns for IPO firms managed by both a reputable sponsor institution and a reputable sponsor representative (e.g. –2.60% in the seventh column of Panel D) is greater than for IPO firms backed by either the interplay of a reputable sponsor institution and a non-reputable sponsor representative (e.g. –2.74% in the eighth column of Panel D), or the interplay of a non-reputable sponsor institution and a non-reputable representative (e.g. –3.22% in the ninth column of Panel D). These results confirm the conclusions I have drawn from the interaction analysis, which implies that the sponsor institution performs a more important function in IPO oversight than an individual sponsor representative.

brevity, the test statistics are not reported in the table.

Table 4.12: Robustness tests by calendar-time factor model regressions

This table presents the ordinary least squares (OLS) estimates of Fama and French's (2015) five-factor model regressions, where the research factors are constructed with 2x3 sorts using all A-share stocks listed on the main, SME and GEM boards of the Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE). Following Ritter and Welch (2002), I included lagged factors in the model:

$$R_{pt} - R_{ft} = \alpha_p + b_t(R_{mt} - R_{ft}) + b_{t-1}(R_{mt-1} - R_{ft-1}) + s_t SMB_t + s_{t-1} SMB_{t-1} + h_t HML_t + h_{t-1} HML_{t-1} + \gamma_t RMW_t + \gamma_{t-1} RMW_{t-1} + c_t CMA_t + c_{t-1} CMA_{t-1} + \varepsilon_{pt}$$

Where the dependent variables are the monthly excess returns on either equal-weighted IPO portfolios or value-weighted IPO portfolios, which include IPO firms that went public during the previous 12 months (Panel A and Panel B) and the previous 36 months (Panel C and Panel D) prior to the current month. The median value of each key independent variable (see Table 4.4) is used to segment all IPOs into different groups, as shown in columns (1) to (13). Except for the calendar-time IPO portfolio in column (2), which contains IPOs from 1992 to 2001 (i.e. those under the quota system), all other calendar-time IPO portfolios contain IPOs from 2004 to 2012 (i.e. those under the sponsorship system). R_{mt} is the return on the value-weighted index of all A-shares. R_{ft} is the three-month Chinese deposit rate. SMB_t is the return difference between the small-cap stock portfolio and the big-cap stock portfolio. HML_t is the return difference between the high B/M stock portfolio and the low B/M stock portfolio. RMW_t is the return difference between the robust-(high)-operating-profitability stock portfolio and weak-(low)-operating-profitability stock portfolio. CMA_t is the return difference between the conservative-(low)-investment firm portfolio and the aggressive-(high)-investment firm portfolio. For brevity, I have only reported the *t*-statistics for intercepts (i.e. the Fama-French alphas), which are in parentheses. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

	Sponsorship or not		Reputable vs. Non-reputable entities				Interplay of sponsoring entities			Information signals		Degree of regulatory review	
	(1) IPO with entities	(2) IPO without entities	(3) Reputable sponsor	(4) Non-reputable sponsor	(5) Reputable reps.	(6) Non-reputable reps.	(7) Reputable sponsor * reputable reps.	(8) Reputable sponsor * non-reputable reps.	(9) Non-reputable sponsor * reputable reps.	(10) Large size of advantage factors section	(11) Small size of advantage factors section	(12) Long processing times	(13) Short processing times
Panel A: Equal-weighted returns of IPO portfolios (during the previous 12 months)													
Intercept	-0.0327***	-0.0391***	-0.0289***	-0.0346***	-0.0314***	-0.0365***	-0.0274***	-0.0335***	-0.0340***	-0.0295***	-0.0307***	-0.0358***	-0.0314***
t-stat	(-6.64)	(-9.32)	(-4.73)	(-4.39)	(-5.05)	(-5.27)	(-4.44)	(-4.62)	(-4.65)	(-4.41)	(-6.68)	(-6.52)	(-5.62)
b_t	1.028***	1.020***	1.253***	1.113***	1.123***	0.912***	1.270***	1.212***	1.078***	0.948***	1.081***	1.006***	1.059***
b_{t-1}	-0.0638	0.0423	0.0313	-0.0396	-0.0187	-0.00651	0.000791	0.0767	-0.0231	-0.0319	-0.0612	-0.0949	-0.0603
s_t	1.342***	0.476***	1.666***	1.825***	1.706***	1.630***	1.679***	1.617***	1.894***	1.493***	1.154***	1.399***	1.344***

s_{t-1}	-0.0486	0.0687	-0.310	-0.225	-0.278	-0.264	-0.314	-0.280	-0.187	0.00417	-0.0659	-0.0214	-0.109
h_t	-0.162	-0.114	0.249	-0.0181	0.101	0.0289	0.210	0.260	0.0848	0.0319	-0.274	-0.101	-0.148
h_{t-1}	-0.0226	-0.0258	-0.454*	-0.233	-0.273	-0.398	-0.393	-0.674**	-0.268	-0.0328	-0.0414	-0.0194	0.102
γ_t	0.860***	0.203	1.026***	0.934**	1.018***	0.566	1.175***	0.709	0.969**	1.037***	0.806***	0.924***	0.835**
γ_{t-1}	-0.227	-0.180	-0.416	0.234	-0.330	-0.279	-0.468	-0.278	-0.00787	-0.0829	-0.257	-0.114	-0.258
c_t	0.0928	-0.107	-0.307	-0.344	0.0591	-0.0301	-0.278	-0.260	0.0455	0.0961	0.0892	0.0473	0.0865
c_{t-1}	-0.156	-0.0362	-1.016**	0.0792	-0.383	0.00687	-1.056**	-0.921*	-0.245	-0.0695	-0.252	-0.0448	-0.164
Adj.R^2	80.2%	95.5%	86.9%	81.0%	87.3%	82.5%	86.8%	82.3%	84.0%	67.7%	82.8%	75.6%	77.5%
Panel B: Value-weighted returns of IPO portfolios (during the previous 12 months)													
Intercept	-0.0299***	-0.0447***	-0.0340***	-0.0439***	-0.0341***	-0.0394***	-0.0322***	-0.0361***	-0.0388***	-0.0279***	-0.0300***	-0.0315***	-0.0287***
t-stat	(-6.52)	(-9.28)	(-5.97)	(-5.28)	(-5.40)	(-4.75)	(-5.20)	(-4.96)	(-4.88)	(-4.04)	(-5.95)	(-5.93)	(-4.78)
b_t	1.176***	1.087***	1.219***	1.212***	1.127***	0.848***	1.259***	1.131***	1.114***	0.894***	1.193***	1.067***	1.120***
b_{t-1}	-0.0157	-0.0408	0.0672	-0.0443	-0.00555	-0.0459	0.0648	0.0284	-0.0126	-0.0220	-0.0143	-0.0733	-0.0360
s_t	0.521***	0.167	1.126***	1.607***	1.395***	1.187***	1.121***	1.394***	1.708***	1.209***	0.380*	0.791***	0.471**
s_{t-1}	-0.315*	0.147	-0.330	-0.0561	-0.288	-0.190	-0.331	-0.325	-0.147	-0.0912	-0.326*	-0.0514	-0.392*
h_t	-0.327*	0.327*	0.0390	-0.0118	0.161	-0.277	0.0112	0.146	0.323	-0.0799	-0.341*	-0.428**	-0.333
h_{t-1}	0.169	-0.331**	-0.330	0.0170	-0.184	-0.109	-0.284	-0.648**	-0.0405	0.0210	0.171	0.00312	0.158
γ_t	0.600**	0.629***	0.835**	0.944*	0.922**	0.394	0.948**	0.653	0.900*	0.862**	0.433	0.693**	0.250
γ_{t-1}	-0.711***	-0.201	-0.250	0.208	-0.303	-0.433	-0.250	-0.302	-0.0229	-0.281	-0.711**	-0.167	-0.810**
c_t	-0.444	0.0694	-0.182	-0.0412	0.375	0.347	-0.160	-0.00903	0.491	-0.125	-0.470	-0.00440	-0.629*
c_{t-1}	-0.918***	-0.0935	-0.782*	-0.170	-0.407	-0.739*	-0.895*	-0.619	-0.324	-0.296	-0.926***	-0.0386	-1.032***
Adj.R^2	84.0%	94.7%	86.5%	79.4%	85.8%	72.3%	84.9%	80.3%	80.7%	61.1%	82.0%	76.2%	75.4%

	Sponsorship or not		Reputable vs. Non-reputable entities				Interplay of sponsoring entities			Information signals		Degree of regulatory review	
	(1) IPO with entities	(2) IPO without entities	(3) Reputable sponsor	(4) Non-reputable sponsor	(5) Reputable reps.	(6) Non-reputable reps.	(7) Reputable sponsor * reputable reps.	(8) Reputable sponsor * non-reputable reps.	(9) Non-reputable sponsor * reputable reps.	(10) Large size of advantage factors section	(11) Small size of advantage factors section	(12) Long processing times	(13) Short processing times
Panel C: Equal-weighted returns of IPO portfolios (during the previous 36 months)													
Intercept	-0.0236***	-0.0304***	-0.0243***	-0.0269***	-0.0249***	-0.0276***	-0.0236***	-0.0259***	-0.0275***	-0.0209***	-0.0256***	-0.0265***	-0.0229***
t-stat	(-7.18)	(-15.07)	(-5.70)	(-6.36)	(-6.51)	(-6.36)	(-5.57)	(-4.91)	(-5.92)	(-4.24)	(-7.18)	(-6.89)	(-5.85)
b_t	1.0273***	1.0312***	1.1373***	0.9959***	1.0839***	0.9951***	1.1755***	1.0129***	1.0094***	0.9623***	1.0684***	1.0530***	1.0517***
b_{t-1}	-0.0245	0.0308	-0.0016	-0.0124	0.0288	-0.0355	-0.0067	-0.0159	0.0388	-0.0107	-0.0175	-0.0205	-0.0467
s_t	1.3659***	0.4385***	1.5444***	1.4289***	1.6211***	1.4448***	1.5591***	1.4386***	1.6749***	1.5773***	1.3128***	1.5727***	1.3789***
s_{t-1}	-0.1088	-0.0248	-0.1304	-0.0313	-0.2082	-0.1906	-0.0585	-0.4612	-0.1798	-0.1272	-0.0277	0.0158	-0.1026
h_t	-0.2218*	-0.0417	-0.0710	-0.2295	-0.0922	-0.0959	-0.1517	0.1748	0.0019	-0.1494	-0.2386	-0.1891	-0.0995
h_{t-1}	0.1033	0.0681	0.1312	-0.0207	0.0957	0.0422	0.1867	-0.1192	-0.1732	0.1595	0.1961	0.2334	0.0982
γ_t	0.4467**	0.0387	0.2805	0.6837***	0.4933	0.5303**	0.3768	-0.0245	0.6492*	0.7502**	0.3476	0.7389***	0.5307**
γ_{t-1}	-0.2605	-0.0289	-0.4059	-0.3012	-0.3831	-0.3207	-0.3776	-0.5951	-0.3507	-0.4728	-0.2852	-0.2081	-0.3092
c_t	-0.3650*	-0.0866*	-1.1297***	-0.2163	-0.5444**	-0.3711	-1.2110***	-0.8649***	-0.2701	-0.5106*	-0.4967**	-0.3958*	-0.3196
c_{t-1}	-0.1073	0.0150	-0.7722**	-0.2628	-0.5117*	0.0830	-0.9242***	-0.0801	-0.4242	-0.3672	-0.3024	-0.2837	-0.1921
Adj.R^2	90.4%	97.9%	91.0%	85.6%	91.1%	87.4%	90.9%	87.1%	88.3%	79.3%	89.4%	87.2%	86.7%

	Sponsorship or not		Reputable vs. Non-reputable entities				Interplay of sponsoring entities			Information signals		Degree of regulatory review	
	(1) IPO with entities	(2) IPO without entities	(3) Reputable sponsor	(4) Non-reputable sponsor	(5) Reputable reps.	(6) Non-reputable reps.	(7) Reputable sponsor * reputable reps.	(8) Reputable sponsor * non-reputable reps.	(9) Non-reputable sponsor * reputable reps.	(10) Large size of advantage factors section	(11) Small size of advantage factors section	(12) Long processing times	(13) Short processing times
Panel D: Value-weighted returns of IPO portfolios (during the previous 36 months)													
Intercept	-0.0182***	-0.0306***	-0.0278***	-0.0330***	-0.0238***	-0.0291***	-0.0260***	-0.0274***	-0.0322***	-0.0180***	-0.0197***	-0.0242***	-0.0151***
t-stat	(-5.89)	(-14.30)	(-6.49)	(-8.06)	(-5.69)	(-6.19)	(-4.86)	(-6.43)	(-7.45)	(-3.22)	(-5.25)	(-6.44)	(-3.52)
b_t	1.0513***	1.0292***	1.0846***	1.0508***	0.9610***	1.0729***	0.9822***	1.1171***	0.9531***	0.9366***	1.1059***	1.0488***	1.1536***
b_{t-1}	0.0174	0.0138	0.0053	0.0094	0.0030	0.0325	-0.0067	0.0158	0.0003	0.0083	0.0348	-0.0039	0.0011
s_t	0.4078**	0.2006***	1.0556***	1.0692***	0.8939***	1.2368***	1.2601***	1.0126***	1.3128***	1.3203***	0.3341*	0.9843***	0.2873*
s_{t-1}	-0.2212	-0.0087	-0.0560	0.0441	-0.3214	-0.2120	-0.4662	0.0282	-0.2093	-0.1721	-0.1329	-0.0067	-0.1947
h_t	-0.5086***	0.0418	-0.1340	-0.2044	-0.2488	-0.1236	0.0384	-0.1745	-0.0201	-0.2243	-0.5651***	-0.4318***	-0.3134
h_{t-1}	0.0765	0.0636	0.2383	-0.1068	0.0148	0.1938	-0.1203	0.3015	-0.1470	0.2014	0.1656	0.2126	0.0385
γ_t	-0.2552	0.1097	-0.1183	0.0825	-0.2802	0.2815	-0.0729	-0.1033	0.3616	0.5675*	-0.3225	0.2681	-0.1691
γ_{t-1}	-0.5736***	0.0067	-0.3576	-0.0985	-0.5006*	-0.4868	-0.5676	-0.3014	-0.4678	-0.6394**	-0.5493**	-0.3170	-0.6894***
c_t	-0.8712***	-0.0811	-0.9879***	-0.5328**	-0.7144***	-0.3109	-0.7915***	-1.0374***	0.0207	-0.6989**	-1.0404***	-0.6686***	-0.9195***
c_{t-1}	-0.4535**	-0.0283	-0.6932**	-0.2267	-0.0463	-0.4253	-0.0723	-0.8468**	-0.2347	-0.6118**	-0.6087**	-0.3616	-0.8173***
Adj.R^2	89.9%	97.6%	89.1%	90.0%	90.7%	88.8%	86.0%	88.2%	87.7%	72.8%	86.8%	86.9%	83.8%

As shown in columns (10) and (11), based on the median value of the ADVANTAGE variable, I split the IPO firms into two portfolios based on the size of the advantage-factors section revealed by sponsoring entities in issuance sponsorship letter (large and small). I find that the level of long-run IPO underperformance for firms that have a large advantage-factors section (e.g. –2.09% in the tenth column of Panel C) is less severe than for firms that possess a small advantage-factors section (e.g. –2.56% in the eleventh column of Panel C). These results are consistent with my previous findings for Hypothesis 3b, which suggests that the information disclosure about candidate firms' competitive advantage in the issuance sponsorship letter can indicate the post-IPO stock performance of these firms.

As shown in the last two columns of Table 4.12, the average monthly abnormal returns for the group of IPO firms that experience a short processing time for the centralized regulatory review (e.g. –1.51% in the thirteenth column of Panel D) is higher than for the group of IPO firms that face a long processing time for the admission review (e.g. –2.42% in the thirteenth column of Panel D). This is consistent with the negative relationship between post-IPO stock performance and the processing time of the CSRC's regulatory review of IPO admission documents, as previously demonstrated by the event-time approach in Hypothesis 4a.[135]

With respect to the coefficient estimates of the Fama-French five factors, my findings are in line with Fama and French (2015) in that the value factor (HML) tends to become redundant regarding explaining the average returns after introducing the profitability (RMW) and investment (CMA) factors into the model. For example, in the first two panels of Table 4.12, given that most coefficients of profitability factors are significantly positive, while most coefficient estimates of investment factors are insignificant in my regression results, the explanatory power of the value factor appears to be absorbed by the profitability factor. For the remaining two traditional factors, the coefficients of the

[135] I do not perform the robustness test for hypothesis 5 by calendar-time time-series regression, because it is difficult to construct calendar-time IPO portfolios with a small number of firms related to sponsoring entities' disciplinary actions.

market and size factors remain strongly positive in terms of both statistical and economic significance. Additionally, I do not find strong evidence that the lagged factors are priced. In summary, the results of the Fama-French five-factor calendar-time regressions demonstrate that the sponsorship regulatory system and related characteristics contribute to explaining the long-run stock performance of China's A-share IPOs.

4.6 Conclusion

In practice, the sponsorship regulatory model has been running for over a decade in China's IPO market since the CSRC (2003a) claimed that the sponsorship system is used to improve IPO firms' quality and protect investors. However, there is a limited number of studies focusing on this regulatory model. Motivated by the recent examination of the experience of private-sector oversight and regulation in London's AIM (e.g. Espenlaub et al., 2012; Gerakos et al, 2013; Piotroski, 2013; Nielsson, 2013; Doukas and Hoque, 2016), I investigated the effectiveness of the sponsorship system for China's IPO institutions, which is a form of private-sector oversight (i.e. sponsoring entities), in combination with the mandatory listing regulations and the central review of admission documents.

I found that there was better market-adjusted post-listing return performance of IPO firms when the government partially transferred the IPO oversight and selection to the private sector. IPO firms screened using the sponsorship regulatory model also experienced a lower delisting rate. To check the robustness of my findings, I evaluated the contribution of the sponsorship-system-related characteristics to explaining the return performance of IPO firms under the sponsorship system. First, I found that certain characteristics of the sponsoring entities (as proxies for their reputation) can explain the cross-sectional variation in the market-adjusted return performance of the IPO firms under the sponsorship system. In particular, the work experience of sponsoring entities in a sponsorship-related industry has a strong association with the client firms' post-IPO return performance. Also, my results suggested that sponsor institution fixed effects can explain around 60% of the variation in the client firms' return performance, while I did not find clear patterns in sponsor representative fixed effects. Moreover, the analysis of the interaction effects between the sponsor institution and sponsor representative indicated that the reputation of the sponsor institution performs a crucial function in the oversight and screening of candidate firms when the role of IPO oversight is given simultaneously to a sponsor institution and an individual sponsor representative. Second, I found that part of the information content (i.e. the advantage-factors section) in the issuance sponsorship letter, which is an additional disclosure document required by the listing authority, helps to signal the quality of post-IPO return performance. To some extent, this also implies that the premarket due diligence of the sponsoring entities is effective. Third, I revealed that the processing time of the IPO application (or admission document review), as a proxy for the degree of centralized inspection of candidate firm quality, has a negative connection with the market-adjusted post-IPO return performance. Moreover, the results my Tobit analysis also suggested that IPO candidate firms with higher pre-IPO ROA performance and firms screened by a reputable sponsor institution will get faster approval for their IPO application. Given that reputable sponsoring entities tend to select candidate firms with better pre-IPO operating performance to apply to go public, sponsoring entities are able to be distinguish themselves by providing a better screening function to candidate firms. Finally, I determined that only the penalty of suspension is effective on sponsor representatives, which incentivizes them to provide a higher level of oversight of subsequent client firms. By contrast, light disciplinary actions imposed by the CSRC on both sponsor institution and sponsor representative are not sufficient to motivate the sponsor entities to improve the quality of IPO oversight. Overall, these results provided empirical evidence on the efficiency of partial private-sector oversight in China's IPO market.

Chapter 5: Conclusions and recommendations for future research

This chapter will summarize the empirical issues examined in this thesis as well as the major findings, and detail the contributions, implications and recommendations for future research from the empirical results. This chapter includes three sections. Section 5.1 summarizes the issues addressed and the key findings of each empirical chapter. Based on this, Section 5.2 discusses the major contributions to the literature of each empirical chapter, and the practical implications. Section 5.3 provides recommendations for future research.

5.1 Summary of the main findings of each chapter

The first of the three empirical chapters, **Chapter 2**, examines the effect of information spillovers on investor participation and IPO price discovery in the context of China's hybrid IPO auctions. In this study, I mainly focused on information spillovers from the announcements of contemporaneous hybrid IPO auction results, and attempt to assess how the information produced by investors in contemporaneous offerings affect the participation and pricing decisions of current IPOs. Moreover, given that the sealed-bid hybrid IPO mechanism used in China specifically separates unsophisticated retail investors from sophisticated institutional investors through two isolated offering tranches, I further investigated whether it is possible for the information generated by sophisticated institutional investors in the current auction tranche to spill over and affect unsophisticated retail investors who intend to participate in the current public tranche. In addition, from a mechanism-design perspective, I examined whether the use of a separate public tranche is helpful for preventing unsophisticated retail investors from affecting the price-setting process. The results and main findings are summarized as follows.

First, by examining the effect of information spillovers on institutional participation, I found that the information produced by institutional investors (especially by large institutional investors) in contemporaneous IPO auctions has a positive impact on the participation or entry of institutional investors into current IPOs. In particular, this information-spillover effect is stronger among IPOs that are subject to a common valuation factor (i.e. are in the same industry). Also, by analysing the entry decision at the investor level, I determined that decisions regarding whether an institutional investor will engage in an IPO auction have a strong association with information spillovers from contemporaneous institutional bidding results. By contrast, there was no convincing evidence that the information produced by retail investors in contemporaneous IPO public tranches affects the participation of institutional investors in current IPOs. This set of results indicated that the participation of institutional investors is only influenced by the spillover information that is able to lower the costs or uncertainty of estimating the value for current IPOs.

Second, in comparison to institutional investors, retail investors participating in current IPO auctions react in different ways to the information revealed in the announcements of contemporaneous hybrid IPO auction results. I confirmed that the information produced by contemporaneous retail investors in IPO public tranches plays a significant role in determining the participation or entry of retail investors into current IPOs, whereas the information generated by contemporaneous institutional investors in the price-setting tranches is of less concern to current retail investors (unless this information comes from contemporaneous IPOs in the same industry). This set of findings showed that the participation of retail investors is susceptible to the spillover information that conveys the collective mood or sentiment of unsophisticated investors prevailing at the time of the current offering phase.

Third, I determined that the information produced by institutional investors in contemporaneous IPO auctions has a positive influence on the price revision of current IPOs, but this spillover information affects the price revision only to the extent that it is conveyed through the current bids of institutional investors. This finding implied that although the announcement of contemporaneous IPO auction results brings considerable new information to the current IPO's price discovery, the underwriter must see the reaction of the institutional bidders in the current IPO auction to the spillover information in order to assess its significance. By contrast, I found that the information generated by retail investors in contemporaneous IPO public tranches has little association with the price revision of current IPOs, which indicated that such spillover information is less important to underwriters for choosing an offer price. Furthermore, by using information spillovers from contemporaries in the same industry to replicate my analysis, I verified that my results were robust to this alternative way of defining contemporaries.

Fourth, even in a sealed-bid hybrid IPO selling mechanism, the information generated by institutional investors in the current auction tranche can spill over and affect the participation of retail investors in the current public tranche. The presence of information leakage in the sealed-bid IPO mechanism is the most likely explanation for such a pattern of spillover effects (Chowdhry and Sherman, 1996). After examining whether the trend of short-term interest rates during the current auction period is a signal used by retail investors to determine the aggregate demand of institutional investors, I corroborated that retail investors appear to see rising short-term interest rates as an increase in their opportunity costs or transaction costs, rather than as an increase in institutional investors' aggregate demand. In addition, I found that the duration of the IPO price-setting tranche (the auction tranche) does determine the extent to which information generated by institutional investors will be learned/perceived by retail investors in the sealed-bid context, as evidenced by a significant and positive relationship between the current auction's duration and the retail investors' oversubscription.

Finally, by adding a separate public tranche for retail investors, the hybrid IPO auction mechanism used in China can prevent unsophisticated bidders from affecting the price-setting process while soliciting valuable information from sophisticated bidders to determine the offer price.

By focusing on sponsorship regulatory reform in China's IPO market, **Chapter 3** questioned whether an improvement to the legal or regulatory environment that facilitates private contracting, rather than largely empowering public regulatory enforcement, can help to mitigate the extreme underpricing of Chinese IPOs. Since sponsorship regulatory reform is characterized by a range of improvements in the certification role of the sponsoring entities, the required disclosure of the issuance sponsorship letter, the membership-composition change of the Issuance Examination Commission in the China Securities Regulatory Commission (CSRC) and the disciplinary action of the sponsoring entities, I further evaluated the importance of these factors in explaining the cross-sectional variation in the underpricing of IPOs under the sponsorship system. The results and main findings are summarized as follows.

First, after controlling for other factors that affect IPO underpricing, I found that IPO firms affected by sponsorship regulatory reform (i.e. involving private enforcement) underprice significantly less (by almost 24%) than IPO firms that are subject to strong public enforcement before the sponsorship reform (i.e. during the quota and channel regulatory phases). This difference in IPO underpricing (after and before the sponsorship reform) became more pronounced and exceeded 80%, in terms of economic magnitude, when I accounted for the potential impact of the regulatory transition and the share-issue privatization that took place over the sample period. These results suggested that the legal or regulatory improvement towards facilitating private enforcement while lessening public enforcement benefits the efficiency of the IPO market in terms of the ability to reduce underpricing; this is consistent with the arguments of La Porta et al. (2006).

Second, I disclosed that the reputation of the sponsoring entities provides a certification role in the quality of client firms or related information production, and affects IPO underpricing under the sponsorship system. Among the battery of reputation proxies examined, the work experience of sponsor institutions in a sponsorship-related industry, and the work experience of individual sponsor representatives in the investment banking industry, has a strong negative association with the underpricing of their client firms. Furthermore, I did not identify any evidence that certain classes of sponsoring entities are able to differentiate themselves in explaining the variation of market-adjusted initial returns, as revealed by the insignificant sponsoring-entity fixed effects. The analysis of the interaction effects between the sponsor institution and sponsor representative showed that the presence of a reputable sponsor institution in any combination with sponsor representatives plays a crucial role in mitigating the underpricing of IPO firms.

Third, by examining the information disclosed in the issuance sponsorship letter, I concluded that the size of risk factors regarding IPO firms revealed by the sponsoring entities is significantly and negatively related to the degree of underpricing. To some extent, this is consistent with the results of Hanley and Hoberg (2010), which suggests that sponsoring entities have fulfilled their function of IPO oversight by performing a high-standard premarket due diligence on client firms.

Fourth, although the main public enforcement body in China's IPO market (i.e. the CSRC's Issuance Examination Commission) changed the composition of its membership by recruiting more professional staff after the sponsorship regulatory reform, I found that the degree of its public regulatory enforcement, as measured by the processing times of the IPO application or admission document reviews, has little association with the level of underpricing. In other words, with public enforcement, the government agency or official authority in charge of supervising the IPO markets is unlikely to be able to produce substantial information or reduce the *ex ante* uncertainty about the value of candidate firms.

Finally, I identified that the disciplinary actions taken by the CSRC on sponsor institutions do matter for reducing their subsequent client firms' IPO underpricing, while disciplinary penalties for sponsor representatives have little impact on their subsequent client firms' IPO underpricing. To this extent, public regulatory enforcement in the form of non-criminal penalties (i.e. disciplinary actions) is able to improve the weakness of private enforcement and thereby mitigate IPO underpricing.

The final empirical chapter, **Chapter 4**, examined whether the approach of partial private-sector oversight adopted in China's IPO market – the sponsorship regulatory model – plays a role in screening out low-quality firms and protecting investors, in terms of IPOs' long-run performance. In order to shed further light on what kind of characteristics make the sponsorship regulatory model able to effectively screen out low-quality firms, I focused on four special characteristics related to the sponsorship regulatory model (in short, those regarding sponsoring entities, information disclosure by these entities, a centralized review of candidate firms and disciplinary actions taken by the regulator), and I examined whether these factors could explain the variation in the market-adjusted post-IPO return performance of firms that went public via a sponsorship regulatory system. The results and main findings are summarized as follows.

First, by comparing the market-adjusted post-IPO return performance between firms screened by the sponsorship regulatory model and firms that went public under government-dominated regulatory models (i.e. the quota and channel regulatory models), I established that the market-adjusted post-IPO returns of sponsoring-entity-managed IPOs outperform the non-sponsoring-entity-backed IPOs, after controlling for the other potential factors that affect the long-run performance of IPO firms. This result demonstrated that the form of partial private-sector oversight can play a better screening role than centralized regulatory oversight.

Second, under a sponsorship regulatory model, the reputation of sponsoring entities plays an important role in IPO screening and oversight. Using several characteristics of sponsoring entities as measures for their reputation, I found that the work experience of the sponsoring entities in a sponsorship-related industry is the most significant factor in explaining the cross-sectional variation in client firms' market-adjusted post-IPO return performance. Moreover, I found that sponsor institution fixed effects can explain around 60% of the variation in the IPO firm's return performance, while I did not find clear patterns in sponsor representative fixed effects. The analysis of the interaction effects between the sponsor institution and sponsor representative indicated that the reputation of the sponsor institution performs a crucial function in the oversight and screening of candidate firms when the role of IPO oversight is given simultaneously to a sponsor institution and an individual representative. Hence, IPO candidate firms can signal their quality by engaging a reputable sponsor. In terms of this evidence in China's IPO market, entrusting oversight to private-sector entities helps to improve the quality of candidate firms attempting public offerings.

Third, the information disclosed by the sponsoring entities in the issuance sponsorship letter, based on their efforts in premarket due diligence, is able to signal the quality of the IPO candidate firms. In particular, I realised that the size of the advantage-factors section revealed in the sponsorship letter is significantly and positively related to client firms' market-adjusted post-IPO return performance, while there is no strong connection between the size of the risk-factors section and the market-adjusted return performance. If having a large amount of informative content reflected in the IPO documents is a measure of premarket due diligence (Hanley and Hoberg, 2010), then sponsoring entities who act as an overseer for IPO candidate firms are effective in performing the premarket due diligence.

Fourth, the extent of centralized regulatory review carried out by the CSRC on IPO candidate firms, as measured by the processing times of IPO applications or admission document reviews, has a significant and negative relationship with the market-adjusted post-IPO return performance of firms that went public under a sponsorship regulatory system. In other words, the deeper the central regulator is involved in IPO oversight, the worse the market-adjusted returns of candidate firms will perform after listing. Also, I found that the IPO applications submitted by candidate firms that are managed by reputable sponsors will be quickly approved by the CSRC.

Fifth, the series of disciplinary actions taken by the CSRC for the weak oversight of the sponsoring entities affects these entities' reputations to a certain extent. This is reflected by a dramatic reduction in the number of subsequent IPO client firms relative to the number of IPOs managed by the sponsoring entities before the CSRC's penalties. Furthermore, based on the evidence of market-adjusted post-IPO return performance, I concluded that the sponsoring entities (individual representatives in particular) tend to provide a higher level of oversight of client firms after the penalties are applied than before the penalties only if they were subject to a serious penalty (e.g. the suspension of the sponsorship qualification), while a light penalty (e.g. a warning) appears to be insufficient for inciting sponsoring entities to improve their oversight of client firms. These results imply that sponsoring entities see the serious penalty as a loss of reputation, but a mild penalty is not viewed this way. Thus, the disciplinary actions on private-sector entities can affect their subsequent client firms' post-IPO performance only if the penalties taken by the regulator are severe enough.

Finally, the empirical results obtained by the event-time approach used in this study are robust to the use of the calendar-time approach of Fama and French's (2015) five-factor regressions. This reinforced my primary conclusion that the sponsorship regulatory model is effective in screening out low-quality firms and protecting investors in terms of risk-adjusted post-IPO return performance, relative to the previous centralized regulatory models adopted in China's IPO market.

5.2 The contributions and implications of each chapter

The investigations and findings of each empirical chapter are expected to contribute to both academia and practice.

The study in **Chapter 2** contributes to the literature in four ways and has practical implications. First, it extends and complements the existing evidence on information-spillover effects in IPO markets (e.g. Ljungqvist and Wilhelm, 2002; Benveniste et al., 2003; Ljungqvist and Wilhelm, 2003; Edelen and Kadlec, 2005; Zhang, 2012; Ince, 2014; Bakke et al., 2017) by highlighting the influence of information spillovers from contemporaneous hybrid IPO auction results (i.e. contemporaneous investors' bidding or subscription results) on the valuation of current IPOs. To the best of my knowledge, this is the first empirical work that attempts to explore the importance of information externalities generated by the investors participating in contemporaneous IPOs. The results of this study demonstrate that the information produced by sophisticated institutional investors in contemporaneous auction tranches is able to lower the costs of estimating the value for current IPOs, and therefore it has a significant impact on the institutional participation and price formation of current IPOs. However, the information produced by unsophisticated retail investors in contemporaneous public tranches mainly conveys the sentiment of the primary market and only influences the participation of retail investors in current IPOs. For academic researchers and market participants, especially for those focusing on auction-based IPO markets, these findings are expected to enrich their understanding of the informativeness of the IPO bidding results revealed in the announcements.

Second, this study adds to the literature that examines the determinants of investor participation in IPO auctions (e.g. Derrien, 2005; Degeorge et al., 2010; Chiang et al., 2010; Neupane et al., 2014; Jagannathan et al., 2015). While these previous studies document that investor participation is mainly driven by idiosyncratic factors and market conditions, this study shows that the information generated by investors in contemporaneous IPO auctions is also an important factor in determining the investor participation of current IPOs. Moreover, the results of this study indicate that institutional and retail investors react to different aspects of the information content revealed in the announcements of contemporaneous hybrid IPO auction results, which implies that investors with different levels of sophistication have varying abilities to interpret the readily available public information. In this regard, this study provides additional evidence to the arguments of Odean (1998), and Field and Lowry (2009). Given that the unexpected entry of investors brings uncertainty or risk to the dynamics of IPO auctions (Sherman, 2005), the findings in this study may provide investors and/or underwriters with assurance that auction entry is largely predictable based on information spillovers from contemporaries.

Third, this work is the first, in a sealed-bid context, to examine the assertion that a sequential hybrid IPO selling procedure is prone to creating cascading demand among investors with different levels of sophistication (e.g. Ljungqvist et al., 2003; Derrien and Womack, 2003). While previous work shows the relevant evidence in a transparent IPO selling procedure (e.g. Neupane and Poshakwale, 2012; Khurshed et al., 2014), the findings of my analysis demonstrate that the information generated by institutional investors in the current price-setting tranche can spill over and affect the participation of retail investors in the public tranche, even with a sealed-bid mechanism. This outcome also confirms Chowdhry and Sherman's (1996) prediction that the presence of information leakage in a sealed-bid IPO mechanism enables unsophisticated investors to learn from the participation of sophisticated investors. An important practical implication drawn from my findings is that shortening the duration of the sealed-bid auction tranche (i.e. the price-setting tranche) in a sequential hybrid IPO mechanism can alleviate the excess demand submitted by retail investors in the public tranche.

Fourth, this study contributes to a small but growing amount of literature that examines the efficiency of the hybrid IPO auction mechanism with a public tranche (Cao et al., 2016; Schnitzlein et al. 2016; Chemmanur et al., 2017) by shedding light on the role of adding a separate public tranche in preventing unsophisticated retail investors from disrupting the price-setting process. In this regard, the results of this study are meaningful for market regulators that attempt to seek a way to fine-tune the standard auction mechanism.

The study in **Chapter 3** makes two contributions to the literature. First, it adds to the vast amount of capital-market regulation literature by examining the impact of a legal or regulatory reform from strong public enforcement to partial private enforcement on the efficiency of the IPO market. The conclusions of this study are broadly consistent with the views of La Porta et al. (2006), with my analysis suggesting that a purely public regulatory solution, which gives the entire role of the oversight of IPO markets to a public enforcer, is less effective in mitigating IPO underpricing (i.e. the indirect costs of going public) than a partially private regulatory solution. This offers an important policy implication to the emerging markets that are seeking to improve the efficiency of their IPO market through legal or regulatory reforms.

Second, this study enriches the existing evidence on the determinants of IPO underpricing, especially for the extreme underpricing of China's A-share IPOs. While some previous studies examine the impact on IPO underpricing of regulatory reforms that have taken place in China across different periods/regions (e.g. Su and Brookfield, 2013; Liu et al., 2014; Chen et al., 2015), this study exclusively focuses on the importance of certain characteristics related to sponsorship regulatory reform in explaining the underpricing of Chinese IPOs. In particular, the results of this study demonstrate that the sponsoring entities from the private sector that are acting as IPO advisors are concerned with their reputational capital (e.g. their work experience in the industry), and their reputation and premarket information production have strong association with the level of their client firms' underpricing. By contrast, the regulatory review carried out by the public enforcer (the CSRC) on candidate firms has had little impact on the level of IPO underpricing, while its disciplinary actions on sponsor institutions have played a role in reducing the underpricing of subsequent IPOs. In practice, these results are meaningful to potential issuers, which implies that firms hiring experienced sponsoring entities as their IPO advisors is a way to lower the indirect costs of going public.

The study in **Chapter 4** makes two distinct contributions to the literature. First, it provides additional evidence on the experience of private-sector oversight under a different institutional environment from the system of London's AIM (e.g. Espenlaub et al., 2012; Gerakos et al., 2013; Nielsson, 2013; Doukas and Hoque, 2016). In particular, China's special institutional framework under a sponsorship regulatory model allowed the researcher to shed further light on the effectiveness of introducing sponsoring entities from private sector to perform IPO screening and oversight by controlling the potential effect of flexible or light-touch regulations; however, Gerakos et al. (2013) had difficulty doing so when analysing the practicality of Nomads in AIM. Moreover, this study also highlights the role of the public regulator in the practice of private-sector oversight, which implies that reducing the force of its regulatory reviews of IPO candidate firms while intensifying its penalties against the weak oversight of private-sector advisors helps to protect investors from overpaying on low-quality firms. The results of this study have an important implication for regulating IPO markets, which proposes that centralized regulatory oversight without private-sector involvement is less efficient in screening out low-quality firms.

Second, this study contributes to the literature that studies the IPO long-run performance anomaly and related determinants (e.g. Ritter, 1991; Levis, 1993; Loughran and Ritter, 1995; Carter et al., 1998; Schultz, 2003; Chan et al., 2004; Fan et al., 2007; Su and Bangassa, 2011; Hoque and Lasfer, 2015) by showing that the characteristics of the sponsorship regulatory model play an important role in explaining the long-run abnormal returns of China's A-share IPOs. Regarding the ongoing debate in the literature over the measurement of the long-run underperformance of IPOs (e.g. Barber and Lyon, 1997; Brav and Gompers, 1997; Kothari and Warner, 1997; Fama, 1998; Brav et al., 2000; Loughran and Ritter, 2000; Gompers and Lerner, 2003), this study also provides evidence that the detection of abnormal performance is sensitive to the methodologies used for estimating post-IPO stock returns, such as a different consequence arising from event-time buy-and-hold abnormal returns and calendar-time portfolio abnormal returns.

5.3 Recommendations for future research

The research conducted in this thesis has led to a number of results and contributions to the study of IPOs; it has also uncovered some areas that need additional study in future research.

Beginning with **Chapter 2**, although it sheds light on the importance of information spillovers from contemporaneous investors' bidding results in explaining investor participation and IPO price formation, due to the lack of data on full bidding results, my empirical results are unable to account for the spillover effects of revealing contemporaneous investors' bid-price information. It is worth future research investigating this aspect in an IPO market that requires all the information contained in investors' bids to be publicized after the close of the offering. In addition, this study confirms the prevalence of information leakage/spillovers in a sealed-bid hybrid IPO selling procedure, but there is no conclusive evidence on the causes of the information leakage. Perhaps, because of rent-seeking behaviour, underwriters might help their favoured clients to bid more successfully in auctions by leaking auction trends. Hence, investigating the rationale behind the information leakage could be a useful direction for future research.

Moreover, **Chapter 3** and **Chapter 4** mainly deal with the impact of the sponsorship regulatory model and related characteristics on the short-run and long-run stock performance of Chinese IPOs, for which I attempt to demonstrate that the level of investor protection and the screening function (i.e. firm quality) has been improved after introducing a private-sector approach. However, the *ex post* return performance is not the only criterion for measuring *ex ante* firm quality. To reinforce my interpretation of investor protections based on the post-IPO return performance, future research could locate some *ex post* outcomes that directly capture the *ex ante* firm quality. For example, the proportion of IPO firms involved in accounting fraud, financial restatements or allegations of fraud after the screening of sponsoring entities. Furthermore, to confirm that my empirical results were not driven by any irreplaceable features of China's mainland markets, future research could assess and compare the performance of IPO firms that are cross-listed on the Hong Kong market and affected by its sponsorship regulatory model. In addition, although the study in these two chapters brings to light the role of the centralized regulatory review in the practice of private-sector oversight, it was unable to address the extent to which the information produced by the public regulator (via its communications with IPO candidate firms and sponsoring entities) influences the process of going public and firm valuation. In this respect, analysing the interactions between the public regulator and candidate firms with private advisors could be an avenue for future research.

Appendices

Appendix 1: A summary of the variable definitions used in Chapter 2

Variable	Description
Dependent variables	
Ln(No. of Institutional Bidders)	The natural logarithm of the number of institutional bidders entering the current IPO's auction tranche.
Ln(Institutional Oversubscription)	The natural logarithm of the overall level of institutional oversubscription (i.e. the total number of shares ordered by institutional bidders divided by the number of shares offered by the issuer) in the current IPO's auction tranche.
D_Institutional Participation	An indicator variable that is equal to 1 if the institutional investor participated in the current IPO's auction tranche and 0 otherwise.
Ln(No. of Retail Investors)	The natural logarithm of the number of retail investors entering the current IPO's public tranche.
Ln(Retail Oversubscription)	The natural logarithm of the overall level of retail oversubscription (i.e. the total number of shares ordered by retail investors divided by the number of shares offered by the issuer) in the current IPO's public tranche.
Price Revision (Offer price normalized using the midpoint of the initial filing range)	Following Hanley's (1993) approach, the normalized offer price is calculated using the change of final offer price relative to the midpoint of the initial filing range (also known as indicative price range).
Independent variables	
Information spillovers from contemporaries	
Contem_ΔInstOversub	The average oversubscription of institutional investors revealed in the announcements of the results of contemporaneous IPO auction tranches occurring between current IPO firm *i*'s filing date and its final offering date, while taking into account the difference between the oversubscriptions submitted by contemporaneous large and small institutional investors. The criteria for dividing the institutional investors into large and small groups is based on the median value of the size of their asset management. In particular, the measure of institutional investors' asset management varies by their company type: the size of assets managed by *mutual funds* is measured using the scale of their portfolio management; the size of *Qualified Foreign Institutional Investors' (QFII)* asset management is measured using their investment quotas in China; the size of the asset management of other institutional investors (including *securities*, *insurance*, *financial* and *trust companies*) is measured using their registered capital. An institutional investor will be assigned to the large group if the size of its asset management is greater than the median value of assets managed by all institutional investors.

Contem_ΔInstBidders	The average number of institutional investors revealed in the announcements of the results of the contemporaneous IPO auction tranches occurring between current IPO firm *i*'s filing date and its final offering date, while taking into account the difference between the numbers of contemporaneous large and small institutional investors. The approach used for grouping large and small institutional investors coinciding with the aforementioned method (see Contem_ΔInstOversub for details).
Contem_ΔInstShares	The average number of shares ordered by institutional investors revealed in the announcements of the results of contemporaneous IPO auction tranches between current IPO firm *i*'s filing date and its final offering date, while taking into account the difference between the number of shares ordered by contemporaneous large and small institutional investors. The approach used for grouping large and small institutional investors is coinciding with the aforementioned one.
Contem_ΔInstAggressive	The average number of aggressive institutional bidders revealed in the announcements of the results of contemporaneous IPO auction tranches occurring between current IPO firm *i*'s filing date and its final offering date, while taking into account the difference between the numbers of contemporaneous large and small institutional investors who submitted aggressive bidding orders. The approach used for grouping large and small institutional investors coincides with the aforementioned method (see Contem_ΔInstOversub for details). If the number of shares ordered by an institutional investor is greater than the total number of shares offered by the auction tranche in which this investor participated, then this institutional investor is defined as an aggressive bidder in that auction tranche.
Contem_RetailOversub	The average oversubscription of retail investors revealed in the announcements of the results of contemporaneous IPO public tranches occurring between current IPO firm *i*'s filing date and its final offering date.
Contem_IR	The average one-day initial return of the contemporaneous offerings occurring between current IPO firm *i*'s filing date and its final offering date.
Contem_MktRet	The return on the market index occurring between current IPO firm *i*'s filing date and its final offering date, where the index uses either Shanghai Stock Exchange (SSE) Index or Shenzhen Stock Exchange (SZSE) Index depending on the listing venue of the IPO firm.
Information spillovers from the current (sealed-bid) IPO auction tranche	
Current_ΔInstOversub	The oversubscription difference between large and small institutional bidders generated in the current IPO's auction tranche. The approach used for grouping large and small institutional investors coincides with the aforementioned method (see Contem_ΔInstOversub for details).
Current_ΔInstBidders	The difference between the number of large and small institutional bidders entering the current IPO's auction tranche.

Avg. Repo Rate [auction start, end date]	The average of the seven-day interbank repo rates between the start date and end date of the current IPO's auction tranche, where the seven-day interbank repo rate is one of the main short-term interbank interest rates in China's interbank market.
Auction Duration [in days]	The number of days between the start date and end date of the current IPO's auction tranche.
Firm- and offer-specific characteristics	
EPS [-3yr, IPO]	The average earnings per share (EPS) of the IPO firm in the most recent three years before its filing. If the firm's IPO prospectus has more than three years of information disclosure about its EPS, the pre-filing window will be extended accordingly.
Leverage [-3yr, IPO]	The average ratio of the IPO firm's total liabilities relative to total assets in the most recent three years before its filing. If the firm's IPO prospectus has more than three years of accounting-information disclosure about its liabilities and assets, the pre-filing window will be extended accordingly.
Ln(Proceeds)	The natural logarithm of the gross proceeds raised by the IPO.
Ln(Firm Age)	The natural logarithm of one plus the IPO firm's age, where the age is calculated as the difference between the firm's offering year and founding year.
Reputation	The reputation ranking of the IPO's lead underwriters, which is constructed on the basis of the ten-tier ranking method (in which Grade 9 is the most prestigious and Grade 0 is the least prestigious) by Carter and Manaster (1990). Although the "tombstone announcement" used in Carter and Manaster's (1990) study is not available in China's IPO market, I use the annual income rankings of China's securities companies from 2002 to 2012 (particularly in their role as underwriters) published by the Securities Association of China (SAC) as a replacement. Specifically, following Carter and Manaster's (1990, p.1055) method, I use the 2002 ranking as the first reference point, in which the top-five underwriters are treated as in Section A of the "tombstone announcement" and are thereby assigned Grade 9; then, the next five underwriters in this ranking list are treated as in Section B of the "tombstone announcement", and thereby assigned Grade 8; and so on. Next, I reassign the preceding reference point using the 2003 ranking. If any of the underwriters in the 2003 ranking are listed above any of those in Section B from the first reference point, then these new underwriters are assigned Grade 9 and the original group is moved down to lower Grade 8 accordingly, etc. This is done until all rankings from 2002 to 2012 are exhausted.
Non-tradable	The proportion of IPO firm's non-tradable shares relative to the total number of shares outstanding at the time of the offering.
Largest Ownership	The percentage ownership retained by the largest shareholder of the IPO firm at the time of the offering.

D_High-tech	An indicator variable that is equal to 1 if the IPO firm is in one of the high-tech industries – which are based on the definition of Ljungqvist and Wilhelm (2003), and Loughran and Ritter (2004) – and 0 otherwise. With respect to the China Securities Regulatory Commission's (CSRC's) classification codes, the high-tech industries are C27, C38–40, I63–65 and M73–75.
D_Real Estate	An indicator variable that is equal to 1 if the IPO firm is in one of the real-estate industries (identified by the CSRC's classification codes K70 and E47–50) and 0 otherwise.
D_Finance	An indicator variable that is equal to 1 if the IPO firm is in one of the finance industries (identified by the CSRC's classification codes J66–68) and 0 otherwise.
D_SOE	An indicator variable that is equal to 1 if the IPO firm is a state-owned enterprise (SOE) and 0 otherwise.
D_Big4	An indicator variable that is equal to 1 if the IPO firm is managed by one of the international Big Four auditors and 0 otherwise.
D_Cross-listing	An indicator variable that is equal to 1 if the A-share IPO firm also has H- and/or B-share offerings (in Hong Kong and Mainland China, respectively), and 0 otherwise.

Appendix 2: A summary of variable definitions used in Chapter 3

Variable	Description
Dependent Variable	
IPO underpricing (IR_{Market})	The market-adjusted initial returns of IPO firms, where initial returns are measured using the change from the firm's initial offer price to the closing price of the first trading day, and the market-adjusted initial returns are adjusted by either the SSE or SZSE value-weighted market returns, depending upon the listing venues of the IPO stocks.
Key Independent Variable	
D_SPONSOR	A dummy variable that equals one if the IPO firm is backed by sponsoring entities under the sponsorship system and zero otherwise.
RepDate	The difference in years between the offering date of the IPO firm and the registration date of the individual sponsor representative.
RepIBDExp	The number of years that an individual sponsor representative worked in the IBD prior to the offering date of the IPO firm (excluding the working years that are not related to share-issuance activities, such as factory workers, medical doctors, engineers, M&A, and stock broker).
RepAge	The individual sponsor representative's age at the IPO date; Ln(RepAge) represents the natural logarithm of this value.
D_RepEdu	A dummy variable that equals one if the individual sponsor representative holds a master's degree or PhD, and zero otherwise.
SponsorDate	The difference in years between the offering date of the IPO firm and the registration date of the sponsor institution.
SponsorCapital	The sponsor institution's registered capital.
SponsorPersonnel	The number of employees hired by the sponsor institution (including sponsor representatives and related personnel).
SponsorAge	The number of years between the incorporation of the sponsor institution and the offering date of the sponsored firm; Ln(SponsorAge) represents the natural logarithm of this value.
D_TOP10	A dummy variable that equals one if the sponsor institution is placed in the Top 10 (based on the SAC's annual ranking of securities companies for the number of managed issuances) at the offering date of the IPO firm, and zero otherwise.
RISK	The number of risk factors in the issuance sponsorship letter.
ApprovalCSRC	The net working days between the submission date of the IPO admission documents and the CSRC approval date for the IPO submission.
D_PENALTY1	A dummy variable that equals one if the sponsored IPO is after the sponsor institution's disciplinary proceedings and equals zero if the sponsored IPO was before the disciplinary proceedings.
D_PENALTY2	A dummy variable that equals one if the sponsored IPO is after the individual sponsor representatives' disciplinary proceedings and zero if the sponsored IPO was before the disciplinary proceedings.
Control Variable	
FirmSize	The IPO firm's total assets at the pre-IPO fiscal year end; Ln(FirmSize) represents the natural logarithm of the value.
ROA	The IPO firm's operating income over total assets at the pre-IPO fiscal year end.
D_Big4	A dummy variable that equals one if the IPO firm is backed by the Big-Four auditors, and zero otherwise.
D_B/Hoffer	A dummy variable that equals one if the A-share IPO firm also issued B- and/or H-share, and zero otherwise.
D_SOE	A dummy variable that equals one if the IPO firm is an SOE entity, and zero otherwise.
NonTradable	The ratio of the firm's non-tradable shares to its total shares at the IPO.
LargestOwnership	The proportion of the IPO firm's shares held by the largest shareholder at the listing.
ListingLag	The number of days between the offering date and listing date, i.e. the waiting time for the listing.
Overhang	The number of shares retained divided by the number of shares offered.

Appendix 3: Tables 3.11–3.15

Table 3.11: By a bootstrap method, comparing the market-adjusted initial returns across regulatory systems

This table presents the results that replicate the regression analyses in Subsection 3.5.1 and Table 3.5 using a bootstrap method. The estimates are based on 500 bootstrap replications. The market-adjusted initial returns are winsorised at the 99th percentile. *z*-statistics based on bootstrapped standard errors are reported in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

	Panel A: IPOs of sponsorship system *versus* quota & channel systems		Panel B: IPOs of sponsorship system *versus* quota system		Panel C: Private IPO firms of sponsorship system *versus* quota & channel systems	
	Dependent variable: Market-adjusted initial returns					
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
D_SPONSOR	-0.2375**	(-2.17)	-0.8210***	(-5.42)	-0.8670***	(-4.92)
ROA	-0.8986***	(-3.12)	-0.7561***	(-2.64)	-1.083***	(-3.33)
Ln(FirmSize)	-0.1659***	(-4.69)	-0.1411***	(-3.67)	-0.1230**	(-2.46)
ListingLag	0.0045***	(13.35)	0.0045***	(13.88)	0.0040***	(9.83)
Overhang	-0.0285	(-1.39)	-0.0287	(-1.33)	-0.0275	(-1.14)
LargestOwnership	-0.0024	(-1.4)	-0.0024	(-1.28)	-0.0001	(-0.06)
D_SOE	0.1087	(1.25)	0.1005	(0.97)	–	–
D_BHoffer	0.3004*	(1.65)	0.2999	(1.49)	-0.2294	(-0.8)
D_Big4	0.1014	(1.2)	0.0571	(0.55)	0.0271	(0.23)
NonTradable	0.0847	(0.57)	0.0463	(0.27)	0.1447	(0.53)
Constant	5.0933***	(7.08)	4.4972***	(5.54)	4.8594***	(3.74)
Exchange Indicator:	Included		Included		Included	
– SSE	-0.0890	(-1.08)	-0.1065	(-1.16)	-0.2210	(-1.61)
Year Indicator	Included		Included		Included	
Industry Indicator	Included		Included		Included	
No. of Observations	2192		1980		1360	
R-squared	72.3%		72.5%		76.4%	

Table 3.12: By a bootstrap method, examining the impact of sponsoring entities' reputation

This table presents the results that replicate the regression analyses in Subsection 3.5.2 and Table 3.6 using a bootstrap method. The estimates are based on 500 bootstrap replications. The market-adjusted initial returns are winsorised at the 99th percentile. *z*-statistics based on bootstrapped standard errors are reported in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

Panel A: Examine the impact of sponsor institutions' reputation

	Dependent variable: Market-adjusted initial returns											
	(1)		(2)		(3)		(4)		(5)		(6)	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
SponsorDate	-0.0752***	(-5.26)									-0.1054***	(-5.19)
D_TOP10			-0.0345	(-0.81)							0.0182	(0.49)
Ln(SponsorAge)					-0.0448	(-1.52)					0.1200**	(2.57)
SponsorCapital							0.000003	(0.58)				
SponsorPersonnel									0.00004	(0.39)		
ROA	-1.4005***	(-5.36)	-1.4401***	(-5.9)	-1.4986***	(-5.93)	-1.5275***	(-6.24)	-1.5290***	(-6.07)	-1.4093***	(-6.2)
Ln(FirmSize)	-0.2182***	(-8.26)	-0.1982***	(-8.32)	-0.2173***	(-8.77)	-0.2195***	(-8.18)	-0.2194***	(-8.07)	-0.2215***	(-8.17)
ListingLag	0.0035	(0.87)	0.0054*	(1.74)	0.0049	(1.05)	0.0054	(1.03)	0.0054	(1.09)	0.0040	(0.94)
Overhang	0.0370***	(3.37)	0.0335***	(3.2)	0.0359***	(3.12)	0.0361***	(3.11)	0.0361***	(3.01)	0.0375***	(3.75)
LargestOwnership	0.0027**	(2.12)	0.0016	(1.4)	0.0027**	(2.17)	0.0026**	(2.13)	0.0026*	(1.91)	0.0024*	(1.84)
D_SOE	0.1380	(1.17)	0.1246	(1.32)	0.1336	(1.15)	0.1376	(1.26)	0.1381	(1.18)	0.1526	(1.42)
D_BHoffer	0.2372	(1.63)	0.2693	(0.97)	0.2620*	(1.71)	0.2569*	(1.74)	0.2575*	(1.68)	0.2219	(1.54)
D_Big4	0.0339	(0.39)	0.0108	(0.02)	0.0487	(0.52)	0.0669	(0.75)	0.0651	(0.67)	0.0590	(0.65)
NonTradable	0.0396	(0.23)	0.0777	(0.77)	0.0987	(0.55)	0.1018	(0.58)	0.1054	(0.58)	0.0229	(0.14)
Constant	5.4244***	(9.71)	4.6271***	(9.2)	5.0347***	(9.65)	4.9498***	(9.21)	4.9574***	(8.81)	5.3766***	(9.38)
Exchange Indicator:	Included		Included		Included		Included		Included		Included	
– SSE	0.0557	(0.9)	-0.0185	(-0.24)	0.0110	(0.18)	0.0140	(0.23)	0.0135	(0.22)	0.0821	(1.27)
Year Indicator	Included		Included		Included		Included		Included		Included	
Industry Indicator	Included		Included		Included		Included		Included		Included	
No. of Observations	969		1137		969		969		969		969	
R-squared	51.2%		48.9%		49.3%		49.2%		49.2%		51.6%	

Table 3.12 (continued)

Panel B: Examine the impact of sponsor representatives' reputation										
	Dependent variable: Market-adjusted initial returns									
	(1)		(2)		(3)		(4)		(5)	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
RepDate	-0.0208**	(-2.26)							-0.0139	(-1.45)
RepIBDExp			-0.0156***	(-2.69)					-0.0135*	(-1.80)
Ln(RepAge)					-0.1844	(-1.03)			0.0863	(0.38)
D_RepEdu							0.0156	(0.23)	0.0144	(0.22)
ROA	-1.4600***	(-6.1)	-1.4262***	(-5.91)	-1.4418***	(-5.82)	-1.4577***	(-5.65)	-1.4384***	(-5.92)
Ln(FirmSize)	-0.2031***	(-8.73)	-0.1978***	(-7.93)	-0.2011***	(-8.13)	-0.2019***	(-7.89)	-0.1982***	(-8.35)
ListingLag	0.0047	(0.94)	0.0050	(1.09)	0.0050	(0.99)	0.0049	(0.99)	0.0049	(1.02)
Overhang	0.0386***	(3.51)	0.0381***	(3.56)	0.0380***	(3.34)	0.0380***	(3.55)	0.0381***	(3.44)
LargestOwnership	0.0016	(1.25)	0.0017	(1.38)	0.0016	(1.41)	0.0016	(1.32)	0.0016	(1.5)
D_SOE	0.1186	(1.23)	0.1074	(1.14)	0.1127	(1.17)	0.1111	(1.12)	0.1058	(1.12)
D_BHoffer	0.2930**	(2.05)	0.2887**	(2.11)	0.2869*	(1.93)	0.2902**	(2.02)	0.2956**	(2.11)
D_Big4	-0.0079	(-0.09)	-0.0157	(-0.19)	-0.0041	(-0.05)	-0.0026	(-0.03)	-0.0168	(-0.19)
NonTradable	0.0751	(0.49)	0.0853	(0.56)	0.0887	(0.63)	0.0912	(0.6)	0.0796	(0.54)
Constant	4.7669***	(10.2)	4.7588***	(9.31)	5.3310***	(6.48)	4.6588***	(8.87)	4.6549***	(4.51)
Exchange Indicator:	Included		Included		Included		Included		Included	
– SSE	0.0001	(0.01)	-0.0082	(-0.16)	-0.0109	(-0.19)	-0.0138	(-0.25)	-0.0043	(-0.08)
Year Indicator	Included		Included		Included		Included		Included	
Industry Indicator	Included		Included		Included		Included		Included	
No. of Observations	1125		1106		1106		1106		1106	
R-squared	49.3%		48.3%		48.0%		47.9%		48.4%	

Table 3.13: By a bootstrap method, analysing the information disclosure by sponsoring entities and the IPO admission review by the CSRC

This table presents the results that replicate the regression analyses in Subsection 3.5.3 and Table 3.7 using a bootstrap method. The estimates are based on 500 bootstrap replications. The market-adjusted initial returns are winsorised at the 99th percentile. *z*-statistics based on bootstrapped standard errors are reported in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

	Panel A: Disclosure of risk-factor section				Panel B: IPO admission review by the CSRC					
	Dependent variable: Market-adjusted initial returns									
	(1)		(2)		(3)		(4)		(5)	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
RISK	-0.0075***	(-2.58)	-0.0074**	(-2.40)					-0.0079***	(-2.65)
ApprovalCSRC					-0.0002	(-1.03)	-0.00003	(-0.21)	-0.00005	(-0.35)
SponsorDate			-0.0767***	(-5.00)			-0.0740***	(-4.91)	-0.0742***	(-5.29)
RepIBDExp			-0.0119**	(-2.26)			-0.0121**	(-2.29)	-0.0112**	(-2.00)
ROA	-1.4630***	(-6.06)	-1.3689***	(-5.31)	-1.5582***	(-6.26)	-1.4190***	(-6.14)	-1.4308***	(-6.22)
Ln(FirmSize)	-0.2004***	(-8.15)	-0.2112***	(-7.73)	-0.2042***	(-8.01)	-0.2151***	(-7.93)	-0.2153***	(-7.95)
ListingLag	0.0056	(1.56)	0.0033	(0.90)	0.0105**	(2.20)	0.0072	(1.46)	0.0076	(1.60)
Overhang	0.0341***	(3.32)	0.0406***	(3.80)	0.0473***	(3.53)	0.0452***	(4.19)	0.0464***	(4.41)
LargestOwnership	0.0014	(1.24)	0.0023*	(1.76)	0.0017	(1.45)	0.0026**	(1.98)	0.0023*	(1.79)
D_SOE	0.1235	(1.28)	0.1180	(1.09)	0.1270	(1.22)	0.1262	(1.10)	0.1231	(1.11)
D_BHoffer	0.2679	(1.07)	0.2678*	(1.88)	0.2408	(0.78)	0.2557*	(1.87)	0.2593*	(1.87)
D_Big4	0.0130	(0.05)	0.0019	(0.02)	-0.0217	(-0.24)	-0.0304	(-0.33)	-0.0327	(-0.36)
NonTradable	0.0831	(0.84)	0.0426	(0.25)	0.0813	(0.81)	0.0283	(0.18)	0.0334	(0.19)

Constant	4.7534***	(9.02)	5.5319***	(9.24)	4.8348***	(9.17)	5.6838***	(9.59)	5.7193***	(9.97)
Exchange Indicator:	Included		Included		Included		Included		Included	
– SSE	-0.0685	(-1.07)	0.0149	(0.25)	-0.0171	(-0.18)	0.0716	(1.16)	0.0159	(0.25)
Year Indicator	Included		Included		Included		Included		Included	
Industry Indicator	Included		Included		Included		Included		Included	
No. of Observations	1137		950		1112		939		939	
R-squared	49.2%		51.1%		48.5%		50.0%		50.3%	

Table 3.14: By a bootstrap method, analysing the disciplinary actions taken against sponsor institutions and sponsor representatives

This table presents the results that replicate the regression analyses in Subsection 3.5.4 and Table 3.8 using a bootstrap method. The estimates are based on 500 bootstrap replications. The market-adjusted initial returns are winsorised at the 99th percentile. *z*-statistics based on bootstrapped standard errors are reported in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

	Panel A: Penalties against sponsor institutions		Panel B: Penalties against individual sponsor representatives			
	Market-adjusted initial returns		Market-adjusted initial returns			
	(1)	(2)	(3)	(4)	(5)	(6)
	All disciplines (on 11 sponsors)	Weak due diligence (on 9 sponsors)	All disciplines (on 68 reps.)	Weak due diligence (on 48 reps.)	Suspension (on 18 reps.)	Warning (on 46 reps.)
D_PENALTY1	-0.0842	-0.1175 *				
	(-1.25)	(-1.85)				
D_PENALTY2			-0.0850	-0.0269	-0.3599	-0.0699
			(-0.61)	(-0.25)	(-0.72)	(-0.42)
ROA	-1.7485 ***	-1.7084 ***	-1.6975 **	-0.7836	-4.0549	-1.3046
	(-3.92)	(-3.87)	(-2.08)	(-1.00)	(-1.01)	(-0.89)
Ln(FirmSize)	-0.2294 ***	-0.2195 ***	-0.0454	0.0072	-0.2325	-0.0060
	(-5.66)	(-5.03)	(-0.42)	(0.06)	(-1.19)	(-0.04)
ListingLag	0.0097	0.0064	-0.0290	-0.0219	-0.0106	-0.0302
	(0.88)	(0.55)	(-0.93)	(-0.87)	(-0.11)	(-1.18)
Overhang	0.0545 ***	0.0507 ***	0.0107	0.0160	-0.0808	-0.0045
	(3.10)	(3.00)	(0.20)	(0.26)	(-0.15)	(-0.04)
LargestOwnership	0.0050 ***	0.0056 ***	-0.0004	0.0012	0.0119	-0.0046
	(2.74)	(3.05)	(-0.10)	(0.25)	(0.67)	(-0.88)
D_SOE	0.2707	0.2994	0.1428	-0.0269	0.1786	0.1750
	(1.43)	(1.54)	(0.59)	(-0.10)	(0.07)	(0.56)
D_BHoffer	-0.0064	-0.1112	-0.0085	0.0364	0.1281	0.0807
	(-0.03)	(-0.46)	(-0.02)	(0.04)	(0.04)	(0.13)

D_Big4	0.1148	0.1884	0.1303	0.0799	–	0.2142
	(0.67)	(1.00)	(0.27)	(0.10)	–	(0.42)
NonTradable	0.1597	0.1575	-0.4249	-0.4761	0.0090	-0.5305
	(0.52)	(0.48)	(-0.83)	(-1.10)	(0.01)	(-0.98)
Constant	4.9444 ***	4.7402 ***	2.4000	1.1641	5.7691	1.8207
	(6.25)	(5.45)	(1.11)	(0.44)	(1.42)	(0.57)
Exchange Indicator:	Included	Included	Included	Included	–	Included
– SSE	-0.0272	-0.0449	-0.1934	-0.2523	–	-0.1235
	(-0.36)	(-0.54)	(-1.01)	(-1.01)	–	(-0.44)
Year Indicator	Included	Included	Included	Included	–	Included
Industry Indicator	Included	Included	Included	Included	–	Included
No. of Observations	456	443	116	87	27	89
R-squared	54.1%	53.4%	57.3%	59.9%	37.3%	52.9%

Table 3.15: By a bootstrap method, analysing the interaction effects of sponsor institution and sponsor representative

This table presents the results that replicate the regression analyses in Subsection 3.5.5.2 and Table 3.10 using a bootstrap method. The estimates are based on 500 bootstrap replications. The market-adjusted initial returns are winsorised at the 99th percentile. *z*-statistics based on bootstrapped standard errors are reported in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.

	Dependent variable: Market-adjusted initial returns					
	(1)		(2)		(3)	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
Reputable Sponsor*Reputable Rep	-0.1281 ***	(-3.67)				
Reputable Sponsor*Non-reputable Rep			-0.3228 ***	(-5.43)		
Non-reputable Sponsor*Reputable Rep					0.0209	(0.39)
ROA	-1.4774 ***	(-5.65)	-1.4131 ***	(-2.99)	-1.5529 ***	(-3.10)
Ln(FirmSize)	-0.2209 ***	(-8.54)	-0.2784 ***	(-7.74)	-0.2644 ***	(-5.80)
ListingLag	0.0046	(0.99)	0.0027	(0.48)	0.0040	(0.72)
Overhang	0.0398 ***	(3.50)	0.0389 ***	(2.63)	0.0362 **	(2.17)
LargestOwnership	0.0026 **	(1.96)	0.0034	(1.47)	0.0031	(1.37)
D_SOE	0.1375	(1.24)	0.1732	(1.21)	0.1839	(1.27)
D_BHoffer	0.2899 **	(2.06)	0.5074 **	(2.35)	0.5423 ***	(2.59)
D_Big4	0.0428	(0.45)	-0.0984	(-0.74)	-0.0970	(-0.75)
NonTradable	0.0935	(0.59)	0.0055	(0.03)	0.0375	(0.16)
Constant	5.0654 ***	(9.50)	7.1652 ***	(8.66)	5.6094 ***	(6.90)
Exchange Indicator:	Included		Included		Included	
– SSE	0.0347	(0.59)	0.0574	(0.55)	0.0016	(0.01)
Year Indicator	Included		Included		Included	
Industry Indicator	Included		Included		Included	
No. of Observations	960		512		512	
R-squared	49.9%		54.4%		52.4%	

Appendix 4: A summary of the variable definitions used in Chapter 4

Variable	Description
Dependent Variable	
BHAR12	Market-adjusted buy-and-hold abnormal returns for 12 months after IPO, excluding initial returns (IR).
BHAR36	Market-adjusted buy-and-hold abnormal returns for 36 months after IPO, excluding initial returns (IR).
Key Independent Variable	
D_SPONSOR	A dummy variable that equals 1 if the IPO firm is backed by sponsoring entities (i.e. under the sponsorship system).
RepDate	The number of years a sponsor representative was engaged in sponsoring activities prior to the offering date of his/her managed IPO firm.
RepIBDExp	The number of years that a sponsor representative worked in the investment-banking division (IBD) prior to the offering date of his/her managed IPO firm (exclusive of working years or experiences that are not related to share issuance, such as M&A and stockbroker).
RepAge	The sponsor representative's age at the IPO date; Ln(RepAge) is the natural logarithm of the value.
D_RepEdu	A dummy variable that equals 1 if the sponsor representative holds a PhD or master's degree.
SponsorDate	The year difference between the registration date of the sponsor institution (with the CSRC) and the offering date of its managed IPO firm.
SponsorCapital	The registered capital of the sponsor institution. Ln(SponsorCapital) is the natural logarithm of the value.
SponsorPersonnel	The number of employees hired by the sponsor institution (including sponsor representatives and related personnel).
SponsorAge	The number of years between the incorporation date of the sponsor institution and the offering date of its managed IPO firm; Ln(SponsorAge) is the natural logarithm of the value.
D_TOP10	A dummy variable that equals 1 if the sponsor institution was placed in the top 10 (at the offering date of its managed IPO firm) in the annual ranking of securities companies (in terms of the number of issuances they have managed in each year) announced by the Securities Association of China (SAC).
RISK	The number of risk factors in the issuance sponsorship letter.
ADVANTAGE	The number of advantage factors (including the sponsoring entities' positive comments about the firm's competitive advantages and good growth prospects) in the issuance sponsorship letter.
ApprovalCSRC	The net working days between the submission date of the IPO admission documents and the CSRC's approval date for this IPO submission or application.
D_PENALTY1	A dummy variable that takes a value of 1 for the IPOs after the sponsor institutions' disciplinary proceedings, otherwise the dummy variable takes a value of 0 for the IPOs before the sponsor institutions' disciplinary proceedings.
D_PENALTY2	A dummy variable that takes a value of 1 for the IPOs after the sponsor representatives' disciplinary proceedings, otherwise the dummy variable takes a value of 0 for the IPOs before the sponsor representatives' disciplinary proceedings.
Control Variable	
IR	The initial return or underpricing of IPOs, which is calculated as the closing price on the initial trading day minus the offer price, all divided by the offer price.

OfferSize	The gross proceeds raised by IPO firms; Ln(OfferSize) is the natural logarithm of the value.
AGE	The difference between the year of the IPO firm's incorporation and the year of going public; Ln(1+AGE) is the natural logarithm of the value.
FirmSize	The IPO firm's total assets at the pre-IPO fiscal year end; Ln(FirmSize) is the natural logarithm of the value.
EPS	The IPO firm's average earning per share in the three fiscal years prior to the offering.
TobinQ	The sum of the market value of equities (at the end of the initial trading month) and the difference between the total assets and book equities, all divided by the firm's total assets.
ROA	The IPO firm's operating income divided by the total assets at the pre-IPO fiscal year end.
Leverage	The IPO firm's total liabilities divided by the total assets at the pre-IPO fiscal year end.
D_Big4	A dummy variable that equals 1 if the IPO firm is backed by one of the Big Four auditors.
D_B/Hoffer	A dummy variable that equals 1 if the IPO firm also issued B- or/and H-shares before its A-share IPO or within three years after its A-share IPO.
D_SOE	A dummy variable that equals 1 if the IPO firm is a state-owned enterprise (SOE).
NonTradable	The ratio of the firm's non-tradable shares to its total shares at the IPO.
LargestOwnership	The proportion of the IPO firm's shares held by the largest shareholder at the time of the offering.

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