INSTITUTO
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DE LISBOA

Underwriting Behavior of Investment Banks and IPO Pricing Efficiency in the Context of China's Reform on the Registration System for Issuing Stocks

ZHENG Hengguo

Doctor of Management

Supervisors:
PhD Luís Miguel da Silva Laureano, Assistant Professor,
ISCTE University Institute of Lisbon
PhD Li Qiang, Professor,
University of Electronic Science and Technology of China

December, 2025

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Jury:

PhD Sérgio Miguel Carneiro Moro, Full Professor,
Iscte - Instituto Universitário de Lisboa
PhD Joaquim Paulo Viegas Ferreira de Carvalho, Adjunct Professor,
ISCAL – Instituto Superior de Contabilidade e Administração de Lisboa
PhD Szabolcs Sebestyén, Assistant Professor,
Iscte – Instituto Universitário de Lisboa
PhD TIAN Yixiang, Professor,
UESTC – University of Electronic Science and Technology of China
PhD Luís Miguel da Silva Laureano, Assistant Professor,
Iscte – Instituto Universitário de Lisboa

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I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed: ZHENG Hengguo Date: 2025.12.15

Name: ZHENG Hengguo

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作者签名：郑恒国 日期：2025.12.15

姓名(拼音)：ZHENG Hengguo

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Abstract

Against the backdrop of China's transition from the approval system to the registration system for stock issuance, the issuance and pricing mechanisms of the capital market have undergone profound transformations. Centered on information disclosure, the registration system reform aims to strengthen the decisive role of the market in resource allocation and to improve pricing efficiency and transparency in the primary market. However, in the early stages of the reform, distortions in institutional quotations, intensified investor gaming, and misaligned incentives among underwriters emerged. The level of IPO underpricing remained high, suggesting that market-oriented pricing mechanisms were not yet fully developed. To enhance the supporting framework of the registration system, regulators introduced two key measures—mandatory co-investment by securities firms and the new inquiry-based pricing rules—intended to strengthen institutional quotation discipline and optimize incentive alignment between issuers and underwriters, thereby improving IPO pricing behavior and market pricing efficiency. Taking the ChiNext Market as the research context, this thesis systematically analyzes the changes in investment banks' pricing behavior following these institutional reforms and explores the mechanisms and effects through which such innovations influence IPO underpricing and pricing efficiency.

Keywords: Reform of the registration system, New inquiry regulation, Co-investment mechanism, IPO underpricing
JEL: G23, G32

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Resumo

No contexto da transição da China do sistema de aprovação para o sistema de registo na emissão de ações, os mecanismos de colocação e de formação de preços no mercado de capitais passaram por profundas transformações. Assente na divulgação de informação, o sistema de registo visa reforçar o papel decisivo do mercado na alocação eficiente de recursos para melhorar a eficiência e a transparência da formação de preços no mercado primário. Todavia, nas fases iniciais da implementação, surgiram distorções nas cotações apresentadas por investidores institucionais, intensificação das especulações dos investidores, e incentivos desalinhados entre os subscritores. O nível de subvalorização das ofertas públicas iniciais (IPO) permaneceu elevado, sugerindo que os mecanismos de formação de preços orientados pelo mercado ainda não estavam totalmente desenvolvidos. Para melhorar a estrutura de apoio do sistema de registo, os reguladores introduziram duas medidas importantes — o coinvestimento obrigatório por parte das corretoras e as novas regras de fixação de preços baseadas em inquérito — com o objetivo de reforçar a disciplina das cotações institucionais e otimizar o alinhamento de incentivos entre emitentes e subscritores, melhorando assim o comportamento de preços das IPO e a eficiência na formação de preços no mercado. Tomando o mercado ChiNext como contexto de pesquisa, esta tese analisa, de forma sistemática, as mudanças no comportamento de formação de preços dos bancos de investimento após essas reformas institucionais e explora os mecanismos e efeitos através dos quais tais inovações influenciam a subvalorização das IPO e a eficiente formação de preços no mercado de capitais.

Palavras-chave: Reforma do sistema de registo, Nova regulamentação de consultas, Mecanismo de coinvestimento, Subvalorização de IPOs

JEL: G23, G32

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摘　要

在中国股票发行制度由核准制向注册制转型的背景下，资本市场的发行与定价机制经历了深刻变革。注册制改革以信息披露为核心，旨在强化市场在资源配置中的决定性作用，提升一级市场的定价效率与透明度。然而，在改革初期，市场亦出现了机构报价失真、投资者博弈强化及承销商激励错配等问题，IPO 抑价水平依然偏高，市场化定价机制尚未完全成熟。为进一步完善注册制配套体系，监管部门先后推出“券商强制跟投”和“询价新规”两项关键制度，旨在通过强化机构报价约束、优化发行人与承销商的激励机制，从根本上改善 IPO 定价行为与市场定价效率。本文以注册制改革为制度背景，以创业板为研究对象，系统分析上述制度实施后投资银行定价行为的变化，探讨制度创新对 IPO 抑价与定价效率的影响机制及效果。

关键词：注册制改革，询价新规，券商跟投，IPO 定价

JEL: G23, G32

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Acknowledgements

As the final words of my dissertation settle on the computer screen, the dawn light from outside the window quietly spilled over the desk. Looking back on the nearly four-year journey of my doctoral studies, those late nights spent poring over books, the online seminars bridging vast distances, and the moments of clashing minds with my supervisors and fellow students have all transformed into the warmest imprints in my heart. This journey, begun with passion and realized through perseverance, has been made all the more steadfast by the support of countless individuals. Here, I wish to express my deepest gratitude with the most sincere words to all the teachers, classmates, and family members who have given me strength.

In the spring of 2022, when the shadow of the pandemic had not yet lifted, I participated in the selection process for the Doctor of Management joint program between the University of Electronic Science and Technology of China (UESTC) and ISCTE - Instituto Universitário de Lisboa (ISCTE), driven by a deep passion for the field of management and a desire for an integrative teaching model that bridges Chinese and Western knowledge. The anxiety of completing interviews and written tests through a screen turned into immense joy the moment I received the admission notice. In September of the same year, I officially stepped into this academic hall that combines international perspective with scholarly depth, embarking on a brand-new journey of knowledge-seeking. Choosing this program was not only to expand the boundaries of my management knowledge but also to construct a more three-dimensional knowledge system through the collision of Eastern and Western educational philosophies. This initial aspiration has consistently guided my unwavering steps along this academic path.

Over the past four years, the rigor of course work and the trials of thesis writing have brought me growth far beyond expectations. The teaching faculty from both UESTC and ISCTE, with their profound knowledge and superb teaching skills, opened up entirely new academic horizons for me. They skillfully integrated cutting-edge management theories with vivid practical cases—from microscopic insights in organizational behavior to macro-level strategic layouts, from the evolution of Western management thought to the unique wisdom of Chinese enterprise management. Each lecture exposed me to previously uncharted territories of knowledge and gradually taught me to examine issues in management practice from a

cross-cultural perspective. It was this systematic academic nourishment that laid a solid theoretical foundation for my thesis writing.

During the conception and writing of my dissertation, the meticulous guidance of my two supervisors served as a beacon, illuminating my path forward. My external supervisor, Professor Luís, with his deep academic accumulation and rigorous scholarly attitude, provided highly constructive feedback on everything from the design of the research framework to the selection of research methods. Whenever I found myself puzzled by the details of cross-cultural management research, he would always help me clarify my thoughts and break through bottlenecks with patient guidance. My Chinese supervisor, Professor Li Qiang, consistently grounded his advice in Chinese management practice, offering guidance from the perspective of contextual adaptation to the local environment. He often reminded me that "academic research must be rooted in theory but also respond to reality," a principle that became a crucial guideline throughout my writing process. From the repeated refinements of the research proposal to line-by-line annotations on the initial draft, from the logical rigor of data argumentation to the value distillation in the conclusions, the meticulous care and precise insights from both supervisors enabled me to overcome numerous difficulties and successfully complete the thesis. I will forever remember this mentorship.

The companions on this academic journey are the most precious gifts of this experience. Within this joint program, which gathered outstanding talents from various fields, I was fortunate to meet a group of like-minded classmates, including partners like world table tennis champion Zhu Yuling, who consistently embodied a tenacious spirit. I recall our bold declaration after the first round of self-introductions: "We are ready to meet at the peak!" That youthful vigor and shared determination became the driving force for our mutual encouragement and collaborative progress in the days that followed. The intense discussions in class, academic exchanges after hours, and sharing of experiences during thesis writing allowed me not only to absorb knowledge but also to learn from my classmates—their resilience, pursuit of excellence, and interdisciplinary thinking. This friendship that transcended roles and fields is a valuable treasure in my academic life.

I am deeply aware that behind this doctoral degree lies the most solid support of my family. My wife, Yan Yalan, took on more responsibilities for caring for our family and children so that I could focus wholeheartedly on my studies and thesis writing. Whenever I was buried in research late into the night, she would quietly prepare hot tea and snacks; when I grew anxious over research obstacles, her understanding and comfort always helped me regain my composure. It was her selfless dedication that allowed me to immerse myself in

academic research without distractions. Pursuing a doctoral degree was not only for my own academic aspirations but also, by working hard, to set an example of diligence and love for learning for my children, helping them understand the value of persistence and striving. Now, with the thesis completed, this achievement also belongs to my family. It was their love and support that gave me the courage to chase this academic dream.

The completion of the doctoral thesis marks both the end of one academic journey and the starting point of a new life chapter. Looking back on this period, all the hardships and efforts have transformed into nutrients for growth. I am grateful to UESTC and ISCTE for providing an excellent academic platform, to my two supervisors for their careful instruction, to my classmates for their companionship and encouragement, and above all, to my family for their selfless dedication. In the future, I will carry forward the knowledge, wisdom, and courage gained from this journey, continuing to explore and advance in the field of management. I aim to repay all those who have helped and supported me with more solid academic achievements and to interpret for my children the life belief that “perseverance ultimately makes dreams come true.”

Once again, I extend my most sincere gratitude.

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致　谢

当电脑屏幕上最终定格住论文的收尾段落，窗外的天光已悄然漫过书桌。回望近四年的博士求学之路，那些伏案苦读的深夜、跨越山海的线上研讨、与导师同学激荡思维的瞬间，都化作此刻心中最温热的印记。这段始于热爱、成于坚守的旅程，因无数人的支持而愈发坚实，在此，我愿以最诚挚的笔墨，向所有给予我力量的师长、同窗与家人致以最深的谢意。

2022 年的春天，疫情的阴霾尚未散去，我怀着对管理学领域的执着热爱，以及对中西方知识融合教学模式的向往，报名参加了电子科技大学-里斯本大学学院联合培养管理学博士项目的选拔。隔着屏幕完成面试与笔试的忐忑，在收到录取通知的那一刻化为满心欢喜，同年 9 月，我正式踏入这个兼具国际视野与学术深度的学术殿堂，开启了一段全新的求知征程。选择这个项目，不仅是为了拓展管理学知识的边界，更渴望在中西方教育理念的碰撞中，构建更为立体的知识体系，这份初心，始终指引着我在求学路上步履不停。

近四年的时光里，课程学习的严谨与论文写作的磨砺，让我收获了远超预期的成长。电子科技大学与里斯本大学学院的各位授课教师，以渊博的学识和精湛的教学技艺，为我打开了全新的学术视野。他们将前沿的管理学理论与鲜活的实践案例相结合，从组织行为学的微观洞察到战略管理的宏观布局，从西方管理思想的演进脉络到中国企业管理的独特智慧，每一堂课都让我接触到未曾涉猎的知识领域，也让我逐渐学会以跨文化视角审视管理实践中的问题。正是这些系统的学术滋养，为我的论文写作奠定了坚实的理论基础。

在论文的构思与撰写过程中，两位导师的悉心指导如同灯塔，为我照亮了前行的方向。外方导师路易斯教授以其深厚的学术积淀和严谨的治学态度，从论文的研究框架设计到研究方法选择，都给予了我极具建设性的意见。每当我在跨文化管理研究的细节中陷入困惑，他总能通过耐心的答疑，帮我理清思路、突破瓶颈。中方导师李强教授则始终立足中国管理实践，从本土情境的适配性角度为我提供指导，他常叮嘱我“学术研究既要扎根理论，更要回应现实”，这句话成为我论文写作过程中的重要准则。从开题报告的反复打磨到初稿完成后的逐字批注，从数据论证的逻辑严谨性到结论部分的价值提

炼，两位导师的无微不至的关心与精准点拨，让我得以克服重重困难，顺利完成论文的撰写工作。这份师恩，我将永远铭记于心。

求学路上的同行者，是这段旅程中最珍贵的馈赠。在这个汇聚了各界优秀人才的联合培养项目中，我有幸结识了一群志同道合的同学，其中不乏像世界乒乓球冠军朱雨玲这样始终保持拼搏精神的伙伴。还记得第一次上课，我们在自我介绍后共同喊出“我们准备好了，顶峰相见”的豪言壮语，那份蓬勃的朝气与共同奋进的决心，成为了我们日后相互鼓励、携手前行的动力。课堂上的激烈讨论、课后的学术交流、论文写作中的经验分享，让我在汲取知识的同时，更从同学们身上学到了坚韧不拔的意志、精益求精的态度和跨界融合的思维。这段跨越身份与领域的友谊，是我学术生涯中一笔宝贵的财富。

我深知，这份博士学位的背后，离不开家人最坚实的支撑。妻子鄢雅斓为了让我能专心投入学习与论文写作，主动承担起了更多照顾家庭和孩子的责任。每当我深夜伏案钻研时，她总会默默准备好热茶与点心；当我因研究瓶颈而焦虑时，她的理解与安慰总能让我重新振作。正是她的无私付出，让我得以心无旁骛地沉浸在学术研究中。选择攻读博士学位，除了自身的学术追求，更希望能通过自己的努力为孩子们树立一个勤奋好学的榜样，让他们懂得坚持与奋斗的意义。如今论文完成，这份成果也属于我的家人，是他们的爱与支持，让我有勇气追逐学术梦想。

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再次致以最诚挚的谢意！

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List of Acronyms

ChiNext — Growth Enterprise Market of the Shenzhen Stock Exchange

CSRC — China Securities Regulatory Commission

IPO — Initial Public Offering

P/E — Price-to-Earnings Ratio

R&D — Research and Development

SSE — Shanghai Stock Exchange

STAR — Science and Technology Innovation Board

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Chapter 1: Introduction

1.1 Research background and significance

1.1.1 Research background

The capital market plays a pivotal role in modern economies and is essential for promoting economic growth. Among its various components, the Initial Public Offering (IPO) issuance mechanism serves as a critical manifestation and functional pillar of the capital market. For enterprises, IPOs provide a crucial channel for raising capital to support further operational expansion, enhance market valuation, and contribute significantly to long-term development. In developed capital markets such as those in Europe and the United States, IPO issuance mechanisms have become highly mature, operating predominantly under a well-established registration system characterized by a high degree of marketization and legal institutionalization.

Since the establishment of a unified nationwide stock issuance review system in 1993, China's IPO issuance mechanism has undergone three distinct institutional phases: the authorized system, the approval system, and the registration system. Following the implementation of the Securities Law of the People's Republic of China on July 1, 1999, the IPO issuance process transitioned from the authorized system to the approval system. Both systems, however, were characterized by a high degree of administrative intervention, with government regulatory authorities playing a dominant and directive role in the issuance process.

Compared with mature capital markets, China’s capital market is characterized by extensive governmental oversight and insufficient marketization and legal institutionalization. The most salient issue lies in the fact that determinations of which enterprises may go public, as well as subsequent capital operations such as refinancing and merger-and-acquisition activities, are, under both the authorized system and the approval system, effectively subject to regulatory scrutiny and approval—with issuance prices of securities often constrained or “guided” by the authorities. This has produced several adverse consequences.

First, administrative intervention by regulatory bodies—most notably the existence of the IPO Examination Committee of the China Securities Regulatory Commission (CSRC)—has

engendered an “endorsement effect” for listed firms. When a listed company subsequently encounters difficulties, the accountability of the regulator remains ambiguous.

Second, both potential issuers and investors have become overly dependent on regulatory agencies. This dependence has given rise to rent-seeking behavior within the regulatory apparatus and to the phenomenon of “blind IPO subscription”, which itself reflects excessive reliance on the regulator’s approval.

Third, such regulatory constraints have led to price distortions in the securities market. Owing to enforced limits on price-to-earnings (P/E) ratios, certain new issues are deliberately underpriced, only to experience substantial price surges upon listing. The resulting IPO underpricing effect significantly undermines pricing efficiency.

Fourth, the processes of going public, refinancing, and undertaking mergers and acquisitions remain onerous, procedurally complex, time-consuming, and costly—factors that impede corporate growth.

Moreover, the prevalence of legal and regulatory infractions within China’s capital market, along with a range of other systemic problems, can largely be traced back to deficiencies in market orientation and the rule of law. Such shortcomings are incongruent with China’s objectives of achieving high-quality economic development—particularly insofar as fostering a healthy, efficient, and rapidly evolving capital market is concerned.

With the continuous development of China’s capital market, reform of the registration system has become both a crucial instrument for comprehensively deepening capital-market reform and an inevitable requirement for sustaining healthy economic growth. As early as November 2013, China formally proposed to introduce the registration system for stock issuance. On November 5, 2018, President Xi Jinping announced at the opening ceremony of the first China International Import Expo the establishment of the Science and Technology Innovation Board (commonly known as the “STAR Market”) on the Shanghai Stock Exchange and the launch of a pilot registration system, thereby initiating the implementation phase of the registration system reform in China’s capital market. On July 22, 2019, the first cohort of STAR Market companies officially commenced trading. Subsequently, the ChiNext market of the Shenzhen Stock Exchange underwent analogous reform and pilot testing of the registration system, which officially took effect on August 24, 2020. On November 15, 2021, the Beijing Stock Exchange was inaugurated and simultaneously adopted the registration system on a pilot basis. Finally, on April 10, 2023, the Shanghai and Shenzhen main boards recorded the listing and trading of the first ten enterprises under the registration system, thus

marking the full rollout of registration-based reform across all segments of China's capital market. The implementation milestones of the registration system are illustrated in Figure 1.1.

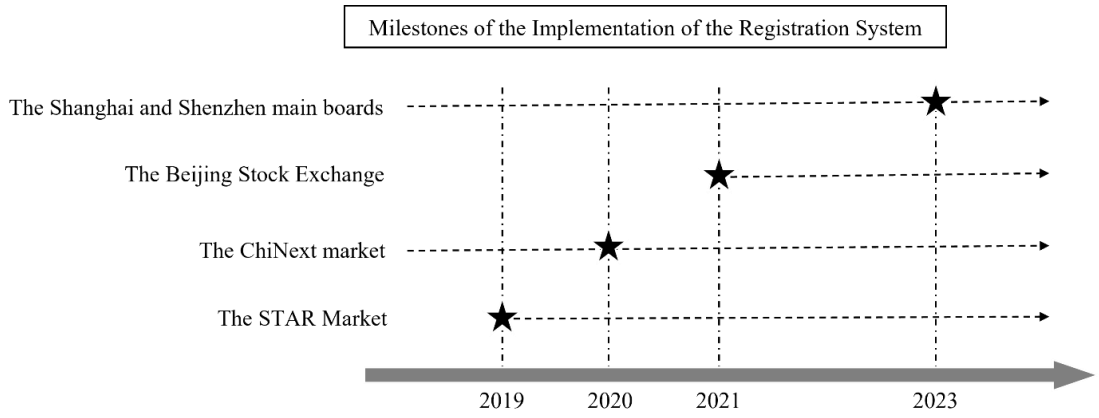


Figure 1.1 Milestones of the implementation of China's registration system

Source: Compiled by the author based on CSRC announcements.

The essence of the registration system reform is to entrust decision-making authority to the market (marketization), to reinforce market discipline and rule-of-law constraints (legal institutionalization), and to enhance the convenience of investment and financing.

Table 1.1 Key differences between the approval system and the registration system

Differentiation	**Approval System**	**Registration System**
Marketization Degree	Initially low, gradually marketized	Fully marketized
Legalization Degree	Low	High
Listing Standards	Relatively simple	Diversified
Audit Transparency	Partially public	Fully public
Audit Concept	Focus on meeting listing criteria	Focus on information disclosure
Audit Method	Substantial review by CSRC	Formal review by CSRC
Substantial Judgment Entity	Regulatory agencies, intermediaries	Intermediaries
Issuance Efficiency	Low	High
Regulatory Enforcement	Lax	Zero tolerance, strong enforcement

Unlike the previous approval system, the registration system, which places marketization and legal institutionalization at its core, can be summarized as having implemented reforms in three primary areas:

First, the issuance and listing requirements have been substantially streamlined. Only the essential eligibility and compliance prerequisites for public offerings are retained, while substantive thresholds under the approval system have been, to the greatest extent possible, converted into information-disclosure obligations. Regulatory authorities are no longer tasked with evaluating the issuer's investment value.

Second, stringent measures have been instituted to safeguard information-disclosure quality. Adoption of the registration system does not imply any relaxation of quality standards;

instead, oversight has become more rigorous. The review process relies primarily on inquiries to ensure that issuers disclose information that is truthful, accurate, and complete. Concurrently, regulators employ a suite of tools—multi-factor validation, on-site supervision and inspections, complaint and whistle-blower investigations, and enforcement actions—to reinforce the issuer's primary responsibility for disclosure and the intermediary's gate-keeping function.

Third, an open and transparent review mechanism is upheld. All standards, procedures, content, processes, and outcomes of registration reviews are publicly disclosed, rendering the exercise of public authority fully transparent, rigorously checked and balanced, and subject to societal supervision—thereby constituting a fundamental departure from the approval system.

Since the implementation of the registration system reform, China's capital market has undergone profound changes, which can be summarized in three principal respects:

(1) Substantial increase in the number of listed companies

As of December 29, 2023, the number of A-share listed firms reached 5,385—more than double the 2,107 companies recorded in 2010, as shown in Figure 1.2. In less than a decade, China's A-share market doubled the number of listings. With respect to direct financing, as illustrated in Figure 1.3, IPO proceeds on the A-share market amounted to RMB 64.07 billion in 2014, rose to RMB 252.88 billion in 2019 following the launch of the registration system, and surged further to RMB 586.89 billion in 2022—demonstrating a clear long-term growth trajectory. In terms of market capitalization, the combined value of the Shanghai and Shenzhen exchanges expanded from RMB 19.26 trillion in January 2013 to RMB 71.21 trillion in January 2023.

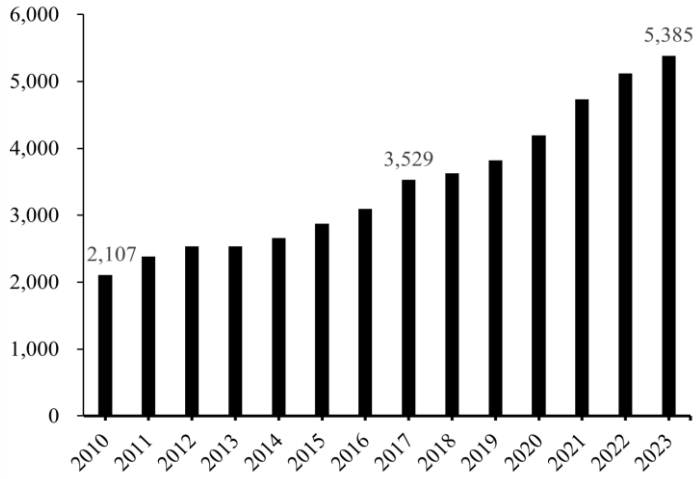


Figure 1.2 Cumulative number of listed companies in the A-share market

Source: Compiled by the author based on data from the official websites of the Shanghai and Shenzhen Stock Exchanges.

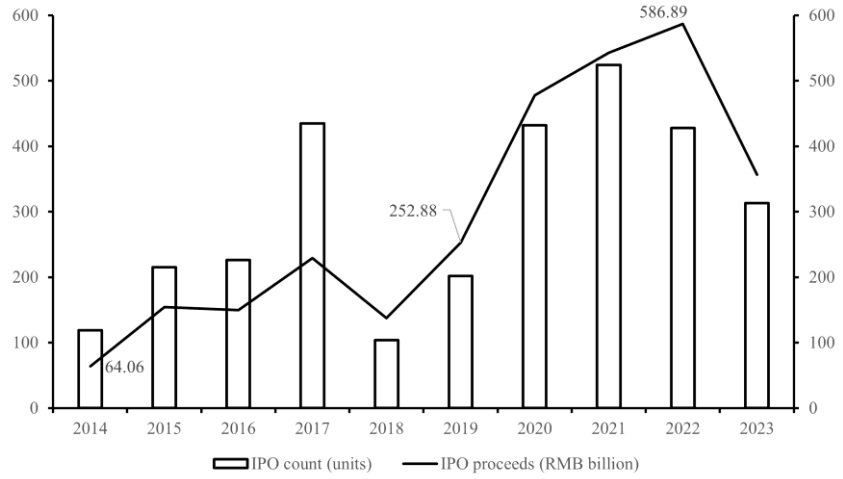


Figure 1.3 Number of IPOs and amount of proceeds raised in the A-share market, 2014–2023

Source: Compiled by the author based on data from the official websites of the Shanghai and Shenzhen Stock Exchanges.

(2) Accelerated regulatory review

Under the approval system, substantive review by the China Securities Regulatory Commission often entailed protracted timelines, with some firms requiring four to five years to complete the listing process. The registration system has dramatically shortened the interval from application submission to successful listing. As illustrated in Figure 1.4, service-oriented innovative small and medium-sized enterprises can now list on the Beijing Stock Exchange in just over 100 days; on the STAR Market, the average time to listing is 283 days; and, on ChiNext, post-reform listing requires approximately 300 days on average—versus over 500 days under the approval system.

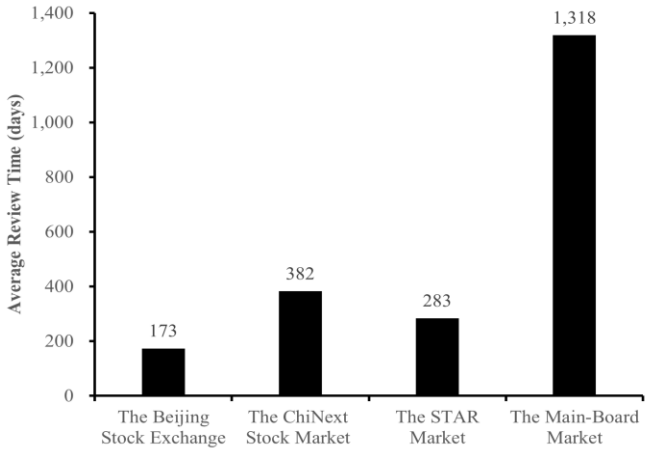


Figure 1.4 Average review time across A-share market segments

Source: Compiled by the author based on data from the official websites of the Shanghai and Shenzhen Stock Exchanges.

This acceleration principally reflects the shift from substantive judgment of issuer quality under the approval system to verification of disclosure authenticity under the registration system. The focus of review has moved from assessing historical profitability to interrogating

the veracity of disclosed information. Enhanced disclosure reduces information asymmetry between investors and firms, while simultaneously raising the bar for investor due diligence and corporate valuation.

(3) Noticeable improvement in corporate quality

China's capital market has increasingly become a nexus for "Three Innovations and Four New Industries," "hard-technology," and "specialized, refined, distinctive, and innovative" enterprises. This evolution owes much to the registration system's emphasis on firms' R&D capabilities and the state's unprecedented support for core technological innovation. Of the approximately 5,000 new listings, nearly half are companies operating in strategic emerging sectors. Taking the ChiNext Market as a representative case, the three leading industries are the new-generation information technology industry, the software and information technology services industry, and the high-end equipment manufacturing industry; this sectoral composition is consistent with the core strategic priorities of China's industrial development.

(4) Removal of Restrictions on Issuance Pricing

The issuance P/E ratio can effectively reflect the distinctive characteristics and growth prospects of different industries. As shown in Figure 1.5, during 2014–2018 the average P/E at IPO in China's A-share market clustered near the 23× regulatory ceiling; even firms with strong growth potential had limited scope to obtain higher valuations. Following the implementation of the registration system, the average A-share IPO P/E exceeded the 23× threshold and has exhibited only modest year-to-year fluctuations.

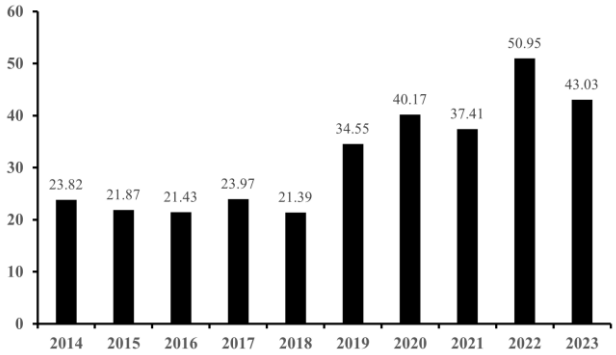


Figure 1.5 Average offering P/E ratio of A-share IPOs, 2014–2023

Source: Compiled by the author based on data from the official websites of the Shanghai and Shenzhen Stock Exchanges.

Figure 1.6 reports IPO P/E ratios by industry on the ChiNext and STAR Market in 2021. By industry classification, valuations diverge markedly: "R&D" and "software and information technology services" approach roughly 120× P/E, whereas segments such as "ecological and environmental governance" are around 20× P/E. High-tech fields such as computer/software and information services generally command higher valuations

(approximately 80–120× P/E), general equipment manufacturing occupies the middle range (about 30–60× P/E), and chemicals and environmental-protection–related industries are typically in the 20–30× P/E range. By board, for the same industry the average valuation on the STAR Market exceeds that on the ChiNext Market, reflecting the stronger R&D and innovation capacity of STAR-listed firms.

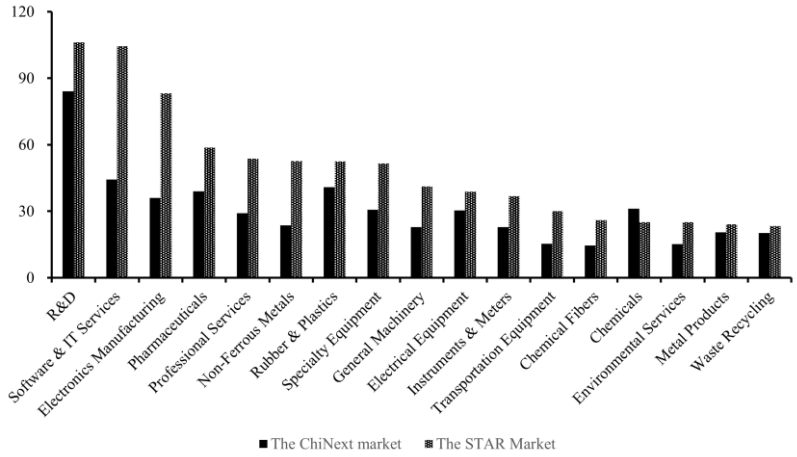


Figure 1.6 Average IPO offering P/E by industry on the STAR Market and the ChiNext Market

Source: Compiled by the author based on data from the official websites of the Shanghai and Shenzhen Stock Exchanges.

(5) Institutionalization of the investor structure in the stock market

Changes in the investor composition are primarily reflected in two aspects. First, under the registration system, the book-building inquiry mechanism differentiates the functional roles of online and offline institutional investors, with virtually all new issues priced by offline institutional investors. Second, the proportion of retail investors' trading in the secondary market fell below 70% for the first time in 2021 and declined further to approximately 60% in 2022, indicating that the concepts of value investing and rational investment are gradually taking hold in China.

After the registration system reform, China's capital market has taken on an entirely new look. To understand why the market achieved such remarkable success in just a few years, one must look to a single starting point: the IPO of new shares under the registration system. The registration system reform introduced changes to the IPO issuance requirements, the review and registration procedures, the issuance and underwriting processes, the information disclosure principles, the trading systems, and to regulatory sanctions. Only with the concerted cooperation of all participants at each stage can the entire system operate smoothly, ultimately enabling the capital market to fulfill its functions of investment and financing, price discovery, and resource allocation.

In the process of reforming the capital market from the approval system to the registration system, the role and positioning of investment banks have undergone significant change. Consequently, their role in IPO pricing warrants a renewed scientific evaluation. Investment banks, as important participants in the capital market, undertake functions such as sponsoring new stock issues, pricing, and underwriting, and they serve as the most important intermediaries in a company's IPO process. The registration system reform is bound to have a significant impact on these institutions.

1.1.2 Research significance

From a theoretical perspective, this study centers on institutional changes brought about by the reform of the registration system, aiming to enhance the understanding of recurring challenges in the IPO pricing process with Chinese characteristics. Prior research on IPO pricing in China has primarily focused on pricing issues under a regime of price controls. However, conducting such investigations within the context of government intervention imposes inherent limitations. As the reform advances, the changing institutional environment calls for a reassessment of how existing theories explain IPO pricing.

The registration system reform signifies China's efforts to establish a book-building mechanism—comprising inquiry, pricing, and allocation—centered on the participation of institutional investors. First, following the removal of price controls in the primary market, it is worth examining whether underwriters' current research and valuation capabilities are sufficient to support independent and professional judgments on investment value. As key participants in IPO pricing, can institutional investors provide a reasonable quotation range? Has the shift from "collusive underpricing" to frequent IPO underperformance gone too far under the current regime? How can a better balance be achieved?

Second, under the registration system, certain companies with strong innovation capacity and multiple core technologies are allowed to list even if they are not yet profitable. This raises further questions: how will such a shift influence corporate governance, particularly with respect to R&D expenditure management and related disclosure behavior? Furthermore, since these firms often do not conform to traditional valuation models, how can investors accurately gauge their true value?

From the perspective of trading system reforms, does the introduction of short selling on the first day of trading promote price convergence toward fundamental value? Does the removal of price fluctuation limits during the first five trading days facilitate sufficient market

interaction, thereby enabling more rational pricing? And to what extent does this mitigate speculative enthusiasm toward new listings?

Addressing these questions aims to provide a theoretical explanation for IPO pricing under the registration system, enrich the literature on the microstructure of China's capital market, and offer policy recommendations and optimization strategies.

From a practical standpoint, on February 18, 2022, the CSRC announced that it would "conduct evaluations and summarize experiences from the pilot implementation of the registration system, adhere to the general principle of seeking progress while maintaining stability, and coordinate efforts to advance the reform of a fully implemented registration system along with supporting trading mechanism reforms."(China Securities Regulatory Commission, 2022). Subsequently, on February 17, 2023, the regulatory framework for the comprehensive registration system was officially released. The reform of the registration system is not a one-time event; it requires periodic evaluation and refinement of implemented policies. The findings of this study contribute to the optimization of China's foundational capital market institutions and offer potential reform pathways for deepening the comprehensive registration system reform.

By examining the impact of the registration system reform on investment banks' underwriting behavior and its implications for IPO pricing, this research not only enriches the theoretical literature in areas such as financial intermediation, IPO pricing, and market efficiency, but also provides meaningful guidance for regulatory authorities, listed companies, intermediary institutions, and investors alike.

1.2 Research questions and methodology

1.2.1 Research questions

Against the backdrop of China's IPO registration system reform, which emphasizes marketization and legal institutionalization, this study addresses the following core research question: How does the registration system reform influence the underwriting behavior of investment banks, particularly regarding IPO pricing efficiency?

On the legal institutional side of the reform, the formal implementation of the co-investment mechanism has fundamentally changed the traditional profit model of investment banks. A significant portion of their revenue now comes from returns on shares acquired through co-investment, the value of which is subject to high uncertainty. This shift

has inevitably affected underwriters' behavior, particularly in their selection of potential IPO candidates and their approach to pricing new issues.

On the market-oriented side, IPO listing standards have become more diversified, and the issuance price of new shares is no longer constrained by the previous regulatory guidance limiting it to 23 times the P/E ratio. This liberalization has introduced considerable uncertainty into IPO pricing—one of the core responsibilities of investment banks. A common dilemma arises: if the IPO is priced too high, the likelihood of the stock falling below the issue price in the secondary market increases, and the offering may even fail due to insufficient subscription. In such cases, the underwriter not only faces book losses from the co-invested portion and the residual underwriting obligation but also suffers reputational damage, which may adversely affect future business opportunities. Conversely, if the IPO is underpriced, the interests of pre-IPO investors and existing shareholders are compromised, potentially leading to a price inversion between the primary and secondary markets. This may disrupt the private equity investment environment and substantially reduce underwriting income.

Therefore, the registration system reform directly impacts investment banks' underwriting behavior, with IPO pricing at the center. At the heart of IPO pricing lies the issue of pricing efficiency.

Question 1: What Is the Impact of New Inquiry Rules under the Registration System on the Pricing Behavior of Investment Banks?

Since the establishment of the Shanghai Stock Exchange in 1990, China's capital market has undergone more than three decades of development, during which the mechanisms for IPO pricing have remained in a constant state of exploration and evolution. Overall, the system of IPO pricing has experienced recurring cycles of "regulation – relaxation – re-regulation – re-relaxation". Within such an institutional framework, issues of IPO underpricing or overvaluation have persisted, and the contradiction between regulatory price guidance and market-based pricing has never been fully reconciled.

To promote the capital market's price discovery function and to improve the rationality and efficiency of IPO pricing, China's stock issuance system has gradually shifted from the approval system to the registration system. In June 2019, the registration system was implemented on the STAR Market, lifting the ceiling on IPO pricing; in August 2020, the registration system and pricing liberalization were extended to ChiNext; and in April 2023, the main board adopted the registration system and removed the pricing cap for new issues. Prior to these reforms, from July 2014 until the official implementation of the registration

system, IPO pricing was subject to regulatory “window guidance”, whereby new issue prices could not exceed 23 times the P/E ratio. The changes in China’s IPO pricing system are shown in Table 1.2.

The registration system places greater emphasis on marketization, reduces administrative intervention by regulatory authorities, eliminates restrictions on IPO pricing related to the P/E ratio, and limits the CSRC’s role to formal review of issuers—delegating the responsibility for value judgment to the market itself. With the full implementation of the registration system in April 2023, a unified reform of IPO issuance and underwriting systems was carried out, focusing primarily on the inquiry process for IPO pricing on the main board, and the “new inquiry rules” were comprehensively adopted.

Table 1.2 Changes in China’s IPO pricing system

Time Period	Pricing Method	Price Limit	Intervention
Before September 1999	Fixed Price and P/E	15x P/E	Yes
October 1999 - October 2001	Cumulative Bidding Pricing	None	Yes
November 2001 - December 2004	Fixed P/E	20x P/E	Yes
January 2005 - May 2009	Inquiry System	30x P/E	Yes
June 2009 - April 2012	Inquiry System	None	Yes
May 2012 - June 2014	Inquiry System	Reference to industry peers	Yes
July 2014 - June 2019	Inquiry System / Direct Pricing	23x P/E	Yes
June 2019 (Registration System Segment) - Present	Inquiry System / Direct Pricing	None	No

Following the full implementation of the registration system, IPO pricing in China may be conducted through either a direct pricing method or an inquiry-based method, with issuers permitted to choose the approach that best suits their circumstances. Taking the regulations of the Shanghai Stock Exchange as an example, when an issuer adopts the direct pricing method for an initial public offering, the issuer and the lead underwriter must submit the proposed issuance and underwriting plan to the exchange. The plan must specify that the P/E ratio corresponding to the offering price does not exceed the average P/E ratio of comparable listed companies in the secondary market. In cases where the issuer has already conducted or is simultaneously conducting an overseas offering, the proposed offering price must not exceed the issuer’s market price in the overseas market.

If the offering price proposed by the issuer and the lead underwriter exceeds either of the aforementioned thresholds, or if the issuer has not yet achieved profitability, the issuer and the lead underwriter are required to adopt the inquiry-based pricing method.

When using the inquiry method for an initial public offering, after the preliminary inquiry is completed, the issuer and the lead underwriter must exclude the highest bidding portion of

the total proposed offline subscriptions. The excluded portion may not exceed 3% of the total proposed offline subscriptions. If the lowest price within the excluded highest bids is equal to the final offering price (or the upper limit of the price range), bids at that price may be retained and need not be excluded. The excluded bids are not eligible to participate in the offline subscription process.

The study of Question 1 begins with the IPO pricing mechanism under the registration system. By examining the IPO pricing of ChiNext-listed companies within two to three years before and after the implementation of the registration system, this research analyzes the factors influencing IPO pricing under the new inquiry-based pricing rules and explores how the inquiry mechanism under the registration system affects the underwriting behavior of investment banks.

Question 2: What Is the Impact of the Co-investment Mechanism under the Registration System on the Pricing Behavior of Investment Banks?

The registration system reform emphasizes legal institutionalization and requires all participants to strictly adhere to regulatory boundaries. In particular, it imposes stricter standards on the quality of information disclosure by issuers and reinforces the “gatekeeping” responsibility of intermediary institutions. These developments place higher demands on investment banking divisions of securities firms. To strengthen their ability to assess issuer quality and price IPOs more accurately, the Shanghai Stock Exchange (for the STAR Market) and the Shenzhen Stock Exchange (for ChiNext) have successively implemented the co-investment mechanism for underwriters.

Taking the STAR Market as an example, the sponsor of the issuer is required to participate in the issuer’s initial public offering through a legally established alternative investment subsidiary, either directly under the sponsor or under the securities company that ultimately controls the sponsor. These subsidiaries must subscribe to a portion of the issuer’s shares during the strategic placement phase and are subject to lock-up restrictions. The sponsoring subsidiary participating in the strategic placement must sign an agreement with the issuer in advance, committing to subscribe for 2% to 5% of the shares issued in the IPO at the offering price. The exact percentage is determined based on a tiered structure linked to the total size of the offering.

The implementation of the co-investment mechanism has transformed investment bank underwriters from mere sponsors and underwriters into equity investors in the IPO firms themselves. This shift has fundamentally altered their profit model. Prior to the introduction of the co-investment mechanism, underwriters primarily earned revenue through sponsorship

and underwriting fees, which were typically calculated as a proportion of the total funds raised during the IPO process. However, under the co-investment mechanism, a substantial portion of their income is now derived from the returns on co-invested shares following the expiration of the lock-up period—returns that are inherently uncertain and volatile.

The purpose of the co-investment mechanism is to strengthen the gatekeeping responsibilities of investment banks and to enhance their ability to assess firm quality and set appropriate IPO prices. By requiring underwriters to invest their own capital, the mechanism is intended to incentivize them to recommend only those firms that possess genuine investment value to access public markets for financing. This reform fundamentally alters the underwriting business model and inevitably influences underwriter behavior, particularly in their selection of potential listing candidates and pricing decisions.

In practice, however, what specific impact has the co-investment mechanism had on the behavior of investment bank underwriters? Compared to the period before its implementation, how have underwriters' selection of IPO candidates and pricing strategies changed? These questions remain to be empirically explored and merit further in-depth research.

Question 3: What Is the Impact of the New Inquiry Rules and the Co-investment Mechanism on IPO Underpricing?

IPO underpricing has long been a pervasive phenomenon in China’s capital market, reflecting not only the insufficiency of pricing efficiency in the issuance process but also the resulting distortions in resource allocation. With the full implementation of the registration system, the introduction of the new inquiry rules and the mandatory co-investment mechanism for securities firms has provided new institutional instruments to alleviate the underpricing problem. The new inquiry rules aim to enhance the validity of investors’ quotations and improve the rationality of IPO pricing by adjusting the quotation elimination mechanism, while the co-investment mechanism strengthens the risk-sharing and accountability constraints on underwriters, theoretically encouraging them to adopt a more prudent and rational approach in pricing decisions.

However, the institutional effects in practice may be more complex. On the one hand, these two mechanisms may improve the marketization of IPO pricing, narrowing the price gap between the primary and secondary markets and thus reducing IPO underpricing. On the other hand, under the combined influence of factors such as underwriters’ and investors’ risk preferences and reputation concerns, “conservative pricing” or even “excessive underpricing” behaviors may still occur, leaving the underpricing issue unresolved.

Therefore, this study focuses on the changes in IPO underpricing levels under the registration system, with particular attention to the effects of the new inquiry rules and the co-investment mechanism on IPO underpricing, and further analyzes the heterogeneity in the improvement of pricing efficiency across firms with different characteristics and under varying market conditions.

1.2.2 Methodology

This thesis employs a combination of multiple research methods to ensure the systematic logic of the research process and the scientific validity of the conclusions. Specifically, it adopts the literature review method, comparative analysis method, statistical analysis method, and empirical research method, aiming to comprehensively reveal the changes in investment banks' pricing behavior and IPO pricing efficiency under the registration system reform through multi-dimensional and multi-level analytical approaches.

(1) Literature Review Method

By systematically reviewing theoretical and empirical studies on IPO pricing, underwriter behavior, and the registration system reform both in China and abroad, this thesis summarizes the main viewpoints and conclusions of existing research and clarifies its academic foundation. On this basis, it integrates prior findings with the institutional context of China's capital market to propose targeted research questions and a corresponding analytical framework.

(2) Comparative Analysis Method

By comparing institutional arrangements before and after the implementation of the registration system, this method focuses on analyzing the differences in IPO pricing mechanisms, inquiry rules, and the co-investment mechanism, thereby revealing the potential impacts of institutional changes on market participants' behavior. This approach helps to grasp the evolutionary logic of investment banks' pricing behavior and market performance from an institutional perspective.

(3) Statistical Analysis Method

Descriptive statistics are conducted on eligible IPO sample data to analyze the overall distributional characteristics and major trends of the sample. This method provides data support for empirical research and helps identify the fundamental characteristics of market operations following the implementation of the registration system reform.

(4) Empirical Research Method

Based on theoretical analysis and statistical results, a multiple linear regression model is constructed to systematically test the research questions. The empirical approach enables an effective evaluation of the actual impact of the registration system reform on investment banks' pricing behavior and IPO pricing efficiency. As the core analytical path of this thesis, this method aims to transform theoretical reasoning and institutional analysis into verifiable empirical conclusions.

Through the integrated application of the above methods, this study not only provides a systematic theoretical and institutional review of the research problem but also empirically uncovers the actual effects of the registration system reform, thereby offering valuable theoretical and policy implications for the ongoing reform of China's capital market.

The overall research framework of this thesis is shown in Figure 1.7.

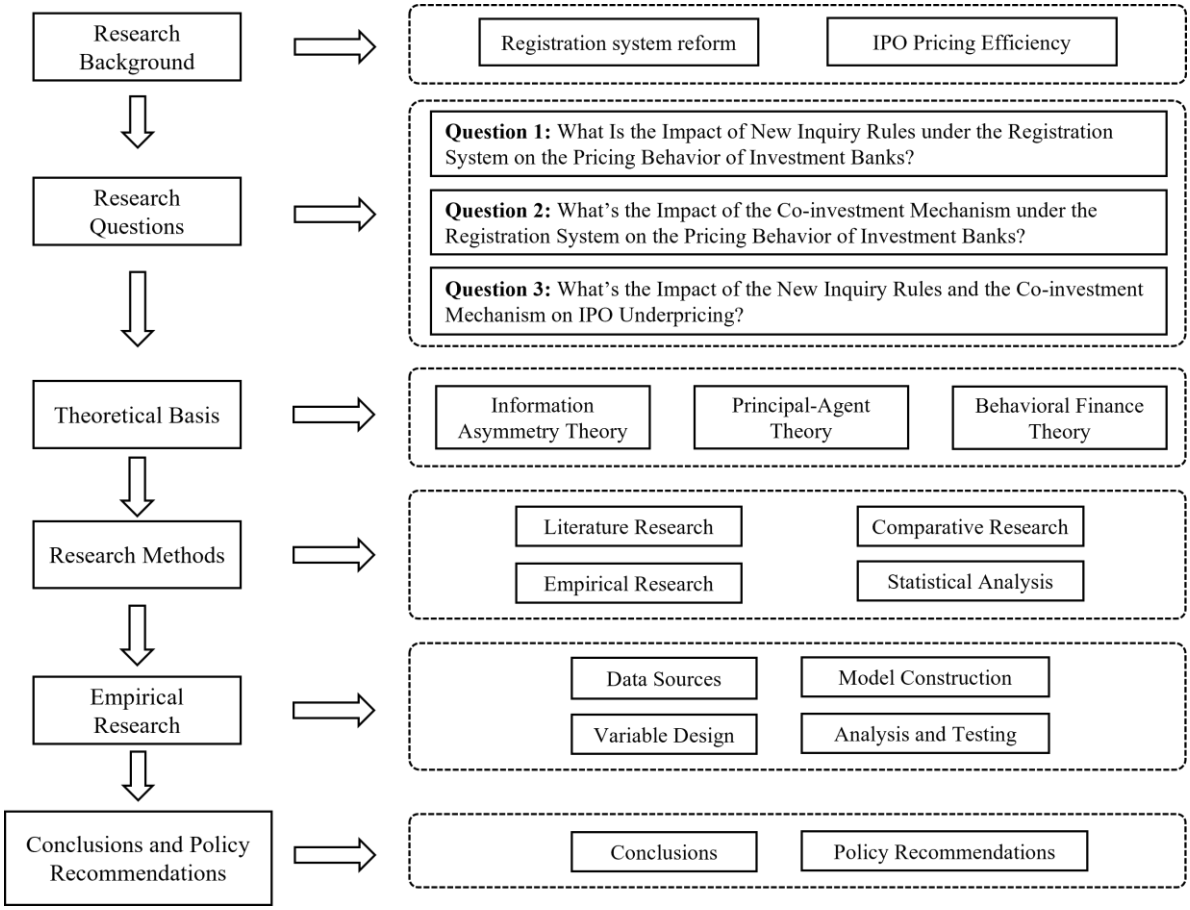


Figure 1.7 Research framework

Source: Author's own elaboration.

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Chapter 2: Literature Review

Issues related to IPOs have consistently been a focal point of academic discussion both domestically and internationally. However, due to differences in policy environments and institutional constraints, the research priorities on IPO pricing efficiency vary between domestic and international scholars. International researchers have primarily focused on theoretically explaining the causes of IPO underpricing, achieving significant progress and developing many mature theories. In contrast, Chinese scholars have concentrated more on examining the applicability of these established theories within the context of China's market while also attempting to identify IPO influencing factors that are unique to China.

This chapter is divided into three main sections. The first section introduces the effectiveness of stock issuance systems and relevant empirical facts, analyzing the strengths, weaknesses, and impacts of China's stock issuance system at different stages. The second section examines underwriters' pricing behavior and its economic consequences from various perspectives and investigates the factors influencing underwriters' actions. The third section provides a comparative analysis of different scholars' methods for measuring IPO pricing efficiency and the factors affecting it. The research in this chapter lays a solid foundation for subsequent empirical studies.

2.1 Stock issuance systems

The stock issuance system refers to a set of procedural regulations that issuers must follow when applying to issue stocks. This includes aspects such as issuance regulatory systems, issuance methods, and issuance pricing. North (1990) posits that institutions are not merely frameworks governing social operations but serve as normative constraints on social interactions. Institutions can be viewed as deliberately designed structures that shape and guide individual behavior and societal interactions. In his theoretical framework, the evolution of institutions is considered a critical determinant of historical social development. Specifically, the progression of institutions influences the economic and political structures of societies, thereby molding their long-term development trajectories and economic performance.

The impact of institutional change on economic performance is profound and multifaceted. The long-term performance disparities among different economies can fundamentally be attributed to variations in institutional evolution. For instance, the stability, effectiveness, and adaptability of institutions play a crucial role in determining an economy's resource allocation efficiency, innovation capacity, and overall economic growth. Effective institutions can foster fair competition within markets, reduce transaction costs, and incentivize economic activities, whereas flawed or inadequate institutions may impede economic development, resulting in resource wastage and reduced efficiency. Therefore, institutions are not only decisive factors in determining economic performance but also essential perspectives for analyzing economic behavior. By examining and understanding the influence of different institutional frameworks on economic activities and outcomes, policymakers and researchers can better design and implement effective economic policies. Such policies are crucial for promoting robust and sustainable economic development. North’s theory provides a novel perspective for analyzing economic phenomena and formulating policies, thereby contributing to the advancement and prosperity of economic systems.

2.1.1 The effectiveness of China’s stock issuance systems

In the stock market, whether prices can rapidly and accurately reflect the intrinsic value of companies is a key factor in assessing market efficiency Fama (1970). The essence of market efficiency lies in the ability of stock prices to represent the true economic conditions and future expectations of companies. However, in actual market operations, there is often significant information asymmetry between investors and issuers. This information asymmetry manifests as investors' inability to access or fully understand crucial information about the issuers’ financial status, development prospects, and other key operational details. Such information asymmetry can lead to the "lemon market" phenomenon described by Akerlof (1978), where high-quality firms are driven out by lower-quality ones (Mahoney, 1995). In this market environment, investors, due to their inability to accurately assess the true value of stocks, tend to avoid high-risk investments. As a result, high-quality companies might be pushed out of the market due to a lack of sufficient investment, illustrating the problem of adverse selection. The high information costs associated with the stock market imply that investors must incur substantial expenses to obtain and analyze information. The increase in information costs makes achieving equilibrium in an information-efficient market more challenging(Grossman & Stiglitz, 1976). High information costs not only elevate the

investment risks for investors but also hinder the market's ability to reflect the true intrinsic value of companies, thereby exacerbating market uncertainty and inefficiency. As Frantz (2013) argues, markets are not infallible. If the inherent flaws in market mechanisms and issues of information asymmetry are not addressed in a timely and effective manner, market transactions may become inefficient, ultimately leading to market failure. Therefore, appropriate intervention is necessary to improve market efficiency.

In this context, government regulation can play a crucial role. By designing and implementing optimal regulatory frameworks, governments can enhance overall social welfare and achieve Pareto optimality (Stigler, 1963). Leuz and Wysocki (2008) also emphasize the role of government regulation in preventing market failure, asserting that regulation is a low-cost and effective means of maintaining market stability and fairness. In countries with inadequate legal systems or imperfect social contracts, market mechanisms often face more significant challenges. Therefore, government regulation can serve to complement and refine market mechanisms, addressing various economic issues arising from deficiencies in the market system (Ekkayokkaya & Pengniti, 2012; D. Su, 2004). This regulation not only helps to prevent market failure but also enhances the overall functionality and efficiency of the market, providing a stronger foundation for economic development.

The effectiveness of issuance systems has been a topic of debate among scholars, often rooted in the legal frameworks and their implementation across different countries and regions. For instance, early discussions focused primarily on the impact of the Securities Act of 1933 and the Securities Exchange Act of 1934 in the United States. Stigler (1963) and Benston (1973) conducted comparative analyses of investor returns and stock price risks before and after these laws were enacted. Their findings indicated that the market performance of listed companies did not significantly improve post-legislation, leading them to argue that the necessity of these laws was not convincingly demonstrated. In contrast, Friend and Herman (1964) provided a different perspective by showing that the implementation of issuance regulations reduced the risks associated with new stock offerings and decreased their volatility, suggesting that these securities laws played a crucial role in stabilizing the new stock market and managing risks, thus providing a safer investment environment. This viewpoint has been corroborated by subsequent research, which further underscores the role of securities laws in investor protection and market stabilization. In a study of the Thai stock market, Ekkayokkaya and Pengniti (2012) found that despite its nascent state, the implementation of market regulation significantly improved the performance of IPO firms. This indicates that issuance regulatory systems can have positive

effects even in countries with less developed legal frameworks, enhancing market stability and efficiency.

However, during the early stages of China's stock market, the immaturity of the market and the lack of robust corporate governance structures meant that market-oriented issuance pricing mechanisms might have exacerbated market flaws, thereby diminishing operational efficiency. Du and Xu (2009) argued that in the absence of adequate market systems, administrative governance tools like the authorizing system and the approving system were instrumental in the rapid establishment of China's capital markets. Consequently, during the initial phases of market development, implementing an authorizing system was necessary to ensure corporate stability and economic health (K. Qian & Jiang, 2012). However, during the listing process, companies were subject to stringent regulatory oversight, making the issue of rent-seeking in market resource allocation inevitable, which could negatively affect the efficacy of the issuance system (G. Li & Zhou, 2015). Therefore, to enhance the effectiveness of the issuance system and optimize the allocation of market resources, a gradual transition to a more market-oriented registration system was essential (Shunlin Song et al., 2014; Tian, 2011). Such a transition would not only help to reduce market intervention and improve the market's self-regulatory capabilities but also enhance overall market efficiency and transparency.

2.1.2 Empirical facts about stock issuance systems in China

Since the establishment of a nationwide unified stock issuance review system in China's securities market in 1993, the stock issuance system has undergone three stages: the authorizing system, the approving system, and the registration system.

The authorizing system refers to an overall planning approach of "quota control", where companies intending to list must file as required. Only after passing reviews, re-reviews, and obtaining an approval certificate from the CSRC can they proceed with public issuance. The authorizing system was divided into two phases: the quota management period (1990-1995) and the index management period (1996-2000). During the quota management period, the government set annual issuance quotas, and the CSRC reviewed IPO applications within the specified quota range. In the index management period, the State Planning Commission (the predecessor of the National Development and Reform Commission) and the Securities Commission set the total scale of new stock offerings. The CSRC allocated issuance quotas to provincial government departments and industry management departments based on the actual market conditions. Through multiple rounds of selection, pre-selected companies were

ultimately decided. Under the authorizing system, some large state-owned enterprises in China actively participated in reforms, rapidly expanding their scale through listing and financing, achieving good results. However, due to administrative control, the listing process for companies lacked transparency, affecting the development and stability of the market economy. Additionally, the emergence of extensive rent-seeking behavior led to low market operation efficiency, and the market's resource allocation function was not fully utilized (F. Cao, 2014).

On March 16, 2000, the CSRC issued the " Approval Procedures for Stock Issuance", marking a significant milestone in the transition of China’s securities market from the authorizing system to the approving system. Officially implemented on March 17, 2001, this system was divided into two phases: the Channel System phase (2001-2004) and the Sponsorship System phase (2004-2019). Compared to the previous authorizing system, the approving system had less administrative involvement, weakened approval authority, and increased transparency in the issuance process (S. Li, 2015). During the Channel System phase, the CSRC allocated recommendation channels to brokerage firms based on their historical performance and capabilities. The brokerage firms, in turn, screened potential IPO candidates according to the number of allocated channels and recommended these candidates to the CSRC for approval. In the "Sponsorship System" phase, despite the sponsoring companies and sponsors being registered entities or individuals with the CSRC, securities companies were still responsible for recommending and guiding issuers through the listing process, ensuring the accuracy, truthfulness, and completeness of the information disclosed in the issuers' documentation. Under the approving system, the securities regulatory authorities conducted both formal and substantive reviews, significantly reducing the efficiency of primary market issuance. Moreover, the government's gatekeeping role weakened investors' assessments of company value, reinforcing investors' blind compliance and directly fueling the trend of speculative trading in new stocks. This disrupted the issuance rhythm and efficiency of the market.

On July 22, 2019, the first batch of companies listed on the STAR Market (Sci-Tech innovAtion boaRd) officially commenced trading. Following this, the Shenzhen Stock Exchange initiated reforms for the ChiNext board and piloted a registration-based system, which officially took effect on August 24, 2020. Subsequently, on November 15, 2021, the Beijing Stock Exchange was inaugurated, also implementing the registration-based system. On April 10, 2023, the Shanghai and Shenzhen main boards saw the debut of the first ten companies under the registration-based system, marking the comprehensive implementation

of the registration system across all segments of China's capital market. The essence of the registration-based system is market-oriented. Essentially, it entrusts the decision-making on issuance to the market and investors themselves (Liao, 2024; Pan & Ma, 2022). Unlike the approval-based system, which involves substantial regulatory review and intervention, the registration-based system emphasizes market dynamics. Under this framework, the substantive review powers are transferred to the market, allowing investors to independently assess the value of stocks. The role of the CSRC is primarily to ensure the quality of information disclosure, guide investors towards rational investment decisions, and refrain from interfering in investors' decisions regarding the assumption of investment risks (Xihao Wu, Shen, et al., 2024). As a result, the registration-based system aims to minimize regulatory interference and enhance the efficiency of resource allocation within the capital market (Xihao Wu, Zhang, et al., 2024). By shifting the focus from regulatory approval to market-driven evaluation, the system promotes a more transparent, efficient, and investor-driven approach to capital raising. This transition is expected to foster greater market discipline, reduce barriers to entry for new and innovative companies, and ultimately contribute to the more effective functioning of China's capital markets.

Institutional change refers to the process by which a more efficient system gradually replaces an existing one. This process is driven when the participating entities anticipate that the benefits of changing agreements or contracts will outweigh the costs involved. This phenomenon was particularly evident during the establishment of the Chinese stock market, as the country was transitioning from a planned economy to a market economy—a transformation inherently characterized by institutional change. Consequently, the stock market, as a crucial platform for providing financing services, naturally became a part of this institutional transformation. In the early stages of the stock market's development, administrative departments acted not only as regulators but also as significant market participants. The government imposed strict controls on issuance quotas and benchmarks because the economic and legal systems were not yet fully developed, necessitating administrative regulation to compensate for these institutional deficiencies.

In the early development of China's stock market, administrative regulation played a crucial role, especially during the initial stages of institutional change. As Porta et al. (1998) argued, such stringent administrative regulation aimed to address various issues that might arise during the process of institutional change. Yu Chen (1995) previously pointed out that the primary objective of stringent regulatory measures was to mitigate the impact of institutional changes, particularly the establishment of foundational institutional arrangements,

on the market. He specifically mentioned that before the establishment of fundamental institutional arrangements, private contractual arrangements, such as the private trading of stocks, could emerge, leading to problems like fraud, deception, and disputes. In this context, Pistor and Xu (2005) discovered that administrative regulation indeed played a substitutive role for formal legal governance during the early development of the Chinese stock market. They argued that although administrative regulation alleviated market disorder caused by institutional inadequacies to some extent, the authorizing system had significant limitations. From a long-term perspective, it lacked sustainability and could only serve as a transitional system. While the authorizing system provided necessary norms and control in the early stages, the shortcomings of administrative regulation became increasingly apparent as the market evolved and matured. Issues such as bureaucratic inefficiency, corruption, and administrative inefficiency not only restricted further market development but also potentially distorted the allocation of market resources.

In March 2000, the CSRC announced the abolition of the authorizing system, giving rise to the approving system, which lies between the registration system and the authorizing system. Under the approving system, a company's eligibility for listing still requires regulatory approval, granted if the company meets established standards, adhering to the principle of substantive management. X. Zhou et al. (2006) selected samples of new stocks under both the authorizing and approving systems to empirically analyze the factors influencing IPO pricing. They constructed a regression model of IPO prices and found that under the approving system, IPO prices reflected significantly more information. Under the authorizing system, IPO prices could only reflect the company's profitability, debt-paying ability, and the supply and demand of the stock in the secondary market. In contrast, under the approving system, IPO prices additionally reflected the company's size, future growth potential, and the method of issuance, indicating higher IPO pricing efficiency under the approving system. Tian (2010) developed a supply and demand theory for IPOs and empirically tested the factors influencing issuance underpricing. The results showed that the phenomenon of IPO underpricing (occurs when the issuance price in the primary market is lower than the listing price in the secondar market) in China was due to institutional underpricing resulting from government market intervention. The issuance quotas and pricing methods set by the Chinese securities regulatory authorities led to distortions in the supply and demand of the issuance market, making current IPO reforms necessary.

Some scholars have conducted in-depth studies on the impact of stock issuance system reforms during this stage. Zheng Zhang and Ouyang (2012) studied IPO samples from the

main board and small and medium-sized enterprises (SMEs) board of the Chinese A-share market from 2006 to 2010 and found that the 2009 IPO system reform significantly reduced the first-day discount of new stocks. Moreover, the correlation between primary market pricing and financial characteristic variables reflecting corporate governance increased after the reform, indicating that the IPO system reform improved the price discovery mechanism of the IPO market. K. Qian and Jiang (2012) reviewed the development history of the Chinese securities market and believed that the Chinese securities issuance system achieved phased results in optimizing market price discovery functions, prompting market participants to fulfill their roles and responsibilities, enhancing the participation of small and medium-sized investors, and alleviating the problem of large capital inflows into new stock subscriptions. They acknowledged the effectiveness of the current stock issuance system reform. However, compared to major international markets, there was still room for further reform in China's stock issuance system.

As the Chinese stock market rapidly developed, the drawbacks of the approving system became increasingly apparent. During the IPO phase under this system, administrative power played a dominant role in the smooth execution of IPO projects. The competition for scarce IPO resources led to rent-seeking loopholes within regulatory departments (J. Shi & Zeng, 2012). Jianli Chen (2015) mentioned that the approving system, which emphasizes substantive review of IPOs, highlighted the decisive role of administrative power in IPO issuance review. This "rule by people" system easily fostered rent-seeking behaviors, restricted the optimal allocation of market resources, and was a root cause of the IPO bubble in the stock market. Moreover, the issuance pace of new stocks under the approving system was effectively controlled by securities regulatory departments, and the batch review and issuance method disrupted the normal operation of the secondary market. This led to IPO subscription booms after long windows without IPOs, further driving high IPO prices.

In the pursuit of rapid development, local governments may intervene in the IPO process of companies. K. Wang et al. (2015) investigated the relationship between regional marketization levels and government subsidies provided to IPO companies, revealing a negative correlation between the amount of government subsidies received and the long-term performance of these companies. This interference, as a means for local governments to compete for scarce IPO resources, potentially distorted normal business activities, reducing companies' sustainable operating capabilities. Furthermore, the approving system hindered the fundamental functions of the stock market. The profit-driven motives of issuers and intermediaries resulted in frequent occurrences of high issuance prices, high initial public

offering price-to-earnings ratios, and significant over-subscription (Haifeng Guo & Brooks, 2008), leading to severe first-day trading speculation in the secondary market (F. Sun et al., 2022). Shunlin Song and Tang (2017) found that price controls increased the uncertainty of new stock values, which in turn influenced investors' speculative behavior. Their empirical research showed that greater pre-issuance value uncertainty and higher investor sentiment at the time of new stock listing amplified the impact of price controls on IPO underpricing in the secondary market. Price controls disrupted the value discovery function of the IPO pricing process, encouraging speculative behavior in the secondary market. While the fundamental goal of the approving system was to protect investors' rights, these practical issues indicated that the expected outcomes were not achieved.

Some scholars argued that all problems arising from the stock issuance system were related to the inconsistency between power and responsibility in the issuance process. G. Sun (2014) conducted a detailed analysis of the roles and relationships of the various participants in the stock issuance process, and argued that listed companies and investors should be in relatively equal positions, with both parties trading in a fair and transparent environment. When this condition is not met, the fairness and rationality of the transaction are severely compromised. Further research indicates that inequalities in the stock issuance system can lead to asymmetrical market information, thereby affecting investor decision-making. Listed companies may exploit their informational advantages to manipulate stock prices, thereby harming the interests of small and medium-sized investors. This asymmetry of power and responsibility not only undermines market fairness but can also lead to a loss of investor confidence in the market, ultimately impacting its healthy development.

Due to the existence of these unfair phenomena, institutional change becomes inevitable. The key to addressing these issues lies in institutional reform, which rebalances power and responsibility, allowing listed companies and investors to trade in a more equitable environment.

Additionally, research by Di Giorgio et al. (2000) and Fohlin (2000) on the impact of financial market development on the evolution of issuance systems revealed that the development of financial markets necessitated a matching and efficient regulatory system. In other words, the development of financial markets prompted changes in issuance systems. Thus, as the Chinese stock market matured, the implementation of registration-based reforms became an inevitable choice to increase the marketization level of the capital market (Z. Chen & Wang, 2024, March 15-17). As a fundamental reform of the entire capital market, the registration system represents the direction of IPO system reform in China. It is an important

measure to establish and improve the capital market system, alter the IPO ecosystem, and stimulate market vitality, indirectly promoting the securities financial market and the overall macroeconomy (H. Shi et al., 2021). Gu and Cao (2015) compared and analyzed the differences, advantages, and disadvantages of the issuance systems in Hong Kong and mainland China in terms of review systems, information disclosure systems, and pricing systems. They concluded that, given the low level of market economic development, incomplete legal and regulatory systems for securities markets, and immature investors in mainland China, the choice of compliance review was reasonable. However, the direction of issuance system reform should be to vigorously promote the marketization of the issuance mechanism, establish the fundamental role of market mechanisms in allocating capital market resources, and ultimately transition to a compliance review with a higher degree of marketization.

In 2015, the abnormal fluctuations in China's stock market attracted the attention of several scholars. Among them, Xiaoling Wu et al. (2015) conducted a detailed review of these anomalies and thoroughly analyzed the underlying causes of the phenomenon. The study indicates that the immediate cause of these abnormal fluctuations lies in the numerous deficiencies within the institutional framework of China's capital market. These deficiencies include, but are not limited to, gaps in the short-selling mechanism, market trading system, and new stock issuance system. Specifically, the lack of a comprehensive short-selling mechanism in China’s capital market means that the market lacks necessary hedging tools when facing downward pressure, leading to increased market volatility. Additionally, the imperfections in the market trading system significantly restrict the normal functioning of the market. For example, frequent changes in trading rules and opaque regulatory measures make it difficult for investors to accurately judge market trends, thereby exacerbating market turbulence. Regarding the new stock issuance system, the current system has obvious shortcomings. Excessive government intervention in the pricing and pacing of new stock issuances disrupts the market's supply and demand balance, leading to unreasonable pricing of new stocks and frequent speculation. To address these issues, Xiaoling Wu et al. (2015) call for further reforms in the new stock issuance system, advocating for a swift transition to a registration-based system. This would return autonomy to market participants, allowing the market to play a decisive role in resource allocation.

The issue of financial fraud during the IPO process also deserves attention. S. Li (2015) noted that the review system's excessive focus on profitability and financial status distorted market forces to some extent, preventing the market competition mechanism from functioning

effectively. The author pointed out that frequent short-seller attacks on Chinese stocks listed in the United States since 2011 were mainly due to financial fraud. Therefore, the primary task in implementing the registration system is to establish a substantive information disclosure mechanism, improving the quality of information disclosure and focusing on its accuracy, completeness, and authenticity. Additionally, it is necessary to improve the regulatory mechanism for issuance pricing, optimize new stock issuance conditions, and form a collective force to promote the registration-based reform, enabling China's new stock issuance to return to market fundamentals.

The successful launch of the STAR Market and the pilot registration-based reform of the ChiNext Board signify the rapid advancement of market-oriented reforms in China’s stock issuance system. In December 2019, the new "Securities Law" was approved and implemented on March 1, 2020. F. Cao (2020) pointed out in his research that the promulgation and implementation of the new Securities Law is a significant milestone in the development of China's capital market. The new Securities Law includes several key provisions aimed at comprehensively promoting the marketization process. Among the most important reforms is the comprehensive implementation of the registration-based system. The core of this system is to reduce administrative approval and grant the market greater autonomy in pricing and issuance, thereby improving the efficiency and transparency of the capital market. In addition, the new Securities Law significantly increases the penalties for securities violations. This change demonstrates the Chinese government's determination to combat illegal activities such as fraud, insider trading, and market manipulation in the securities market. By increasing penalties, the law can effectively deter wrongdoers, maintain market order, and protect the legitimate rights and interests of investors. Another important aspect of the new Securities Law is the strengthened requirements for information disclosure. F. Cao (2020) pointed out that information disclosure is the cornerstone of capital market transparency. By enhancing information disclosure, investors can obtain more accurate and timely information, enabling them to make more rational investment decisions. This not only helps protect investors' rights but also improves the overall efficiency of the market. However, since China is still transitioning to a market economy and the capital market is not yet fully mature, the full implementation of the registration-based system will require a transitional period. During this period, market participants need to gradually adapt to the new rules and institutional arrangements, and regulatory authorities need to continuously improve and optimize regulatory measures to ensure the smooth implementation of the registration-based system and the stable operation of the capital market.

From the perspective of the initial policy effects of the registration system, it has contributed to improving market pricing efficiency and significantly optimized the market's price discovery function (C. Zhou et al., 2021). Z. Zhang and Z. Wu (2021) evaluated the pricing mechanism reform of the STAR Market's foundational system reforms and found that the inquiry mechanism reform better achieves market-based issuance pricing. Through "inquiry institution quotation behavior", it has improved the pricing efficiency of STAR Market IPOs and effectively restrained the premium levels of new listings. F. Cao (2014) compared the Chinese market with other mature markets and proposed that during the transition from the approving system to the registration system, China should adopt a gradual reform path. This transition should be accompanied by a series of institutional reforms: transforming the functions of the CSRC, promoting the reform of stock exchanges, enhancing the quality of information disclosure, establishing accountability mechanisms, strengthening corporate governance and internal control systems, further improving the legal regulations for issuance review, and directly implementing the registration system in the over-the-counter (OTC) market. L. Ma and Qin (2021) studied the phenomenon of parallel existence of the approving system and the registration system on the ChiNext Board. They found that under the registration system, the Investor Relations Management (IRM) of ChiNext companies faces more difficulties and challenges, primarily due to the increased delisting pressure. They argued that the implementation of the registration system would force listed companies to continually strengthen corporate governance and improve relations with investors.

Market-based equilibrium pricing of IPOs under the registration system is the result of a multi-party negotiations among investors, issuers, and underwriters. The pricing efficiency of IPOs and the quotation behavior of inquiry institutions are influenced by underwriters to some extent (P. Jiang et al., 2022). As the core of the registration system on the STAR Market, IPO review inquiries are vital for corporate information disclosure. Chinese stock exchanges have played an active role in information disclosure regulation, improving the quality of disclosed information (Brown et al., 2018). Jianhua Li and Xu (2024) used an event study method to analyze the impact of the registration reform on stock pricing efficiency. Their results indicated that stock pricing efficiency and price discovery capabilities are higher under the registration system compared to the approving system. Xihao Wu, Fan, et al. (2024) studied the stock price synchronicity of Shanghai and Shenzhen A-share listed companies from 2017 to 2021. Their findings revealed that the implementation of the registration system enhances the quality of information disclosure by listed companies, thereby reducing stock price synchronicity and contributing positively to the standardization and transparency of the

capital market. Further analysis of the constraints and regulatory impact of the registration system on different companies showed that the inhibitory effect on stock price synchronicity is more pronounced when the degree of financialization is higher and institutional investor shareholding is lower.

However, the research by Dong et al. (2020) found that the registration-based system reform did not improve market efficiency as expected in its early stages. They pointed out that both issuers and underwriters still lack significant self-discipline, which prevents the market's self-regulation function from being fully utilized. Additionally, the maturity of investors needs considerable improvement, as many investors remain irrational and immature when faced with the new system. Deng et al. (2023) further supported this view. They analyzed the initial phase of the registration-based system reform and found that the relaxation of government regulation and the promotion of marketization did not enhance IPO pricing efficiency. Instead, it significantly reduced pricing efficiency in the ChiNext market. Further analysis revealed that this phenomenon was mainly due to underwriters and other intermediaries seeking risk premium compensation in the primary IPO market and irrational behavior by investors in the secondary market. Underwriters, aiming to protect their interests, often demanded higher premiums in new stock pricing, while secondary market investors, due to misunderstandings and blind optimism about the new system, caused irrational market price fluctuations. Jiahui Li and Li (2022) utilized IPO data from the STAR Market between July 2019 and July 2021 to analyze the impact of the registration-based system reform on IPO underpricing. Their findings indicated that the reform not only failed to curb IPO underpricing but significantly amplified initial returns. Specifically, the registration-based system might have exacerbated excessive speculation on new stocks, thereby pushing up post-issuance market prices. These studies underscore the importance of further refining and optimizing the registration-based system reform. Achieving true marketization requires enhancing the self-discipline of market participants, increasing the maturity of investors, and improving relevant regulatory measures to ensure the market operates smoothly under the new institutional framework, ultimately fostering the healthy development of the capital market.

2.2 Underwriters' pricing behavior

According to the principal-agent problem inherent in the IPO inquiry mechanism, the issuer delegates the task of determining the IPO issuance price to underwriters who possess more

information. The underwriters, in turn, need to collect, aggregate, process, and generate information through various channels, which they then use to set the IPO issuance price.

2.2.1 Underwriters' pricing behavior and its economic consequences

As intermediaries connecting issuers and investors, underwriters play a crucial role in the pricing process. Following multiple rounds of inquiry system reforms, the current pricing issuance system grants underwriters a certain degree of pricing autonomy. Underwriters can choose to negotiate with issuers and further adjust the issuance price of new stocks based on the pricing results from institutional investors' inquiries. Compared to individual investors, institutional investors have significant advantages in information access and processing capabilities, playing an important role in the process of securities prices reverting to their intrinsic value (Anderson & Huang, 2017; Kanagaretnam et al., 2022). Many scholars have theoretically analyzed that underwriters have motivations to both raise and lower issuance prices.

Considering the motivation to lower issuance prices, Lawrence M. Benveniste and Spindt (1989) pointed out early on that to ensure institutional investors truthfully disclose the information they possess, underwriters must lower IPO pricing to ensure that institutional investors can profit after telling the truth. Therefore, IPO underpricing is the cost paid to incentivize institutional investors to participate genuinely in the inquiry process. Especially when underwriters have the right to allocate new shares, they are more inclined to underprice the issuance based on their short-term interests. Loughran and Ritter (2002) argue that if underwriters do not have allocation power, their motivation to lower the issuance price to represent investors' interests would be weakened. Regarding the motivation to raise issuance prices, the underwriting and sponsorship fees that underwriters charge issuers are positively correlated with the final amount raised. To increase underwriting revenue, they are likely to choose to further raise the issuance price, hence underwriters have a subjective motivation to raise the issuance price. C. Wang et al. (2015) pointed out that underwriting fees are significantly positively correlated with IPO underpricing. However, government price regulation weakens this relationship and can even reverse it. Companies subject to higher degrees of government price regulation tend to have higher underwriting fees and lower IPO underpricing rates.

To predict underwriter behavior, Lawrence M. Benveniste and Spindt (1989) constructed a classic inquiry model. A key prediction of this model is that underwriters will adjust the IPO price range and issuance quantity to reflect the private information collected from informed

investors during the inquiry process. The model predicts that when underwriters receive favorable information, the IPO issuance price will be adjusted upwards, approaching or even exceeding the upper limit of the initial price range. However, to provide sufficient incentives for investors to disclose the favorable information they hold, the upward adjustment will be inadequate, resulting in higher underpricing for these IPOs. Hanley (1993) empirically found support for this "partial adjustment" phenomenon predicted by the model: IPOs priced above the initial price range tend to have higher average underpricing rates but are also more likely to increase the number of shares issued. However, Loughran and Ritter (2002) found that IPO prices set by underwriters do not fully reflect publicly available pre-issuance market information, such as recent index movements and average IPO underpricing levels.

By analyzing how underwriters utilize public information in the IPO pricing process, Lowry and Schwert (2004) found that the initial price range provided by underwriters did not fully reflect public information (such as prior market performance, issuance size, planned financing scale, listing location, venture capital backing, and whether it is a spinoff). However, the extent of deviation was economically insignificant. Similarly, the final IPO issuance price also did not fully incorporate public information, with a small deviation. This suggests that the IPO pricing process is almost efficient. Moreover, they found that favorable information is only partially reflected in the IPO issuance price, while unfavorable information is fully reflected. This indicates an asymmetry in how underwriters handle favorable and unfavorable information when setting IPO prices. Roosenboom (2007) conducted an in-depth study of underwriters' pre-IPO valuations and pricing behavior using valuation reports from 228 IPOs in France from 1990 to 1999. The findings revealed the following: Firstly, underwriters often use multiple methods (such as the dividend discount model, comparable company multiples, and discounted cash flow model) to calculate the intrinsic value of IPO companies. Secondly, the intrinsic valuations provided by underwriters may exhibit systematic upward bias. The extent of this bias is related to factors such as the IPO company's profitability, issuance size, underwriter reputation, and pre-issuance market performance and volatility. Thirdly, underwriters apply a discount to the intrinsic valuation to determine the initial IPO reference price, using this as a promotional tool to encourage investor participation. Finally, the magnitude of the valuation discount is negatively correlated with the underwriter's reputation and positively correlated with the final upward adjustment of the IPO issuance price. However, the upward adjustment of the issuance price is often insufficient, resulting in a positive correlation between IPO underpricing and the valuation discount applied.

In addition to examining whether underwriters' pricing behavior aligns with the predictions of classic IPO inquiry models developed by Lawrence M. Benveniste and Spindt (1989), some scholars have tested the predictions of other theoretical models. Gondat‐Larralde and James (2008) found that during the internet bubble period, underwriters did not excessively lower IPO issuance prices (leading to IPO underpricing rates far exceeding historical averages). Their empirical results were consistent with the underwriter IPO pricing rules derived by Kenney and Klein (1983) based on block-booking theory (in broader economic and marketing contexts, block-booking refers to bundling multiple products or services together to increase sales, incentivize purchases, or create a more attractive offer for consumers). Neupane and Poshakwale (2012), using more transparent IPO issuance process data from 306 IPOs in India between 2001 and 2010, found that underwriters consider investor sentiment and recent market data when setting IPO issuance prices. Both retail and institutional investors' demands positively affect IPO issuance prices, with retail investors having a larger impact. Additionally, recent market movements also positively influence IPO issuance prices. Cornelli and Goldreich (2003) collected non-public detailed book-building data from 37 IPOs and 28 SEOs underwritten by a European investment bank. This data significantly opened the "black box" of underwriters' pricing behavior, allowing for direct examination. Their results showed that limit orders revealing private information from investors significantly impact the issuance price, and the underwriter-determined IPO price is close to the limit price weighted by book-building quantities. Moreover, limit orders from large investors and frequent investors have a greater impact on the issuance price, while the oversubscription ratio has a smaller but significant effect. Public information affects investor bidding and, consequently, the issuance price. They argue that these findings provide strong support for book-building theory based on information revelation, as proposed by Lawrence M. Benveniste and Spindt (1989).

Domestic scholars have also explored underwriters' pricing behavior from various theoretical perspectives. Haixing Guo and Wan (2011), using the theory of information asymmetry, applied the residual income valuation model to control for differences in intrinsic value among IPO companies. Their empirical analysis of underwriter pricing efficiency for 82 IPOs on the ChiNext Board from October 2009 to May 2010 revealed that due to the inefficiency of China's stock market and the lack of constraints from the reputation mechanism, the interests of issuers and underwriters tend to align. This alignment weakens the underwriters' role in assessing the value, leading to significant positive deviations of the IPO issuance price from the company's intrinsic value. Shao et al. (2013) argued that when

underwriters have pricing power but no allocation rights, they are likely to use investor sentiment to raise IPO issuance prices to maximize their own benefits. They conducted an empirical study using offline bidding data from 199 IPOs between November 2010 and May 2011. The results showed that underwriters typically price at relatively high positions on the demand curve formed by institutional bids, with IPO issuance prices significantly higher than the average bid price.

Additionally, underwriter reputation has a moderating effect on the tendency of underwriters to raise prices. Yuqin Huang et al. (2013) analyzed approximately 30,000 quotes from institutional investors for 296 IPOs from November 2010 to November 2011. The study found that when underwriters face a conflict between the incentive of underwriting fees and the constraint of reputation risk, the lower the information content reflected in the institutional investors' quotes, the greater the deviation of the IPO issuance price from the reasonable valuation, leading to poorer post-IPO performance. Chemmanur et al. (2017) used offline bidding information from institutional investors for 715 IPOs from July 2009 to November 2012 provided by the Shenzhen Stock Exchange. Their study examined the information content of bids from inquiry institutions and underwriters' pricing behavior. The results showed that the weighted average of institutional bids and the oversubscription multiple significantly positively impact the IPO issuance price set by underwriters. Moreover, bids from inquiry institutions with greater information advantages, higher reputations, and long-term relationships with underwriters have a more substantial effect on pricing. This indicates that institutional bids and demand information are rich in information content, and underwriters effectively extract and utilize these insights in the IPO pricing process, suggesting higher pricing efficiency under the IPO inquiry system. X. Ma (2021)analyzed offline bidding data from institutional investors for 783 IPOs from July 2009 to November 2012 on the Shenzhen Stock Exchange, examining information generation issues under a single-price auction mechanism for IPOs. The study found that the sensitivity of IPO issuance prices to the weighted average of bids from information-advantaged investors is approximately twice that to bids from information-disadvantaged investors. This indicates that information-advantaged investors reveal their private information through their bids, and underwriters incorporate this information into IPO pricing.

Utilizing a sample of 189 IPOs from China between November 2010 and December 2012, Chemmanur et al. (2017, April 25-28) investigated the impact of underwriter rent-seeking incentives on their IPO pricing behavior. The results revealed that underwriters without allocation rights intentionally lower IPO issuance prices to ensure that fund investors who pay

them commissions can participate in the allocation, leading to higher IPO underpricing. However, this effect of favoring commission-paying funds is countered in the sub-sample of "pro-issuer" underwriters who rely more on underwriting revenue. This suggests that underwriters balance the interests of institutional investors and issuers when setting IPO prices. Yu et al. (2013), based on offline bidding data for 280 IPOs from November 2010 to December 2011, found that excessive competition among institutional investors participating in the IPO inquiry process, due to the unreasonable design of the inquiry system rules, results in excessively high IPO issuance prices. This leads to problems such as high issuance price-to-earnings ratios and high oversubscription rates. Furthermore, with increasing competition among institutional investors, the probability of IPO underperformance rises, and long-term excess returns decrease. D. Li et al. (2014) examined offline bidding data from 406 IPOs between November 2010 and April 2012 to explore issues related to China's IPO "three highs" (high issuance prices, high price-to-earnings ratios, and high oversubscription rates), first-day returns, and long-term performance. Their research found significant discrepancies in bids among inquiry institutions, indicating severe disagreement among these institutions. Moreover, the variability in institutional bids is significantly positively correlated with IPO pricing and the "three highs" issues, but negatively correlated with first-day returns and long-term performance, suggesting that discrepancies in investor opinions in the secondary market are reflected in the IPO issuance prices set by underwriters.

Using a sample of 477 IPOs listed on the Shanghai and Shenzhen stock exchanges between November 2010 and December 2013, for which detailed offline investor bidding data was disclosed, Jia (2017) conducted an empirical study on the theoretical models of IPO underperformance or underpricing. The study found that the level of private information held by institutional investors is negatively correlated with first-day IPO returns but positively correlated with retail investor sentiment. Furthermore, IPO underperformance is primarily determined by retail investor sentiment rather than the private information of institutional investors. Gao et al. (2020) analyzed offline bidding details for 479 IPOs in China from November 2010 to December 2012 and found strong evidence supporting the heterogeneity expectations hypothesis (referring to the idea that in financial markets, different investors or market participants have varying expectations and views about future market trends or economic indicators.). The study showed a positive correlation between IPO issuance prices and the weighted average of institutional bids, while this was unrelated to market-clearing institutional bid levels. Conversely, the first-day closing price of IPOs is positively correlated with market-clearing institutional bid levels but unrelated to the average of institutional bids.

2.2.2 Underwriters' reputation

As third-party certifiers mitigating the information asymmetry between issuers and investors, underwriters play a crucial role in IPO pricing (Booth & Smith, 1986). The reputation of underwriters is a prerequisite for their diligence and certification functions (Busaba & Chang, 2010). The reputation signaling hypothesis posits that underwriter reputation is a significant factor influencing IPO underpricing. High-reputation underwriters can signal high-quality IPO companies to external investors, thereby reducing IPO underpricing (Beatty & Ritter, 1986; Carter & Manaster, 1990; Loughran & Ritter, 2002). Moreover, high-reputation underwriters are able to disclose high-quality prospectuses, ensuring that IPO pricing reflects the intrinsic value of the company (Kerl & Walter, 2008; Roosenboom, 2012). Conversely, companies underwritten by low-reputation underwriters experience significantly higher underpricing compared to those underwritten by reputable underwriters (Carter & Manaster, 1990; Johnson & Miller, 1988). Reputation serves as the foundation for brokers to gain future market share, thus allowing them to garner "rents" from their reputation (Beatty & Ritter, 1986; Chua, 2014).

In the Chinese stock market, the impacts of damaged underwriter reputation are multifaceted: not only do investors exhibit more significant negative feedback towards related companies, but the future IPO approval rate for these underwriters also declines (L. Zhang et al., 2023). Additionally, the market share of underwriters in the IPO segment decreases markedly, and clients are more likely to switch underwriters during refinancing. Once reputation is damaged, investors begin to doubt the certifying function of the underwriters, leading to the loss of their long-term survival foundation. To maintain their reputation, underwriters proactively undertake supervisory responsibilities during the new stock issuance process, thereby reducing moral hazard (Hansen & Torregrosa, 1992). Therefore, the signaling and punitive mechanisms of reputation motivate underwriters to maintain their own reputation (Allen & Faulhaber, 1989). Fang (2005) pointed out that underwriter reputation affects investors' judgment of the quality of debt-issuing enterprises. Higher reputation underwriters value reputational capital more and thus apply more stringent screening to the bond projects they underwrite. Erhemjamts and Raman (2012) indicated that high-reputation underwriters possess strong expertise and the ability to invest more resources in uncovering private information about the company's value. They also adopt stricter standards to select and evaluate companies issuing new shares. Hu et al. (2021) found that IPO companies with renowned underwriters have lower market-adjusted average initial returns, as reputable

underwriters shorten the time gap between issuance and listing, select high-quality companies to underwrite, and reduce information asymmetry between issuers and investors, thereby lowering IPO underpricing.

However, C. Su and Bangassa (2011) studied the initial returns and subsequent long-term performance of Chinese IPO stocks from 2001 to 2008 and found that while underwriter reputation does not significantly impact IPO underpricing, there is a significant positive correlation between underwriter reputation and IPO long-term performance. H. Shen et al. (2023) conducted a study using sample data from 170 companies listed on the Sci-Tech Innovation Board (STAR Market) from July 2019 to September 2020, examining the impact of investment banks' reputation on IPO pricing efficiency. The study found that IPO underpricing rates on the STAR Market were significantly lower and pricing efficiency was higher. The main reason for this improvement is that the reputation of investment banks reduces the degree of information asymmetry, thereby significantly lowering IPO underpricing. The research results suggest that under the comprehensive implementation of the registration system, the reputation mechanism of investment banks and the healthy operation of the market complement each other. Therefore, it is crucial to strengthen the information certification role of investment banks in the IPO process. S. C. Chang et al. (2010) found that high-reputation brokers, leveraging their extensive experience, can more effectively increase the informative content of new stock issuance prices, making the issuance prices more in line with market demand and the intrinsic value of the enterprise, thereby reducing IPO underpricing.

Additionally, some scholars revealed the conflicts of interest faced by underwriters in the stock issuance process. Shao et al. (2013) pointed out that underwriters are often motivated to increase the offering price to secure higher underwriting fees. However, the reputation of underwriters is crucial for the sustainability of their long-term business, and this reputation can, to some extent, temper their motivation to excessively inflate the offering price. If underwriters significantly raise the IPO price by exploiting investors' optimism, although they can earn higher fees in the short-term, this behavior carries significant risks. If the new stock performs poorly or even falls below its issue price after listing, it will directly damage the underwriter's reputation. Investors, after experiencing the so-called "winner's curse" (referring to the situation where successful investors often find that they have paid more for the shares than their true market value, leading to investment losses), might lose trust in the underwriter and reduce their collaboration. This not only weakens the underwriter's market position but can also lead to a decline in their market share (Gao et al., 2020). Therefore, while seeking

high underwriting fees is a short-term incentive for underwriters, they must balance raising the offering price with maintaining market trust to protect their reputation and long-term interests. Shao et al. (2013) highlight the importance of the reputation mechanism in financial markets from another perspective, indicating that excessive profit-seeking behavior will ultimately be penalized by the market.

An opposing perspective suggests that some companies with poor quality are more willing to pay high underwriting fees to hire reputable underwriters as their sponsors to pass the IPO review successfully. Dai et al. (2014) analyzed the reasons for IPO approval rates and found that companies in regions with lower levels of social trust tend to hire more reputable sponsors to increase their chances of IPO approval. In other words, firms in less trustworthy regions rely more on the reputation of their sponsors. In the practice of IPO admission regulation, the CSRC heavily relies on financial report-based information to assess the quality of applicant companies. Therefore, Xin et al. (2021)argued that high-reputation auditors can signal high-quality IPO companies to external investors, thereby increasing the likelihood of these companies obtaining listing qualifications.

2.2.3 The impact of co-investment mechanisms on underwriters' pricing behavior

The implementation of the co-investment system has also impacted underwriters' pricing behavior. Dong et al. (2024) demonstrated that when the proportion of co-investment by underwriters is higher, IPO pricing tends to be lower. The co-investment system aligns the interests of rational underwriters, who have relative information advantages, with those of ordinary investors, who are less informed and more irrational, achieving "interest alignment." In this context, underwriters will adopt a more conservative pricing strategy to reduce the probability of losses caused by post-IPO price drops. This indicates that the co-investment system can suppress underwriters' motivation to increase prices. However, this suppressive effect is weakened in issuing companies with higher governance levels. A. Cao and Zhang (2022) empirically analyzed the signaling effect of underwriters' willingness to co-invest. They found that this willingness significantly inhibits IPO pricing bias. When underwriters show a stronger willingness to co-invest, the risk pricing is more realistic and reasonable, leading to lower IPO pricing errors. Additionally, adjustments to the inquiry system on the Shanghai Stock Exchange (SSE) STAR Market significantly moderated the relationship between underwriters' co-investment willingness and IPO pricing deviations, strengthening the inhibitory effect of co-investment willingness on IPO pricing bias. Deng et al. (2024) empirically verified that mandatory co-investment by underwriters significantly reduces IPO

underpricing, with the extent of co-investment being inversely related to the degree of IPO underpricing. Moreover, the impact of co-investment on IPO underpricing is primarily reflected in the reduction of primary market underpricing.

Based on a dataset of IPOs from 1,074 A-share listed companies between July 2019 and December 2021, S. Huang and Liu (2023) examined the impact of the co-investment system on IPO pricing efficiency. The research found that IPOs where underwriters participate in co-investment have significantly lower underpricing rates compared to those where underwriters do not co-invest. Further examination revealed that the reduction in market information asymmetry and the expansion of investor opinion divergence are two channels through which the co-investment system reduces IPO underpricing. Additionally, underwriter co-investment increases short-term and mid-term market returns but also exacerbates post-market volatility and raises IPO underwriting costs. Jing Chen (2022) studied the impact of the co-investment system on earnings management of IPO companies listed on the Sci-Tech Innovation Board and the ChiNext Board from 2019 to 2022, and analyzed the effect of underwriting fees on the co-investment system's ability to restrain earnings management. The research found that the proportion of underwriter co-investment is significantly negatively correlated with the level of earnings management before the IPO. However, increased underwriting fees can weaken the co-investment system's ability to restrain earnings management before the IPO. Further analysis revealed that the co-investment system is more effective in restraining earnings management before the IPO for companies with lower underwriter market share, higher auditor reputation, and lower company intellectual capital. Y. Zhang and F. Wu (2021) studied the impact of the co-investment system on IPO pricing using data from 205 IPO companies listed on the Sci-Tech Innovation Board between July 2019 and December 2020. The study found that the co-investment system has a suppressive effect on IPO pricing; as the co-investment proportion increases, the IPO issuance price tends to decrease. However, this suppressive effect is weaker for companies with higher governance levels. Further research indicated that the suppressive effect of the co-investment system on IPO pricing diminishes when the company's stock price growth potential is higher. Additionally, the study found that underwriters with higher co-investment proportions tend to increase underwriting fees to compensate for the risks associated with co-investment. Furthermore, the analysis of the relationship between co-investment proportion and the excess return over 90 trading days post-IPO revealed a positive correlation, suggesting that the co-investment system helps improve the long-term market performance of Sci-Tech Innovation Board IPO companies.

Existing research on the co-investment system, while demonstrating its role and impact to some extent, has not focused primarily on the effect of the co-investment system on IPO pricing efficiency. Instead, the research has predominantly analyzed the impact of underwriters' co-investment willingness on IPO companies. Additionally, the sample studies are relatively limited in scope, and there is a lack of adequate treatment of endogeneity issues. Therefore, further in-depth research is needed to explore the impact of the co-investment system on IPO pricing efficiency.

2.3 IPO pricing efficiency

Economic efficiency research typically implies the existence of an optimal frontier, with the extent of deviation from this frontier reflecting the degree of efficiency loss. This concept is equally applicable to the study of IPO pricing efficiency. The core of IPO pricing efficiency research lies in assessing the degree of deviation between the actual pricing in the primary market and the intrinsic value of the issuing firm.

2.3.1 Methods for measuring IPO pricing efficiency

Research on pricing efficiency involves examining the extent to which the actual pricing in the primary market deviates from the intrinsic value of issuing firms. Methods for measuring IPO pricing efficiency can be broadly categorized into indirect and direct valuation methods. Indirect valuation methods primarily include the comparable company method and the IPO underpricing method. The comparable company method uses peer companies as benchmarks for valuation, employing metrics such as price-to-earnings ratios and price-to-sales ratios. While this approach is frequently used in practice, it is less commonly employed in academic research and will not be discussed in detail here.

A more prevalent approach in academic research is to use the degree of IPO underpricing as an indirect valuation method of IPO pricing efficiency. IPO underpricing refers to the discount at which the IPO price is set compared to the closing price on the first day of trading. A higher degree of IPO underpricing indicates a larger disparity between primary market pricing and secondary market trading prices, resulting in higher first-day underpricing rates. The concept of IPO underpricing was first introduced by Reilly and Hatfield (1969), who demonstrated through extensive research that IPO underpricing is a widespread phenomenon in global stock markets. Stoll and Curley (1970) measured IPO underpricing by the deviation of the first-day closing price from the offering price and confirmed that underwriters tend to

discriminate against small-scale companies, forcing them to set an offering price below the actual value of their stock. Subsequent studies by McDonald and Fisher (1972) and Logue (1973) also found that initial returns on new issues were positive. Ibbotson (1975) calculated that the initial returns for IPOs offered to the public in the U.S. during the 1960s averaged 11.4%, indicating that IPO prices were undervalued, a phenomenon he termed the "New Issues Puzzle." In addition to developed markets, emerging markets also exhibit significant IPO underpricing. Ritter (2003) summarized research on IPO underpricing across global stock markets, proving its universality and showing that the excess returns on IPOs in emerging markets are significantly higher than those in developed markets. For instance, Rathnayake et al. (2019) analyzed short-term IPO performance in emerging markets using data from 148 IPOs listed on the Colombo Stock Exchange between 1991 and 2017. The results indicated that IPOs in Sri Lanka were, on average, undervalued by 47%.

Therefore, many scholars directly use the IPO underpricing rate as a proxy variable for pricing efficiency to analyze the impact of various factors on pricing efficiency (Y. Ma et al., 2022; Shunlin Song et al., 2014). Yao Lu and Yuan (2014) conducted a systematic study based on 939 A-share companies newly listed on the Shanghai and Shenzhen Stock Exchanges between 2005 and 2011 to explore the impact of IPO issuing company shareholder characteristics on pricing efficiency. They introduced the concept of pricing deviation as an innovative indicator to measure IPO pricing efficiency. The findings indicate a significant positive correlation between IPO pricing efficiency and the presence of foreign shares, suggesting that foreign shares contribute to improving the pricing efficiency of new stocks. In contrast, the presence of state-owned shares and venture capital shares is negatively correlated with IPO pricing efficiency, implying that these types of shareholders tend to lower the pricing efficiency of new stocks. Further analysis from the perspective of shareholder characteristics shows a positive correlation between the shareholding ratios of founding shareholders or directors and IPO pricing efficiency. This suggests that higher ownership by founding shareholders or directors is associated with better pricing efficiency, potentially due to their deeper understanding of the company and ability to provide more accurate market information. Additionally, the study reveals the specific impact of state-owned shares. State-owned shares tend to lead to IPO underpricing, primarily because state-owned enterprises adopt more conservative pricing strategies. While conservative pricing reduces market risk, it also lowers pricing efficiency, making IPO underpricing more pronounced. Through detailed data analysis and innovative research methods, this study uncovers the

varying impacts of different types of shareholders on IPO pricing efficiency, emphasizing the critical role of shareholder structure in the IPO process.

Using pre- and post-IPO data from 929 non-financial firms listed on A-share market between 2008 and 2012, Z. Huang et al. (2016) analyzed the impact of geographic location and transportation development on IPO pricing efficiency The authors argue that IPO underpricing is caused by investor-information asymmetry, with a company's geographic location being a significant factor reflecting the degree of this asymmetry. The study finds that companies located closer to central cities exhibit higher IPO pricing efficiency. Additionally, improvements in transportation infrastructure, which facilitate better information communication, help offset the impact of geographic distance on IPO pricing, thereby enhancing capital market pricing efficiency. Further research confirms that the convenience of information communication brought by high-speed rail can compensate for the impact of geographic distance on IPO pricing, reducing the distortion of issuance prices relative to true value and improving the efficiency of capital market pricing.

To further reveal the unique advantages of foreign-invested underwriters in IPO underwriting, R. Li et al. (2018) found that IPOs underwritten by foreign-invested underwriters experienced significantly lower underpricing rates compared to those underwritten by domestic underwriters. This phenomenon can be attributed to two main reasons. Firstly, foreign institutions generally operate within more developed institutional environments and adhere to stricter regulatory processes. These institutions invest more resources and incur higher costs during the underwriting process to uncover the true information about the issuing company, thus enhancing the pricing efficiency of new stocks. The advantages of foreign-invested underwriters in terms of information transparency and accuracy enable them to more accurately assess the value of issuing companies and reduce pricing deviations. Secondly, multinational institutions are major sources of technology transfer between enterprises. When foreign entities enter the Chinese market through equity stakes, they bring not only capital but also advanced technology, management skills, and strong reputations. These foreign institutions provide domestic companies with financial support as well as international technology and management expertise. This cross-border collaboration model helps to improve the overall competitiveness and market image of domestic firms, indirectly enhancing IPO pricing efficiency. Their research indicates that the advantages of foreign-invested underwriters in information disclosure and technology introduction significantly improve IPO pricing efficiency and reduce underpricing, highlighting the important role of foreign investment in the Chinese capital market.

Some scholars focused on the relationship between social trust in China and IPO underpricing. X. Li et al. (2019) examined the relationship between social trust and IPO underpricing using a sample of Chinese IPO companies and found that companies in regions with higher social trust levels have lower underpricing rates. The negative correlation between social trust and underpricing is more pronounced in small, growth-oriented, and high-tech companies.

However, Chinese scholars have largely overlooked an important premise of using underpricing to measure IPO pricing efficiency, namely, the efficiency of the secondary market. IPO pricing efficiency represents the operational efficiency of the new issuance market. Using the first-day return rate of new stocks to represent pricing efficiency assumes that the secondary market pricing is accurate. This assumption may hold for mature Western capital markets but is less valid for emerging markets like China. The price discovery function and resource allocation efficiency of China's secondary market have long been problematic.

Earlier empirical studies have found that both the primary and secondary markets on China's main board exhibit inflated stock prices, with no actual issue of IPO underpricing; rather, the secondary market experiences even greater price bubbles (E. Chang et al., 2008; Ting & Tse, 2006). Y. Liu and Sheng (2011) focused on the IPO underpricing of the main board market and found that the main reason for the abnormally high first-day returns of IPOs in China is not primary market underpricing but the institutional basis of supply-side control in China's stock market. Haixing Guo and Wan (2011) were the first to verify the reasonableness of IPO issuance pricing in the ChiNext market, discovering that ChiNext IPO issuance prices deviate from intrinsic value and exhibit price bubbles. They further validated that speculative behavior in the secondary market is the main cause of underpricing. Empirical studies on the IPO pricing of the STAR Market by Dong et al. (2022) reached similar conclusions. Yong Huang et al. (2021) pointed out that the high first-day returns of new stocks in China and the large secondary market price bubbles indicate that Chinese investors are less rational than their U.S. counterparts. Therefore, using the underpricing rate as a measure of pricing efficiency becomes inaccurate. In response, some scholars have modified the underpricing rate indicator. For example, Liang (2021) used both the first-day and the thirtieth-day returns as research indicators when studying the impact of registration system reforms on IPO pricing efficiency. In reality, due to the unobservable nature of the intrinsic value of IPO companies, determining the accuracy of IPO pricing remains perplexing (Roosenboom, 2012). While indirect methods are simple and intuitive, finding effective reference standards is challenging. Thus, direct methods might be a better choice.

Direct valuation methods include the Discounted Cash Flow (DCF) model, the Economic Value Added (EVA) model, and econometric models that examine the extent to which IPO pricing reflects the intrinsic value of a company. The core of the DCF method is to calculate the present value of future cash flows. Deloof et al. (2002) used the DCF method to assess the reasonableness of IPO prices determined by underwriters, based on various information disclosed in the prospectus prior to listing. They found that underwriters might undervalue IPO prices. Additionally, foreign scholars have found that the DCF method offers higher valuation accuracy compared to indirect methods such as the P/E (Price-to-Earnings Ratio) or P/B (Price-to-Book Ratio) methods (Berkman et al., 2000; Deloof et al., 2009; Kim & Ritter, 1999). The EVA model, derived from the DCF model, incorporates the advantages of the DCF model and updates the concept of economic profit. EVA can accurately reflect a company's value creation capability and measure the discounted value of future growth (Damodaran, 2007; Roosenboom, 2007). However, despite its theoretical perfection, the DCF model faces significant uncertainties in predicting future cash flows and accurately estimating discount rates, making practical application challenging. In comparison, building econometric models is often more practical and favored by many scholars. Hunt-McCool et al. (1996) argued that inferring the reasonableness of IPO pricing from post-listing data presents significant issues. Therefore, they innovatively introduced the Stochastic Frontier Analysis (SFA) into the study of IPO pricing rationality. Using company-specific variables, Hunt-McCool et al. estimated the reasonable IPO pricing in the U.S. stock market and found that underwriters tend to intentionally undervalue prices. Subsequently, Koop and Li (2001) and Chan et al. (2007) reached similar conclusions.

Considering the inefficiency of China's secondary market, many domestic scholars have utilized Stochastic Frontier Analysis (SFA) to study the IPO pricing efficiency in China. Luo and Wu (2017) utilized data from 138 ChiNext IPOs between 2012 and 2015 and employed a two-sided stochastic frontier model to investigate the impact of investor attention on the initial-day excess returns of IPOs. By constructing both stochastic frontier production (upper boundary) and stochastic frontier cost (lower boundary) models for likelihood ratio tests, their findings reveal that IPO prices exhibit a significant lower boundary. This indicates that IPO issuance prices in the primary market for ChiNext companies are systematically higher than the intrinsic value of new stocks, suggesting the presence of price bubbles in the primary market. Further analysis of the coefficient estimates for investor attention in the primary market shows that higher levels of investor attention are associated with a greater deviation of issuance prices from intrinsic values, leading to lower pricing efficiency of IPOs. Jin et al.

(2021), comparing the ChiNext board and the SME board, used the stochastic frontier analysis method to study IPO pricing efficiency and found that the pilot registration system on the STAR Market has improved IPO pricing efficiency while refining the stock issuance mechanism and optimizing the investor structure.

Using a heterogeneity stochastic frontier model to analyze China's IPO market, L. Feng (2022) found that there is a positive correlation between the firm's fundamentals and pricing efficiency, with offline investors and the policy environment being the main factors leading to the lack of pricing efficiency. As a research tool, stochastic frontier analysis is continually evolving, with many scholars now using the bilateral stochastic frontier model to study the Chinese stock market. S. Huang et al. (2017), based on the bilateral stochastic frontier model, developed a new IPO underpricing decomposition model and found that both the primary and secondary markets of China's ChiNext board have significant valuation bubbles, with underpricing phenomena primarily caused by the large bubbles in the secondary market. W. Ma and Hu (2022) studied the identification method of the discount effectiveness of refinancing tools' rights offerings using the bilateral stochastic frontier model. Liao (2024) applied the stochastic frontier model with inefficiency heterogeneity (SFMH) to analyze the components of initial returns and the impact of the registration system, finding that after the implementation of the registration system, IPO underpricing levels decreased, but the rate of post-listing mispricing was higher than under the authorizing system.

Compared to indirect methods such as IPO underpricing, the advantage of the SFA lies in their exclusion of a priori assumptions regarding secondary market stock prices as a reasonable estimate of company value. SFA solely evaluate pre-listing company information. If actual IPO pricing consistently deviates from the frontier boundary, it indicates whether IPO pricing is either undervalued or overvalued.

2.3.2 Theories related to IPO pricing efficiency loss

In Western economics, two fundamental assumptions prevail: the rationality assumption and the perfect information assumption. Under these premises, and with the operation of market mechanisms, markets can autonomously achieve equilibrium and achieve efficient pricing. The phenomenon of underpricing in the new stock issuance market, indicative of a loss in market pricing efficiency, is primarily theorized in economics based on the invalidation of these foundational assumptions. Given the prevalent assumption of market efficiency in secondary markets abroad, underpricing in IPOs serves as a primary indicator of inefficiencies in pricing within the issuance market. This theoretical framework has spawned several mature

theories based on the symmetry of information among participants and the rationality of market actors.

2.3.2.1 Theories based on the information asymmetry hypothesis

According to the different participants in the new stock issuance market, current research on information asymmetry mainly includes asymmetry between investors, between issuers and investors, between issuers and underwriters, and between underwriters and investors. These can be categorized into the following four types based on the relationships among participants.

(1) Winner's Curse Theory.

Based on the information asymmetry among investors, Rock (1986) was the first to propose the theory related to the winner's curse. This theory classifies investors into uninformed investors, who possess less information, and informed investors, who have more information about the IPO. Informed investors, possessing superior information, will avoid overpriced new stocks and instead pursue undervalued stocks. Conversely, uninformed investors are more likely to acquire overvalued stocks, resulting in negative post-listing returns and subsequent losses despite successfully subscribing to the IPO, which constitutes the winner's curse. To ensure successful issuance, IPOs must be underpriced to compensate uninformed investors for their potential losses and attract their participation. Carter and Manaster (1990) validated this theory through equilibrium models, indicating that the higher the proportion of informed investors, the greater the risk compensation demanded by uninformed investors. From a behavioral finance perspective, Z. Shen et al. (2013) noted that the winner's curse arises due to the psychological disparity between the perceived gains and losses from IPO investments. Based on loss aversion theory, investors will demand underpricing as compensation.

Several Chinese scholars have attempted to verify the presence of the winner's curse phenomenon in the Chinese stock market. S. Zhang and Lu (2014), using a sample of A-share IPOs from 2000 to 2010, constructed a simplified multivariate regression model and verified that the winner's curse hypothesis can explain the IPO underpricing in China. However, Xie (2010), using IPO data from the Chinese A-share market from June 2005 to August 2008, empirically analyzed and concluded that the winner's curse hypothesis cannot primarily explain the IPO underpricing phenomenon in China's A-share market. Instead, it was the investors' optimistic sentiment and speculation leading to secondary market premiums that were the primary causes of IPO underpricing.

(2) Signaling theory.

Signaling theory primarily addresses the information asymmetry between issuers and investors, with issuers typically possessing superior information about the company's quality compared to investors. Booth and Smith (1986) suggested that to resolve this information asymmetry and improve pricing efficiency, well-informed issuers should actively send signals to investors, such as leveraging the market reputation of auditors or underwriters. Beatty and Ritter (1986) also argued that reputable underwriters could serve as a signal of high-quality firms, thereby enhancing the IPO pricing efficiency of the respective companies. To convey information about the quality of new stocks to investors and attract substantial investor participation, high-quality firms often deliberately lower the offering price. After listing, they can increase the follow-on offering price, ultimately maximizing the overall revenue through a two-stage issuance. In contrast, low-quality firms face the risk of failure in subsequent offerings if they also lower their offering prices (Welch, 1989). Therefore, IPO underpricing also serves as a signal reflecting the quality of the firm. Jegadeesh and Titman (1993) found that firms with higher IPO underpricing are more likely to conduct larger follow-on offerings. However, Michaely and Shaw (1994) found no relationship between the degree of IPO underpricing and the amount of subsequent offerings.

Regarding the applicability of signaling theory in China, D. Su and Fleisher (1999) conducted an empirical analysis of 308 new stocks in the Chinese capital market from 1987 to 1995 and concluded that underpricing was a strategy used by Chinese companies to signal their value to investors. J. Zhou et al. (2003)used a separating equilibrium model and empirically found that signaling theory provides a good explanation for IPO underpricing in the Chinese stock market. However, when further analyzing post-IPO performance, the evidence supporting the separating equilibrium was insufficient. Hong Guo and Zhao (2006) found that underwriters' signaling had little impact on China's IPO pricing efficiency. Jun Chen and Chen (2010) also discovered that in the Chinese market context, the state-owned or privately-owned nature of equity and price control significantly diminished the role of auditors' reputation. Jia (2017) found that IPOs underwritten by underwriters with foreign backgrounds had lower underpricing rates compared to those underwritten by purely domestic underwriters.

(3) Information revelation theory.

In information revelation theory, market suppliers possess an advantage regarding product information, whereas product demanders, i.e., investors, have an advantage concerning market demand information. Price is determined by the interaction of supply and demand. For

underwriters to price reasonably, they need to acquire demand information from investors in some manner. Lawrence M. Benveniste and Spindt (1989) argued that this acquisition method involves underwriters using their allocation rights to distribute more shares to those who provide superior market demand information. Simultaneously, they also incentivize investors to provide information through underpricing.

(4) Principal-agent theory.

Based on the information asymmetry between issuers and underwriters, David P Baron and Holmström (1980) first introduced the principal-agent problem in IPOs. They posited that because underwriters are more knowledgeable about capital markets, they have an information advantage over issuers during the IPO process. To ensure the success of the issuance, underwriters may choose to underprice the IPO. This strategy helps mitigate the risk of issuance failure and reduces their own effort. Ritter and Welch (2002) suggested that lead underwriters might intentionally lower the issuance price, making investors perceive IPO underpricing as a necessary cost of going public. However, Muscarella and Vetsuypens (1989) found that even when 38 American investment banks underwrote their own IPOs between 1970 and 1987, underpricing still occurred, indicating that IPO underpricing may not necessarily arise from principal-agent issues. Considering the Chinese market context, Wei et al. (2018) conducted an empirical analysis on a sample of 1,198 Chinese IPO companies. They found that the higher underpricing levels in IPOs of companies with tax adjustments could only be explained from the principal-agent theory perspective. This is because the management of these companies had weaker oversight incentives over the underwriters, not due to a lack of effective incentive compensation for the underwriters.

2.3.2.2 Theories based on the bounded rationality hypothesis

In addition to the primary theories based on the assumption of rational agents, the following section will introduce relevant financial theories considering the bounded rationality of issuers, underwriters, and investors.

(1) Prospect theory.

Kahneman and Tversky (1979) posited that for individuals exhibiting bounded rationality, the positive utility derived from a certain gain is less than the negative utility caused by an equivalent loss. Loughran and Ritter (2002) leveraged this to explain why boundedly rational issuers accept IPO underpricing. They assumed that issuers' expectations of the offering price are at the median of the initial price range. Since the secondary market price is higher than the offering price, issuers experience some loss and negative utility. However, because the

offering price is higher than the issuers' psychological anchor, positive utility is generated. Overall, the total benefit for the issuers is positive, thus they do not oppose underpricing. According to prospect theory, investors prefer stocks with positively skewed returns, akin to lottery-like stocks. H. Chen and Zheng (2021) and Green and Hwang (2012) argued that IPO stocks under the registration system fit this description. Compared to already listed stocks, a portion of the value of IPO stocks is regarded as call options, and their returns exhibit positive skewness due to the unrestricted price fluctuations in the first five days of trading, making them more attractive to investors.

(2) Partial adjustment theory.

Within the framework of the partial adjustment theory, underwriters' irrationality manifests in their inability to fully adjust prices based on new information revealed by the market, resulting in IPO underpricing. Bradley et al. (2001) found through their research that the adjustment magnitude during the book-building process is positively correlated with the first-day returns of IPOs.

(3) Investor behavior theory. This theory primarily focuses on secondary market investors, with its main research directions being investor heterogeneity in beliefs and investor sentiment. Miller (1977) was the first to use the theory of heterogeneous beliefs to explain the IPO underpricing issue. He posited that if there are short-selling restrictions, the stock price will reflect only the expectations of optimistic investors due to the influence of heterogeneous beliefs. This results in a price bubble and leads to IPO underpricing.

Domestically, Yin and Zhu (2019) argued that investor heterogeneity in beliefs not only manifests in the stock market but also causes changes in market liquidity. They found that the degree of fluctuation in investor heterogeneity is negatively correlated with stock liquidity levels. As investors' expectations of a stock’s intrinsic value increase, so does the heterogeneity in their beliefs, leading to a decrease in liquidity and consequently IPO underpricing. J. Sun and Li (2019) developed an IPO pricing model based on the characteristics of Chinese IPOs and empirically analyzed 1,413 IPO samples from 2005 to 2015, concluding that heterogeneous beliefs reliably explain IPO underpricing and that greater heterogeneity leads to more severe underpricing. L. Li et al. (2024), using Chinese stock trading data from 1997 to 2020, empirically verified that irrational beliefs are the main cause of stock anomalies, with these beliefs negatively predicting future stock returns. They suggested that the dominance of small investors in the Chinese stock market, coupled with their disadvantages in information channels, trading skills, and processing capabilities, as well

as their emotional influences, lead to persistent deviations in stock prices from fundamental values.

Investor sentiment may be a significant factor contributing to high pricing in the secondary market (Ritter & Welch, 2002). This conclusion is also supported by the research conducted by Shunlin Song and Wang (2016) on the Chinese capital market. Kecskés et al. (2017) posited that investors' ability to obtain various information is limited, and authoritative intermediary evaluation agencies can increase investor attention and sentiment towards IPO stocks, thereby raising IPO underpricing levels. Ljungqvist et al. (2006) studied the impact of investor sentiment on IPO pricing mechanisms, and Scheinkman and Xiong (2003) used theoretical models to explain why investors favor IPOs. Shunlin Song and Tang (2016) explored the influence of investor sentiment on IPO pricing in the primary market. Analyzing detailed bidding data from institutional investors for 380 IPOs issued through book-building in China between November 2010 and October 2012, they observed that heightened investor sentiment leads to higher bids from institutional investors during the book-building process. Consequently, underwriters tend to increase the offering price based on these elevated bids. Their findings reveal that investor sentiment is significantly negatively correlated with IPO underpricing, and significantly positively correlated with both IPO premiums and first-day returns. Shuangjie Song et al. (2011) found through empirical research that online search volumes, representing investor attention, can effectively explain the short-term and long-term market performance of related stocks. Tang and Xu (2016), using gambling theory, discovered that companies with stronger gambling characteristics perform better in the short-term but worse in the long-term.

2.3.3 The impact of issuance systems on IPO pricing efficiency

Given the information asymmetry between investors and underwriters, the widely adopted book-building issuance system provides an effective means for underwriters to gather market demand information (Bozanic et al., 2017). As key participants in the IPO book-building process, institutional investors play a crucial role in the formation of market equilibrium prices (Yuechan Lu & Samdani, 2019; Petkevich & Samdani, 2022). The book-building system requires investors to indicate their intentions and the quantity of shares they wish to purchase to the issuer and underwriter. This allows issuers and underwriters to collect extensive feedback from the buyer's market, enabling them to adjust the offering price and quantity according to demand conditions, thereby ensuring the successful issuance of new shares.

To fully leverage the information discovery function of the book-building system, Lawrence M. Benveniste and Spindt (1989) found that underwriters can incentivize institutional investors to provide more information during the book-building process, thereby enhancing pricing efficiency. Specifically, if underwriters have the discretion to allocate shares among institutional investors, they can use price and quantity discrimination to motivate these investors to reveal the true market demand as accurately as possible, thereby reducing information asymmetry among the participants. Implementing uniform price limits can increase the costs for underwriters to obtain market information from investors.

Additionally, enforcing a fair allocation system makes it even more challenging for underwriters and issuers to gather the necessary information (Lawrence M Benveniste & Wilhelm, 1990). Sherman (2005) compared the auction and book-building pricing mechanisms to identify their significant differences, advantages, and disadvantages. The study indicates that under the auction mechanism, underwriters, lacking the right to allocate shares freely and absent appropriate incentive structures, encounter numerous issues throughout the pricing process. Specifically, investors under this mechanism often engage in "free-riding" and excessive bidding. Such behaviors allow investors to adjust their bids based on others' bids rather than their own genuine demand and valuation, leading to distortions in new stock pricing and a significant decrease in pricing efficiency. In contrast, under the book-building mechanism, underwriters gain more comprehensive information about market demand and possess greater flexibility and discretion. They can adjust the offering price and quantity of new stocks based on investor feedback and market conditions. This mechanism improves the rationality of new stock pricing and market acceptance by guiding investors to bid based on their true demand and valuation, thereby enhancing the overall efficiency and success rate of new stock issuances. Consequently, the auction mechanism has gradually been replaced by the book-building mechanism in practical applications.

The book-building system is widely recognized as a more market-oriented pricing method internationally. However, the implementation of this system in China has not been as effective. Given that China experiences the highest levels of IPO underpricing, many scholars have focused on the impact of China's issuance pricing system on IPO underpricing rates. Initially, China did not employ the book-building system but relied on the price-earnings ratio pricing method. At this stage, the pricing regulations for new stocks are relatively stringent, which has a significant impact on the issuance of new shares. Y. Liu and Xiong (2005) conducted an analysis of data from 908 stocks issued and listed on the Shanghai and Shenzhen A-share markets between 1995 and 2003. Their research uncovered that IPO underpricing during this

period was exceedingly high. The underlying cause of this phenomenon was identified as the influence of "shareholding segregation" and "government regulation" on the market mechanisms. Shareholding segregation refers to the division between tradable and non-tradable shares in the Chinese stock market, where non-tradable shares constitute a substantial portion and are not allowed to be traded freely on the market. This institutional arrangement has led to a significant disruption in the normal arbitrage activities between the primary and secondary markets. As a result, investors in the primary market are unable to hedge risks or engage in arbitrage through secondary market transactions, which has significantly increased their investment costs. Confronted with this scenario, investors in the primary market are compelled to accept higher investment costs and risks, resulting in more conservative quoting and investment strategies. This conservative investment behavior further intensifies the level of IPO underpricing, thereby perpetuating a detrimental cycle.

Based on data from all IPO companies listed on the Shanghai and Shenzhen stock markets up to June 2005, J. Yang and Zhao (2006) empirically test and theoretically analyze the impact of different pricing mechanisms and underwriting methods on the issuance costs and underpricing levels of listed companies. Their findings revealed that while the inquiry-based pricing system significantly increased the direct costs of issuing and listing companies—specifically, it raised the issuance fees—it also notably reduced the indirect costs, particularly the IPO underpricing levels. Consequently, the overall average direct and indirect costs saw a significant reduction. They concluded that the inquiry-based pricing system implemented after 2005 has effectively lowered underpricing levels, leading to a decrease in the total issuance costs for listed companies. From a policy perspective, this indicates that the new system has been effective in improving the overall cost-efficiency of the IPO process.

However, from June 2006 to the first quarter of 2008, X. Yan (2008) found that the average first-day return of 210 new stocks in the Chinese A-share market reached an astonishing 158.7%, which significantly exceeded the average level observed in international stock markets. His research identified that this phenomenon was primarily due to the regulatory authorities' implementation of price caps on new stock issues. In the Chinese stock market, to prevent excessively high initial offering prices and thereby maintain market stability, regulatory bodies typically impose a price ceiling on new stock issues. This price cap restricts the extent to which the issuance price of new stocks can be determined by market supply and demand forces, imposing a policy constraint on the pricing process. Yan's study demonstrated that although the price cap regulation aims to prevent excessively high issue prices, it distorts market supply and demand dynamics, leading to excessive price increases on

the first trading day of new stocks. This distortion reflects the significant impact of policy constraints on the market pricing mechanism, highlighting the unintended consequences of regulatory interventions in the IPO process. Z. Liu et al. (2011) also analyzed this issue and pointed out that the institutional arrangements during this period did not effectively stimulate competition among the book-building participants. Moreover, due to the China Securities Regulatory Commission's restrictions on the price-earnings ratio corresponding to the issuance price, the pricing efficiency of new stocks was relatively low. Jenkinson et al. (2018) suggested that underwriters should implement quantity "discrimination" in the allocation of new shares to encourage investors to participate in the book-building process with "research quotes," thereby improving the discovery of the true investment value of new stocks.

Following the first reform of the book-building system in 2009, Zheng Zhang and Ouyang (2012) conducted a study using a sample of 440 IPOs on the Chinese A-share market from 2006 to October 2010, examining issues related to issuance systems and new stock pricing. Their research found that following the reform, an increase in the initial stock issuance price led to a significant decrease in the first-day underpricing level. Additionally, the correlation between the issuance price and financial characteristics that reflect company quality became stronger. The empirical results suggest that the 2009 reform contributed to the improvement of the IPO market's price discovery mechanism. The study further elucidates that deficiencies in the primary market's price discovery system were among the significant reasons for the high underpricing and structural imbalances in IPO pricing. Similar conclusions were reached by Cheung et al. (2009) and Tian (2011). Despite the enhancement in pricing efficiency, the market experienced a phenomenon characterized by "three highs."

Employing a sample of 280 IPOs from the SME Board and the ChiNext Board, where the same pricing rules applied, Yu et al. (2013) examined the behavior of institutional investors in the bidding process. The aim was to explore the efficiency of IPO pricing and the roots of the "three-high" issues, namely, high issuance prices, high price-to-earnings ratios, and excessive fundraising. The research results indicated that following the reform of the pricing system, IPOs were generally priced higher compared to matched samples, which led to the manifestation of the "three-high" phenomenon. Further analysis revealed that the unique institutional arrangements in China’s bidding mechanism were flawed, resulting in excessive competition among institutional investors during the pricing process. This excessive competition inflated IPO prices, exacerbated the "three-high" issues, and skewed wealth distribution towards issuers in the IPO process. In the long-term, the intensification of institutional competition during the bidding phase increases the likelihood of stocks falling

below their issuance price and leads to a decrease in long-term excess investment returns. The study further argues that excessive competition among institutions significantly contributes to the overpricing of IPOs, highlighting that such competition not only undermines market pricing efficiency but also increases investor risk. The research underscores that while the reform of the bidding system has improved market transparency to some extent, it has also introduced new challenges. To achieve more rational IPO pricing, further optimization of the bidding mechanism is necessary to reduce excessive competition and ensure that new stock pricing better reflects the actual supply and demand in the market. The study emphasizes the importance of institutional design in IPO pricing and suggests that improvements in the system are needed to balance the interests of all market participants, thereby enhancing the overall efficiency and stability of the IPO market.

In contrast, T. Jiang (2014) utilized data from stocks listed on the SME Board from June 2006 to October 2011 to investigate the behavior of IPO underpricing before and after the reform. The empirical results indicated that before the 2009 reform, deliberate underpricing was a significant cause of high IPO underpricing. However, post-reform, IPO underpricing predominantly originated from high valuations in the secondary market. The “price high wins” rule led to bidding participants being inclined to submit higher bids, while the “price near wins” rule encouraged a focus on the reasonableness of bids. This regulatory framework is expected to further enhance IPO pricing efficiency. To address the "three highs" issue, the CSRC reformed the book-building system once again, leading to a period of implicit price regulation in the Chinese IPO market. W. Zhang et al. (2018) investigated the impact of first-day price limit regulations on IPO underpricing using a sample of 1,155 IPOs from July 2009 to July 2015. Their research reveals that the implementation of first-day price limits exacerbates IPO underpricing. Specifically, the price limit mechanism restrains the free fluctuation of market prices to some extent, preventing the IPO price on the first trading day from fully reflecting the true market supply and demand. This distortion results in reduced pricing efficiency and intensified underpricing. Furthermore, the study highlights that market sentiment significantly affects IPO underpricing. Variations in market conditions, particularly during periods of heightened or subdued market sentiment, play a crucial role in determining IPO pricing and performance. During bullish market conditions, investor optimism tends to drive up IPO prices, potentially mitigating underpricing. Conversely, in bearish markets, pessimistic sentiments put pressure on IPO prices, exacerbating underpricing. Additional findings indicate that market sentiment itself is also influenced by the price limit regulations. When investors are aware that first-day price movements are subject to limits, their trading

behavior and market expectations are affected, which amplifies the volatility of market sentiment. The presence of price limit mechanisms causes the market's reaction to IPO pricing to be more sluggish, thereby increasing the risk of price fluctuations during the early days of trading.

Through a detailed study of IPO data from 2014 to 2016, S. Zhou and Yang (2019) discovered that new stocks often achieve extremely high returns on their first trading day. Utilizing comparative analysis between China and the U.S. as well as survival analysis, their research examined the impact of first-day price limit regulations on IPO underpricing. The results indicate that the imposition of first-day price limits further exacerbates IPO underpricing in China. Moreover, their analysis of the relationship between IPO underpricing and speculative returns reveals that the phenomenon of IPO underpricing in China is essentially aligned with the issues of speculative trading. This suggests that the high levels of underpricing observed in Chinese IPOs are closely linked to the speculative nature of the market, where the expectation of substantial initial returns drives both the high underpricing and the subsequent speculative activity.

Utilizing a sample of 708 IPO companies listed on the SME Board from June 2006 to June 2015, J. Zhang and Li (2017) employed the two-sided stochastic frontier model and the heterogeneity stochastic frontier model to empirically examine the pricing efficiency of new stock issuances under the book-building system. Their study aimed to explore the influence and pricing efficiency of offline investors and issuers in the IPO pricing process. The results reveal that offline investors have a greater impact on the issuance price than the issuers themselves. This finding suggests that, although the final decision on the issuance price rests with the issuer, the actual pricing process is significantly influenced by offline investors. These investors' valuation assessments and market demand inputs provide crucial references during the quotation process. Further research uncovers a noteworthy phenomenon: between May 2012 and June 2015, IPO pricing in China appeared to enter a seemingly "efficient" yet "inefficient" state. Although IPO pricing seemed to become more reasonable and effective on the surface, the actual pricing efficiency did not genuinely improve due to stringent price controls. The so-called "regulatory red lines" were primarily responsible for this issue. The presence of these regulatory constraints restricted the market's ability to set prices freely, preventing investors from fully expressing their true opinions and demands regarding new stocks in both the primary and secondary markets. Despite the book-building system's intention to address information asymmetry through market-oriented mechanisms, the

intervention of price controls undermined its effectiveness, perpetuating the problem of information asymmetry.

It can be observed that the reform of the book-building system primarily affects institutional investors' willingness to disclose market information. Since underwriters determine the new stock issuance price based on the information gathered from the demand, the efficiency of IPO pricing consequently varies. Zhu and Qian (2010) noted that if new stock issuance is subject to direct pricing controls or window guidance, the IPO underpricing rate is significantly higher than when it is not subject to such controls. J. Liu and Li (2019) conducted a study using data from 2,464 IPO companies listed on the Shanghai and Shenzhen stock exchanges between 1997 and 2016. They explored the impact of the marketization process on IPO underpricing from the perspective of information asymmetry theory. The results indicate that the marketization process has a significant negative effect on IPO underpricing, with this effect being more pronounced during the book-building period. Further analysis reveals that the marketization process affects the IPO issue price rather than the first-day trading price. This suggests that the more transparent external information environment provided by the book-building mechanism significantly reduces pre-issuance uncertainty and principal-agent issues, thereby enhancing the positive role of marketization in IPO pricing efficiency. Moreover, they emphasize that the progress in marketization involves not only formal institutional reforms but also substantial improvements in market conditions and information transparency. As marketization deepens, the problem of information asymmetry is effectively mitigated, allowing investors to make decisions based on more accurate and comprehensive information. This reduction in information asymmetry diminishes errors and biases in IPO pricing, thereby contributing to more efficient and fair pricing outcomes.

Simultaneously, some scholars have studied the impact of offline investors' bidding behavior on the efficiency of new stock pricing. They found that institutional investors, leveraging their substantial market share and pricing advantages, engage in "club-like" stockholding, which undermines the market-based price formation mechanism (Cai et al., 2019; Z. Wang et al., 2018). Therefore, if the book-building system emphasizes marketization and develops towards incentivizing institutional investors to provide accurate bids, the IPO underpricing rate will decrease, and pricing efficiency will improve. Conversely, if the book-building system is strictly regulated and lacks incentives, institutional investors may conceal market information to protect their own interests, resulting in lower IPO pricing efficiency (Deng et al., 2024).

The key objective of the registration-based reform is to relax government regulation and delegate pricing authority to market participants, aiming to achieve a more market-oriented pricing mechanism. Zongxin Zhang and Teng (2020) conducted an in-depth study of IPO data from the A-share market before and after the pilot registration-based inquiry reform. Their research reveals that the registration-based inquiry reform has increased the entry barriers for inquiry participants, restricting the inquiry and bidding rights of small and medium-sized investors. This change ensures that only investors with substantial strength and experience can participate in the inquiry process, thereby enhancing the professionalism and reasonableness of the quotations. Additionally, the reform introduced mechanisms such as strategic placements and co-investment by underwriters' affiliated subsidiaries, which curbed excessive competition among inquiry participants. These arrangements have, to some extent, reduced the occurrence of unreasonable quotations, improving the efficiency and accuracy of IPO pricing. Overall, the registration-based inquiry reform has effectively enhanced the pricing efficiency of new stock issuances, making the pricing process more transparent and equitable.

Using a sample of 932 companies listed on the ChiNext board from October 2009 to March 2021, G. Feng et al. (2022) analyzed the impact of the registration system reform on IPO underpricing and short-term returns of new stocks. The findings indicate that the release of the registration-based reform dividends and speculative behavior by investors have led to an increase in IPO underpricing on the first day of listing. Although the implementation of the registration-based reform on the ChiNext board did not curb investors' "IPO speculation" behaviors, it did lead to a shift in investor behavior, resulting in a greater focus on the risk-return trade-off and more rational investment decisions. This is evidenced by a notable decrease in both underpricing and short-term returns during the first five trading days post-listing. Further research suggests that the role of underwriters does not seem to be significantly recognized by the market; the positive impact of underwriter reputation on IPO underpricing in the ChiNext registration-based reform is not significant, and it even has a negative impact on short-term returns. Lai et al. (2022) conducted a comparative analysis of the daily returns of companies listed on the Sci-Tech Innovation Board (STAR Market) versus non-STAR companies, revealing that, in the absence of trading limits, the average daily returns for STAR Market firms over the first five trading days post-listing were significantly lower than those for non-STAR firms. This finding indicates that, after implementing the registration-based reform, the STAR Market's price discovery mechanism operates effectively, resulting in a notable improvement in pricing efficiency. The performance of STAR Market

companies further corroborates the positive impact of the registration-based reform in optimizing market pricing mechanisms.

In summary, these findings collectively suggest that the registration-based reform has effectively enhanced IPO pricing efficiency and market transparency through several measures, including the relaxation of government oversight, the elevation of inquiry thresholds, and the introduction of strategic placements and co-investment systems. Although speculative behavior still exists in the short-term, the overall market environment has become more rational and stable, with investor behavior showing increased maturity. This series of reforms provides a solid institutional foundation for the healthy development of China's capital market and lays an important groundwork for further improvements in market-based pricing mechanisms.

Some scholars argue that the IPO underpricing rate on the ChiNext board did not decrease as expected following the registration system reform. Dong et al. (2020) employed a stochastic frontier model to conduct a detailed empirical analysis of the pricing rationality of new stocks on the Sci-Tech Innovation Board (STAR Market). The study revealed that, contrary to expectations of underpricing, the issuance prices of STAR Market stocks were significantly higher than their intrinsic values. This indicates that there was a certain degree of overvaluation in the pricing of these new stocks. Further analysis showed that the higher the proportion of shares allocated to strategic investors, the more likely the stock prices were to attract attention from secondary market investors, leading to increased initial and short-term price gains. However, indicators representing the innovative attributes of companies did not significantly impact the initial returns of new stocks. This suggests that secondary market investors are more focused on specific concepts or trends rather than the company's research and development capabilities or growth potential. The study highlights that such irrational investment behavior contributes to market price bubbles.

With the A-share main board market as the control group and the ChiNext and SSE STAR boards as the experimental groups, E. Yan and Wang (2022) constructed a difference-in-differences model for empirical analysis. Their findings indicated that after the implementation of the registration system reform, the overreaction of investors to relevant trading policies and reforms exacerbated speculative behavior, leading to an increase in IPO underpricing rates. Despite this, the gradual rise in the proportion of institutional investors and improvements in audit quality have led to a gradual reduction in the positive impact of the registration system reform on IPO underpricing. Deng et al. (2023) discovered that in the early stages of the registration system implementation, the pricing efficiency of the ChiNext

board did not improve as a result of reduced government regulation; rather, it declined. This decline is attributed to the long-standing speculative atmosphere in the A-share market, where most institutional investors participate in new stock subscriptions with the strategy of seeking short-term gains rather than long-term holdings. By locking in new stock returns early, investors aim to avoid risks associated with market fluctuations (Lee et al., 2023; Y. Qian et al., 2024). K. Li et al. (2023) found that the changes in trading mechanisms sparked a surge in investor sentiment, especially among uninformed traders, which further fueled their enthusiasm for participating in IPOs on the ChiNext board under the registration system. This increase in speculative behavior has led to a further rise in IPO underpricing.

Chapter 3: Background of China's Capital Market Issuance System and the Registration System Reform

As a vital source nourishing the real economy, the capital market's institutional framework and market mechanisms have continuously evolved in response to the changing needs of the real economy. With the deepening of China's market-oriented reforms and the steady expansion of a market-savvy professional workforce, the institutional structure and market mechanisms of the stock market—the most critical segment of the capital market—have undergone ongoing reforms and improvements.

In terms of capital flow sequence, the stock market can be divided into the issuance market (primary market) and the trading market (secondary market). The institutional framework of the stock market encompasses a range of systems, including the issuance system (particularly the issuance review system), listing rules, delisting mechanisms, trading systems, and regulatory oversight mechanisms. Among these, the issuance review system occupies a central position within the broader stock market institutional architecture, as it often determines the efficiency of capital allocation and, consequently, the overall operational efficiency of the stock market.

Within the broader issuance system, the issuance review mechanism and the IPO pricing mechanism constitute its two core components. These mechanisms play a fundamental role in shaping the behavior of market participants across multiple dimensions.

3.1 Issuance system

Around 1990, the Shanghai Stock Exchange and the Shenzhen Stock Exchange were established, marking the formal entry of China's centralized securities market onto the historical stage. Over the past three decades, China's capital market has progressed through reforms, growing from small to large and from non-existent to established, undergoing multiple institutional reforms that have led to leapfrog development. As a fundamental system of the securities market, the new stock issuance system serves as the cornerstone for capital market development. The rationality and adaptability of the new stock issuance system are directly related to whether stocks can be smoothly issued, whether investors can trade at

reasonable prices, and whether companies can obtain financing to fund their fundraising projects, as well as long-term innovation and development. More importantly, as the link between the primary and secondary markets, the new stock issuance system plays a critical role in the financial sector’s service to the real economy.

International experience indicates(Lowry et al., 2020) that an inclusive and accessible issuance system, transparent and effective information disclosure rules, flexible trading systems, and a strict and cautious delisting mechanism are the foundations for a healthy cycle between investors and issuers, ensuring the stable operation of the capital market. These elements are also prerequisites for building a well-regulated, transparent, open, dynamic, and resilient capital market.

3.1.1 The evolution of the new stock issuance system

China's new stock issuance system has primarily undergone reforms in three key areas: issuance, allocation, and pricing. The system has progressed through three stages: the authorized system, the approval system, and the registration system.

(1) The Authorized System Stage

The 1990s marked a transitional period in China, shifting from a planned economy to a market economy. During this time, there was a scarcity of market-oriented professionals, and institutional frameworks were underdeveloped. Consequently, from 1990 to 2000, China's new stock issuance operated under the authorized system.

Under this system, the government primarily employed administrative review methods, with the CSRC conducting substantive reviews and oversight throughout the entire IPO process, thereby controlling the issuance pace. The allocation process required subscription certificates issued by the People's Bank of China, lacking mechanisms for institutional investor allocations. Regarding pricing, issuers did not have pricing authority; instead, the CSRC set the P/E ratio range between 15 and 20 times, using a fixed P/E ratio for issuance.

In this arrangement, the role of intermediaries, serving as a link between issuers and investors, was significantly diminished, primarily offering compliance-related technical services. In contrast, government departments led the entire issuance process. Given the societal context at the time, this institutional setup aligned with the prevailing circumstances and contributed to the healthy development of China's capital market. However, it did not fully leverage the self-regulatory functions of a market economy.

From 1990 to 1995, the government implemented a quota management approach, setting annual issuance quotas, with the CSRC reviewing IPO applications within these limits. From

1996 to 2000, the government adopted an “indicator management” issuance method, where the National Development and Reform Commission and the Securities Commission determined the total scale of new stock issuances. The CSRC then allocated quotas to provincial and industry authorities, who, through multiple selection layers, identified pre-qualified enterprises.

Under this system, some large state-owned enterprises actively participated in reforms, listing to raise capital, rapidly expanding under financial support, and achieving favorable outcomes. However, the administrative controls led to a lack of transparency in the listing process, which, to some extent, affected the development and stability of the market economy.

(2) The Approval System Stage

The implementation of the *Securities Law* in 1999 marked China’s shift from a strict quota management system to a more market-oriented approval system for new stock issuance. During this period, a subscription mechanism and lock-up period were introduced in the allocation process. It was stipulated that companies with a total issued capital of more than 400 million yuan could allocate shares to strategic investors and general legal entities, with a minimum of 25% and a maximum of 75%, and the lock-up period should last at least three months. From this point, institutional investor offline placements and retail investor online placements became the primary model for securities issuance.

In terms of pricing, the system transitioned from using a fixed P/E ratio to an inquiry-based pricing mechanism. Issuers and underwriters would determine a pricing range, with the final issue price set through reverse roadshows, inquiries, and placements.

The approval system went through two phases: the “Channel System” and the “Sponsorship System.” From 2001 to 2004, the Channel System phase served as a precursor to the later implementation of the Sponsorship System. During this period, the CSRC, based on the strength and historical performance of securities firms, allocated the number of IPO application channels available to each firm. Firms, in turn, selected potential companies for IPOs based on the number of channels available and recommended them to the CSRC for approval. During the Channel System phase, over 200 companies were financed, raising over 200 billion yuan in total.

The Sponsorship System was officially implemented in February 2004 and continued until its historical role was completed with the full implementation of the registration system in 2023. The system played a pivotal role over nearly two decades, not only driving the robust growth of China’s real economy but also cultivating a large pool of professionals for the capital markets. Notably, in the early stages of the Sponsorship System (2004), it operated

alongside the Channel System, with securities firms still adhering to the existing application channels.

Under the Sponsorship System, securities firms, even though their sponsors and representatives were registered with the CSRC, were still required to fulfill the following core duties by law: first, providing professional IPO recommendations and guidance services to issuers; second, ensuring the authenticity, accuracy, and completeness of the issuer's application documents; third, assisting issuers in establishing effective information disclosure systems; and fourth, continuing to fulfill supervisory duties after the issuer's listing, with the sponsor representative specifically implementing these responsibilities. This institutional design effectively improved the quality of listed companies and laid a solid foundation for the regulated development of the capital markets.

During the approval system phase, the securities regulatory bodies implemented a "dual review" mechanism, involving both formal and substantive reviews. Specifically, regulatory authorities were required to conduct formal reviews to ensure the authenticity and completeness of the documents submitted by the IPO applicants, while also conducting professional judgments regarding their operational conditions, financial indicators, and compliance. Although this review mechanism helped ensure the quality of listed companies to some extent, it also led to several market efficiency issues: first, the complex review process significantly lowered the issuance efficiency in the primary market; second, the substantial review by regulatory bodies, in some cases, replaced the market's value judgment function, weakening investors' ability to independently assess company value; and finally, this system fostered a herd mentality among investors, exacerbating speculative behavior and disrupting the orderly issuance process and resource allocation efficiency in the securities market.

(3) The Registration System Stage

The reform of China's capital market under the registration system has demonstrated a distinct gradual characteristic, with its evolution divided into two key stages: pilot exploration and comprehensive implementation. From the pilot implementation of the registration system on the STAR Market in 2019 to the full implementation of the registration system on February 17, 2023, a dual-track system emerged, with both the approval system and the registration system operating in parallel. Specifically, the main board continued to follow the approval system regulatory framework, while the STAR Market and ChiNext completed the transition to the registration system.

From the perspective of institutional economics, the essential feature of the registration system is the separation of regulatory and pricing powers. Regulatory authorities retain only

the formal review function, transferring substantive evaluation powers, such as value judgment, to market participants. This institutional arrangement fully embodies the core concept of market-oriented reform.

From the perspective of the driving forces behind institutional change, the pilot reform of the registration system on the STAR Market, initiated on March 2, 2019, represents a significant milestone. This reform scheme, based on a comprehensive learning from mature capital markets, fully considers the uniqueness and developmental stage of China's capital market, reflecting an organic combination of institutional transplantation and localized innovation. The STAR Market achieved major breakthroughs in its listing criteria design: first, it broke away from the traditional profit-oriented listing standards by innovatively introducing market capitalization as a core evaluation dimension and creating a diversified listing criteria system with five sets of differentiated standards; second, in terms of inclusivity for listing entities, the market significantly enhanced its inclusiveness and adaptability by relaxing entry restrictions for red-chip companies and enterprises with special shareholding structures. These institutional innovations not only expanded the breadth and depth of the capital market's service to the real economy but also accumulated valuable practical experience for the full implementation of the registration system.

Since its establishment, the STAR Market has played a significant role in supporting the listing of high-tech enterprises, demonstrating remarkable institutional innovation effects and achieving positive policy outcomes. Building on the successful experience of the STAR Market, the reform of the registration system in China's capital market gradually expanded to the existing market. On April 27, 2020, the 13th meeting of the Central Committee for Deepening Reform reviewed and approved the *Overall Implementation Plan for the Reform of ChiNext and the Pilot Registration System*, marking an important turning point in the expansion of China's registration system reform from the incremental market to the existing market. This institutional change reflects the typical characteristics of gradual reform—expanding the scope of reform based on the success of localized pilots.

From the perspective of institutional evolution, the implementation of the new *Securities Law* in March 2021 was a milestone. The law not only established the legal status of the stock issuance registration system but also clarified the step-by-step reform path for its implementation, providing legal assurance for subsequent reforms. By the full implementation of the registration system in 2023, China's capital market completed a fundamental institutional transformation from the approval system to the registration system. This transformation process reflects the deepening of market-oriented reforms in China's capital

market and marks a significant shift in the regulatory paradigm—from substantive review to an information disclosure-centric approach. This shift holds important institutional innovation significance in enhancing the capital market's ability to serve the real economy.

3.1.2 Main changes in the registration system reform

The main changes brought about by the registration system reform are reflected in the issuance criteria, review model, pricing method, and trading system.

(1) Issuance Criteria

Under the approval system, the standards for new stock issuance were overly reliant on financial indicators, which created significant financing constraints for new economy enterprises. Specifically, companies in strategic emerging industries often have characteristics such as heavy asset investment and long return cycles, which result in fundamentally different profit models compared to traditional industries. Taking the biopharmaceutical industry as an example, new drug development involves rigorous clinical trials (typically taking 5-10 years) and complex approval processes, leading to long periods of profitability gaps for these companies. This institutional barrier forced many high-quality innovative companies to choose overseas listings. According to statistics, from 2015 to 2019, over 60% of Chinese biotechnology companies chose to list on the Hong Kong Stock Exchange, creating a significant "institutional arbitrage" phenomenon(X. Yang, 2022).

The implementation of the new *Securities Law* in March 2020 marked a major transformation in the fundamental institutional framework of China's capital market. Through the registration system reform, the listing standards were restructured, shifting from a "profit-oriented" approach to a "growth-oriented" approach. Specifically, the new system downplayed traditional financial indicators, such as the requirement for sustained profitability, and instead emphasized a company's core competitiveness and future growth potential. This institutional innovation significantly enhanced the inclusivity and adaptability of the capital market, contributing to the formation of a multi-tiered capital market system with clear levels and complementary functions.

(2) Review Model

Under the approval system, the IPO review mechanism had significant efficiency bottlenecks and administrative intervention characteristics. Specifically, the review process not only involved examining the qualifications of the company but also considered external variables such as market conditions and investor sentiment. This multi-layered constraint mechanism resulted in long and uncertain review cycles. Historical data shows that China's

capital market has experienced multiple IPO suspensions, with the longest suspension occurring between October 2012 and January 2014 due to a large-scale financial audit by the CSRC, which lasted a cumulative 15 months (Pan & Ma, 2022). These administrative controls severely impacted the financing function of the capital market, obstructing direct financing channels. The changes in the review models between the approval system and the registration system are shown in Table 3.1.

The registration system reform restructured the IPO review mechanism, significantly improving market efficiency. The review periods for listed companies were notably shortened after the reform. For example, the average review time for the STAR Market was reduced to 283 days, and for the ChiNext Market, it was reduced to 382 days. Prior to the implementation of the registration system on ChiNext, the average review period was as long as 549 days. This reduction in review duration indicates an improvement in the operational efficiency of the primary market. This improvement in efficiency was primarily driven by the establishment of market-driven constraints under the registration system. On the one hand, the review process became more transparent and predictable, reducing uncertainty surrounding the listing timeline. On the other hand, the issuance pace of new stocks was dynamically balanced with the supply of market capital, helping alleviate administrative bottlenecks. As a result, the registration system facilitated timely access to capital markets, supporting faster financing for high-quality companies.

Table 3.1 Comparison of the approval system and registration system review models

Issuance Segment	Review Model	Review Process
Main Board (Approval System Period)	Regulatory Substantive Review	(1) Acceptance and Preliminary Disclosure (2) Feedback Meeting (3) Update of Preliminary Disclosure (4) Initial Review Meeting to discuss the issuer's basic situation and the issues found in the preliminary review, and the response to feedback, then submit to the approval meeting for review (5) Approval Meeting (6) Closing the file (7) Post-meeting matters (8) Approval of issuance
STAR and ChiNext (Registration System)	Regulatory Formal Review	(1) The exchange must decide whether to accept the registration application within 5 business days after receiving the application documents (2) The exchange must form a review opinion within 3 months of accepting the registration application documents (3) The CSRC must decide on whether to approve or reject the registration application within 20 business days after receiving the application

(3) Pricing Mechanism

Under the approval system, the IPO pricing mechanism was subject to significant institutional constraints. The regulatory authorities set a uniform upper limit of 23 times the P/E ratio for initial public offerings, leading to a “one-size-fits-all” pricing model where many companies issued new stocks at a P/E ratio of 22.99 times. This pricing approach failed to accurately reflect the intrinsic value and growth potential of these companies. The flaws in this pricing mechanism contributed to the phenomenon of continuous price increases post-listing, creating market expectations of “guaranteed profits from IPO subscriptions” and fueling speculative trading behavior. The changes in pricing mechanisms between the approval system and the registration system are shown in Table 3.2.

The registration system reform restructured the pricing mechanism, significantly improving market pricing efficiency. The reform measures primarily focused on three aspects: first, the removal of the P/E ratio cap, establishing a market-driven pricing mechanism; second, excluding high-net-worth individuals and private equity investors who did not meet the 1-billion-yuan scale requirement from the inquiry process, allowing for more professional institutional investors to provide full quotations; and third, the system mandates that 10% of accounts from six categories of medium- and long-term investors be randomly selected and locked for six months, thereby restricting corporate pricing behaviors. These reforms, working together, have contributed to the improvement of the IPO pricing mechanism and enhanced the market's functionality.

Table 3.2 Comparison of pricing methods between the approval system and the registration system

Issuance Segment	**Pricing Method**	**Offline Allocation Ratio**	**Clawback Mechanism**
Main Board (Approval System Period)	Market-based Inquiry + 23x P/E Limit	Allocate no less than 40% of the offline issued shares to public funds and social security funds, with a certain percentage allocated to enterprise annuity funds and insurance funds.	(1) If the online subscription multiple is between 50-100 times (inclusive), clawback 20%. (2) If the online subscription multiple exceeds 100 times, clawback 40%. (3) If the online subscription multiple exceeds 150 times, there is no lock-up period, and the offline issuance ratio does not exceed 10%.

Table 3.2 Comparison of pricing methods between the approval system and the registration system (continued)

Issuance Segment	Pricing Method	Offline Allocation Ratio	Clawback Mechanism
STAR Board (Registration System)	Inquiry Issuance + No P/E Limit	Allocate no less than 70% of the offline issued shares to public products, social security funds, pension funds, enterprise annuity funds, insurance funds, and six types of long-term funds, including qualified foreign investors.	(1) If the online subscription multiple is between 50-100 times (inclusive), clawback 5%. (2) If the online subscription multiple exceeds 100 times, clawback 10%. (3) After clawback, the offline allocation ratio will not exceed 80%.
ChiNext (Registration System)	Direct Pricing, Inquiry Issuance + No P/E Limit	Allocate no less than 70% of the offline issued shares to public products, social security funds, pension funds, enterprise annuity funds, and insurance funds.	(1) If the online subscription multiple is between 50-100 times (inclusive), clawback 10%. (2) If the online subscription multiple exceeds 100 times, clawback 20%. (3) After clawback, the offline allocation ratio will not exceed 70%.

(4) Trading System

Under the approval system, new stocks were not only subject to a 23 times P/E ratio limit for pricing but also faced a 44% price fluctuation limit on their first day of listing. This dual price control often led to the phenomenon of consecutive price increases.

Under the registration system, the trading mechanism was modified and improved in three areas: price fluctuation limits, short-selling mechanisms, and investor thresholds. First, new stocks on the STAR Market and ChiNext Market are not subject to price fluctuation limits for the first five trading days, and after the fifth day, the fluctuation limit is set at 20%. Removing the fluctuation limit allows for more active trading, better reflecting market supply and demand, and helping to achieve a more reasonable price range. Second, the ability to short selling on the first day of trading provides a channel for both long and short investors to engage in market activities. Finally, with the higher investor thresholds, the registration system leans towards attracting mature long-term institutional investors and allows certain qualified small and medium investors with capital strength or professional experience to enter the market, enhancing the market's role in value discovery. The differences in trading systems between the approval system and the registration system are shown in Table 3.3.

Table 3.3 Comparison of trading systems between the approval system and the registration system

Issuance Segment	Price Fluctuation Limit	Margin Trading System	Investor Threshold
Main Board (Approval System Period)	44% price fluctuation limit on the first trading day of new stocks.	Strict restrictions on margin trading targets regarding listing time, circulating stock, number of shareholders, market indicators, and risk warnings.	General investors (no account asset or investment duration restrictions).
STAR Board (Registration System)	No price fluctuation limit for the first 5 trading days, 20% fluctuation limit thereafter.	Can be used as a margin trading target on the first trading day.	(1) The average daily asset in the securities account and fund account must be no less than 500,000 yuan for the first 20 trading days (excluding funds and securities borrowed via margin trading). (2) Must have participated in securities trading for over 24 months.
ChiNext (Registration System)			

3.2 Pricing mechanism and new inquiry rules

As the level of marketization increases, the process of new stock issuance has gradually shifted more decision-making power to market participants during the issuance review stage. In the pricing stage of new stock issuance, by decentralizing the relevant authority to market participants, pricing increasingly relies on the market's price discovery function.

3.2.1 The evolution of the pricing mechanism

According to the evolution of China's new stock pricing mechanism, this section divides it into four stages for analysis.

(1) Fixed Pricing

From 1989 to 1999, China’s stock market was in its “infancy”, during which the institutional framework was underdeveloped and market-oriented professionals were scarce, making it difficult to implement market-based pricing for new stock issuances. Therefore, during this stage, the pricing of new stocks was based on a fixed-price system. Overall, it can be categorized into fixed price pricing and fixed P/E ratio pricing, depending on the object.

Between 1989 and 1994, China’s new stock pricing mechanism adopted a fixed pricing system that complemented the approval system. This system design considered China’s talent pool and institutional environment at the time. Under this system, the pricing authority for

new stocks effectively rested with the CSRC, but the specific process involved the issuer and the lead underwriter initially negotiating the preliminary price, which was then submitted to the CSRC for approval. It is worth noting that in 1994, China briefly experimented with a highly marketized online auction pricing method for IPOs. However, due to the immature market conditions at the time, this approach was overly speculative and was eventually discontinued.

From 1995 to 1999, the new stock pricing mechanism evolved into the fixed P/E ratio pricing method. The core of this method was to determine the issuance price by multiplying the earnings per share (EPS) by a pre-determined P/E ratio. During this period, regulatory authorities generally controlled stock valuations within a P/E ratio range of 13 to 17 times, reflecting the regulators' cautious stance on market valuations. This pricing mechanism took market factors into account while maintaining necessary administrative control, reflecting the unique national conditions during the early development of China's securities market.

(2) Cumulative Bidding Pricing

From September 1999 to August 2001, China embarked on an exploration of market-based pricing for stock issuance. The *Securities Law* (Standing Committee of the National People's Congress, 1999)implemented on July 1, 1999, explicitly stipulated that new stock issuances would adopt a combination of roadshows and institutional investor inquiries, granting underwriters and issuers the authority to jointly negotiate and determine the issuance price. Under this system, the total amount of stock issuance was subject to limits, but only a minimum price was set, with no upper price limit. This reform aimed to improve stock issuance prices through market-based pricing mechanisms, reduce the price gap between the primary and secondary markets, lower new stock yields, and thereby enhance the efficiency of resource allocation in the capital market.

However, the practical outcomes of the reform significantly deviated from expectations. Due to the absence of an upper price limit, new stock pricing exhibited irrational escalation, leading to the phenomenon of over-subscription by many listed companies. The funds raised through over-subscription far exceeded the actual needs of the enterprises, with large amounts of idle funds deposited in banks, causing severe resource misallocation. Moreover, the price gap between the primary and secondary markets did not narrow effectively, and speculative "IPO flipping" behavior remained rampant. Given the severity of these issues, regulatory authorities terminated this pricing mechanism in the second half of 2001.

(3) Fixed Price-to-Earnings Ratio

In response to the various market disruptions, regulatory authorities reintroduced administrative intervention in IPO pricing from November 2001 to December 2004, implementing a cap on the P/E ratio at 20 times. While this administrative pricing mechanism somewhat curbed market speculation, it also led to new problems. Many companies with strong growth prospects were constrained by the P/E ratio cap, making it difficult for their IPO pricing to accurately reflect their intrinsic value and development potential. This pricing distortion resulted in funds that should have flowed into the real economy being diverted into capital gains for investors, preventing the capital market from fully fulfilling its core function of optimizing resource allocation and supporting the development of the real economy.

(4) Inquiry-Based Pricing System

On December 7, 2004, the CSRS issued the *Notice on Certain Issues Regarding the Trial Implementation of the Inquiry System for Initial Public Offerings*(China Securities Regulatory Commission, 2004), which stipulated that, starting from January 1, 2005, companies and their sponsors planning an IPO must determine the issuance price through inquiries to six categories of qualified institutional investors. Under this system, the new stock issuance price no longer required approval from regulatory authorities. The release of this notice marked the formal establishment of the inquiry-based pricing system, an important institutional safeguard for the market-based pricing mechanism in China’s capital market.

The pricing process under the inquiry system involves several key stages: first, the issuer commissions the underwriter to prepare a professional valuation report, which forms the preliminary price range and provides the relevant pricing data to the inquiry targets. Second, the issuer and underwriter jointly hold roadshows to disclose various types of information about the listed company to the inquiry targets. Subsequently, the inquiry targets submit their preliminary bids, forming an initial pricing range. Based on these bids, the underwriter evaluates the subscription demand from institutional investors, adjusts the initial price based on market supply and demand, and finalizes the issuance price.

It is noteworthy that the inquiry system in China differs significantly from those in mature capital markets such as those in the U.S. and Europe: underwriters do not have allocation rights. In the "highest bid wins" principle, all institutional investors whose bids exceed the issuance price are given equal allocation opportunities. This institutional design, to some extent, limits the underwriter’s ability to obtain accurate quotes and demand information from institutional investors. To achieve the goal of improving pricing efficiency and issuance efficiency, regulatory authorities have continuously pushed forward institutional reforms, resulting in distinct stages of development for China’s inquiry system.

The implementation of the inquiry system can be divided into three main stages, each reflecting the evolution of regulatory thinking and the improvement of market mechanisms.

The First Stage (January 2005 to December 2008). This was the market exploration phase. Although the pricing process was fully marketized in terms of design, the CSRC implemented an invisible cap of 30 times the P/E ratio to prevent inquiry institutions from artificially inflating new stock prices to secure a place in the offering. Although this phase had a pricing cap, it laid a crucial foundation for future market reforms.

The Second Stage (January 2009 to November 2012). This was the phase of deepening marketization. In order to fully leverage the inquiry system, the CSRC gradually relaxed the invisible control on the P/E ratio starting in June 2009. The reform aimed to increase the allocation of shares to individual institutions in the IPOs of small and medium-sized enterprises, encouraging institutional investors and underwriters to better play their market roles, improve their pricing ability, and enhance information services, thus bringing the issuance price closer to the company's true value. While this reform effectively reduced underpricing rates, it also led to persistent over-subscription in the ChiNext and SME boards.

The Third Stage (2014 to the Full Implementation of the Registration System). This was the cautious adjustment phase. In 2014, the CSRC reintroduced the P/E ratio control mechanism. Although no explicit upper limit on the P/E ratio was specified, securities firms gradually adopted a default cap of 23 times the P/E ratio to improve the likelihood of IPO approval. This invisible “window guidance” continued to be implemented in the main board and SME markets until the full implementation of the registration system. Notably, the ChiNext market implemented a fixed P/E ratio system from 2004 until August 2020, while the STAR Market, from its inception, did not set a P/E ratio limit, reflecting a differentiated regulatory approach.

3.2.2 Innovations of the new inquiry rules

On September 18, 2021, China’s capital market witnessed a significant reform of the inquiry system. The China Securities Association, Shanghai Stock Exchange, Shenzhen Stock Exchange, and the CSRC jointly released a series of guidelines, collectively known as the “New Inquiry Rules” (China Securities Regulatory Commission, 2021). This reform not only optimized and improved the specific rules for the inquiry process but, more importantly, strengthened the behavioral constraints on the participants in the inquiry process across multiple dimensions, marking a substantial step toward a more market-oriented and standardized pricing mechanism for new stock issuances in China.

In terms of specific arrangements for the inquiry system, the reform made three key adjustments: first, it optimized the high-price exclusion mechanism by reducing the exclusion rate from the original minimum of 10% to a maximum of 3%, which is expected to improve pricing efficiency; second, in alignment with the revised *Securities Offering and Underwriting Guidelines under the Registration System*, it removed the requirement to explain differences when the issuance price exceeded the valuation range indicated by the pricing report, granting more pricing autonomy to the market; and third, it abolished the rule that required issuing companies to release risk announcements and delay issuance when the price fell below the "four values" lower limit, simplifying the issuance process and improving efficiency. The "four values" refer to: the median of the remaining quotes after the highest bids are excluded; the weighted average of the remaining quotes after the highest bids are excluded; the median of the remaining quotes from public products and social security funds; and the weighted average of the remaining quotes from public products and social security funds.

Regarding the constraints on participants in the inquiry process, the reform focused on strengthening supervision in the following two areas. First, for lead underwriters, the *Underwriting Guidelines* retained the original professional standards but further enhanced behavioral constraints. The new rules require lead underwriters to improve roadshow arrangements, emphasizing the professional role of securities analysts in helping offline investors to more comprehensively understand the issuer's fundamentals, industry peers, as well as profitability analysis and valuation status. Additionally, by adjusting the relevant regulations on financing value research reports, the professional and practical value of the reports was enhanced, while normative requirements were strengthened. Second, for offline investors, the *Offline Investor Management Rules* (Securities Association of China, 2023)were comprehensively refined based on the *ChiNext Offline Investor Management Rules* (Securities Association of China, 2019), strengthening the social responsibility of institutional investors and improving management effectiveness through more targeted self-regulation, ensuring the legal rights of investors are effectively protected. These adjustments better meet the actual demands of the offline inquiry process and contribute to building a more standardized and transparent inquiry environment.

Through a systematic review of the New Inquiry Rules, this thesis argues that, while optimizing specific inquiry rules, the new system significantly strengthens the behavioral constraints on participants in the inquiry process. This institutional reform is expected to effectively enhance IPO pricing efficiency. Given the long-standing issue of "IPO speculation"

in China's securities market, the implementation of the new rules is expected to reduce pricing bubbles and bring issuance prices closer to the intrinsic value of companies.

Before the implementation of the new rules, due to the low risk and high returns associated with new stocks, coupled with insufficient constraints on investor bidding behavior, investors with weak pricing abilities tended to adopt a "bidding for entry" strategy. With the previous 10% high-price exclusion rate, investors could submit overly high bids without bearing the associated risks. However, following the implementation of the New Inquiry Rules, the offline investor grouping system introduced by the China Securities Association has had a significant impact on investor behavior. This system establishes a reward and punishment mechanism, disciplining irrational bidding behaviors and incentivizing institutions that provide reasonable pricing to enter the preferred group and obtain long-term benefits. This institutional design forces offline investors to abandon short-term speculative perspectives and focus on improving their pricing ability to maintain market competitiveness.

On the other hand, when the issuer has a strong fundamental business and full information disclosure, the pricing difficulty is relatively low, and investors with various pricing abilities will participate in the inquiry process. In this case, investors tend to increase their bids to ensure participation while staying within the rules, which could result in higher levels of overvaluation for high-quality companies relative to lower-quality ones, thus somewhat reducing pricing efficiency. In contrast, for companies with less information disclosure and weaker fundamentals, under the new rules, investors with weaker pricing abilities will exit the inquiry process, while high-caliber investors will provide more reasonable pricing. It is worth noting that the stronger a company's operational capacity and growth potential, the more likely it is to attract high-caliber investors, and this selection effect will marginally enhance overall pricing efficiency.

3.3 Co-investment mechanism for securities firms

The co-investment mechanism for securities firms refers to the equity investment by the sponsor's affiliated subsidiaries in the underwriting company. Prior to the implementation of the STAR Market system, according to the *Securities Issuance and Underwriting Management Measures (2018 Revision)* (China Securities Regulatory Commission, 2018), lead underwriters (securities firms) were not allowed to participate in the strategic allocation of IPO shares. It was not until the release of the *Shanghai Stock Exchange STAR Market Stock Issuance and Underwriting Business Guidelines* (Shanghai Stock Exchange, 2019)

(hereinafter referred to as the *Business Guidelines*) that the co-investment mechanism for securities firms was formally introduced and trialed on the STAR Market. Although there is no unified definition of co-investment in academic circles, the general understanding based on the *Business Guidelines* refers to the behavior where the issuer's sponsor, through a legally established alternative investment subsidiary or an alternative investment subsidiary of the securities company that controls the sponsor, participates in the strategic allocation of shares in the issuer's IPO. This behavior is collectively referred to as "co-investment by securities firms."

Co-investment by securities firms differs from direct investment by securities firms, although both involve underwriting firms making equity investments in the companies they sponsor. Direct investment by securities firms is similar to private equity or venture capital, where the securities firm invests in the unlisted company it sponsors at a valuation price and exits after the company goes public. In contrast, co-investment involves securities firms investing in the listed companies they sponsor at the issuance price, with a lock-up period applied to the shares allocated. Co-investment on the STAR Market is mandatory—every securities firm underwriting a STAR Market IPO must also co-invest in the company being listed.

3.3.1 International practices of co-investment mechanism by securities firms

The mandatory co-investment mechanism introduced by the STAR Market is a significant institutional innovation aimed at improving sponsor quality. Its origins can be traced back to the practices of the Korea Securities Dealers Automated Quotations (KOSDAQ) market. To address issues such as frequent occurrences of IPO underperformance, sharp declines in stock prices, and periodic "delisting waves," the Korea Exchange (KRX) first implemented the sponsor co-investment system in February 2013. The system was gradually refined through four systematic revisions between June 2014 and April 2018. The co-investment system in the KOSDAQ market is implemented with differentiated arrangements based on the type of sponsored entity: when sponsoring domestic companies, securities firms are required to co-invest in 3% of the total issued shares at the offering price (with a cap of 1 billion Korean Won), with a lock-up period of 3 months; when sponsoring foreign companies, the co-investment ratio increases to 5%, with a mandatory holding period of one year from the issuance date, and after six months of listing, the monthly reduction in holdings cannot exceed 5% of the initial holdings; for companies transferring from the Korea New Exchange

(KONEX) market to KOSDAQ, securities firms are required to co-invest 5% (up to 2.5 billion Korean Won), with a 6-month lock-up period.

The overall design of the KOSDAQ co-investment system presents three notable characteristics: first, the co-investment ratio is set within a reasonable range of 3%-5%, which ensures that the sponsor's interests are aligned with investors' while avoiding an excessive financial burden; second, differentiated lock-up periods are implemented based on the risk characteristics of the sponsored entities, reflecting the principle of matching risk with responsibility; third, the introduction of tiered reduction rules effectively prevents short-term speculative behavior, thereby maintaining market stability.

To ensure the effective functioning of the co-investment system, the Korea Exchange has also introduced additional regulations regarding IPO underwriting. First, it mandates that securities firms allocate no less than 20% of the shares to retail investors, and in practice, securities firms typically allocate the minimum required to retail investors, with institutional investors typically receiving around 80%. Second, the advisory period for securities firms is set to three years post-listing, with at least biannual disclosures of the company's operational analysis reports. Third, securities firms are required to disclose any cross-shareholding relationships with the issuer.

From an institutional implementation perspective, the KOSDAQ co-investment system has achieved significant results across multiple dimensions. First, the system has effectively suppressed the occurrence of IPO overpricing through its interest alignment mechanism. By linking the interests of securities firms with investors, the system significantly reduces the incentive for securities firms to inflate the offering price to cater to issuers, thus promoting more reasonable IPO pricing. Second, the system has played a positive role in mitigating IPO underperformance. Empirical data (S. Wu & Zheng, 2020) shows that, from 2016 to 2018, the average post-listing price decline rates for new stocks on KOSDAQ, at 3, 6, and 12 months, were all lower than those on the main board market (KOSPI), with the 6-month post-listing decline rate being 43%, which is 12 percentage points lower than the KOSPI market, a difference that is statistically significant. Third, the implementation of the co-investment system has significantly increased the activity level and healthy development of the KOSDAQ market. Since its introduction in 2013, the number of IPOs in KOSDAQ has steadily increased, and 2015 marked a "golden year" for market development, reflecting a significant boost in investor confidence. Finally, the system has notably improved the quality of listed companies by strengthening the responsibilities of securities firms. Under the constraints of the co-investment system, securities firms have become more cautious in

project selection and due diligence, effectively performing their gatekeeping role, and resulting in a clear improvement in the overall quality of listed companies.

Apart from the Korean market, other major global capital markets have also accumulated practical experience with mechanisms similar to broker co-investment or joint investment. Although these mechanisms are not always explicitly labeled as “mandatory co-investment,” their underlying logic commonly reflects the alignment of underwriters’ interests with market stability.

In the United States, there is no mandatory co-investment mechanism equivalent to those implemented on China’s STAR Market or Korea’s KOSDAQ. However, in IPO underwriting practice, U.S. investment banks frequently engage in “direct investment” or “sponsor co-investment,” thereby achieving an alignment of interests with investors. Empirical research indicates that such underwriter co-investment helps mitigate pricing bias and improves IPO pricing efficiency (Dong et al., 2024). This demonstrates that, despite the absence of regulatory mandates, market-driven risk-sharing arrangements have become a widely accepted practice in the United States.

In European markets, including the United Kingdom and Italy, there is likewise no formally defined mandatory co-investment mechanism. Nonetheless, underwriters and their affiliated funds often voluntarily participate in private placements or strategic allotments to enhance market confidence. Di Giorgio et al. (2000)point out that one of the key directions of financial market reform in Europe is to strengthen the linkage of underwriters’ interests with those of the market to improve IPO pricing behavior—an approach that closely aligns with the core rationale of the co-investment mechanism.

In Japan, underwriter responsibility is primarily reinforced through proprietary subscription and the green shoe mechanism. Although there is no direct mandatory co-investment requirement, underwriters frequently subscribe to a portion of shares using proprietary capital during the offering process and subsequently stabilize post-listing prices through the exercise of the overallotment option (green shoe). Functionally, this arrangement is analogous to the co-investment mechanism, as it similarly binds underwriters’ financial interests to the quality of the issuance.

In several emerging markets, mechanisms resembling mandatory placement or strategic investment arrangements have also been introduced. For instance, Thailand, in its IPO reform, implemented a compulsory placement mechanism requiring underwriters and related parties to retain ownership stakes in the offering to mitigate excessive underpricing. Empirical

studies have found that this measure effectively improves IPO pricing efficiency and protects minority investors (Ekkayokkaya & Pengniti, 2012).

In summary, although differences exist in institutional design across markets, their shared logic lies in aligning interests and imposing accountability constraints on underwriters to enhance prudence in IPO pricing and project selection. This, in turn, achieves a dual improvement in pricing efficiency and market stability. Such international experiences provide valuable reference points for the design and optimization of China's mandatory co-investment mechanism on the STAR Market.

3.3.2 Characteristics of the co-investment mechanism in China

The co-investment mechanism for securities firms in China shares similarities with South Korea's system in terms of institutional design and regulatory intent, but there are significant differences in the specific details.

(1) The co-investment entity is clearly defined as the sponsor's alternative investment subsidiary.

Article 15 of Chapter 3 of the *Business Guidelines* states that the STAR Market will pilot the co-investment mechanism through the sponsor's related subsidiaries. The issuer's sponsor will participate in the strategic allocation of shares in the IPO through an alternative investment subsidiary established in accordance with the law by the sponsor's parent company or a securities company controlling the sponsor, with a lock-up period applied to the allocated shares. This makes it clear that the co-investment entity is the alternative investment subsidiary legally established by the sponsor's parent company. This choice takes into account the compliance, operational feasibility, and inclusivity of the co-investment system.

The *Business Guidelines* specify that the funds used for co-investment must come from the securities firm's own capital. Among the three types of subsidiaries that a sponsor's parent company can legally establish, only the alternative investment subsidiary invests entirely with its own funds, making it the appropriate entity to implement the co-investment mechanism in compliance with relevant regulations. According to statistics from the CSRC, there are currently 98 sponsor institutions in China, of which 59 have already established alternative investment subsidiaries. Most of the remaining sponsor institutions have applied to establish such subsidiaries.

Given that, in rare cases, some sponsors may be unable to implement co-investment through an alternative investment subsidiary due to special reasons, the policy allows them to participate through other methods recognized by the CSRC and the Shanghai Stock Exchange

(SSE), provided they comply with the relevant regulations and supervision requirements. Additionally, in cases of joint sponsorship, the Business Guidelines specify that joint sponsors must implement the co-investment through their related subsidiaries as prescribed in this guideline and disclose specific arrangements.

(2) Co-investment Scale Set at 2%-5% of the Initial Offering

According to the *Business Guidelines*, subsidiaries of the sponsoring institution that participate in the strategic placement are required to sign a placement agreement with the issuer in advance and commit to subscribing 2% to 5% of the IPO shares at the offering price. The corresponding tiered co-investment ratios are presented in Table 3.4.

Table 3.4 Tiered co-investment ratios for underwriters

Issuance Size	**Co-investment Ratio**	**Maximum Co-investment Amount**
< RMB 1 billion	5%	RMB 40 million
RMB 1 billion ≤ Size < RMB 2 billion	4%	RMB 60 million
RMB 2 billion ≤ Size < RMB 5 billion	3%	RMB 100 million
≥ RMB 5 billion	2%	RMB 1 billion

The co-investment ratio for securities firms is determined within a range of 2%-5%, with the percentage specified based on the scale of the offering, and a cap on the maximum investment amount for each project. This approach avoids a "one-size-fits-all" co-investment ratio and reduces the financial burden on securities firms when co-investing in large IPO projects, making it a more reasonable design. According to market feedback, even the minimum co-investment ratio of 2% requires a significant amount of capital from the securities firms. Therefore, after the implementation of the mandatory co-investment system, it is beneficial in further enhancing securities firms' ability to select companies for listing, ensuring the quality of IPOs, and alleviating pressure on regulatory authorities. At the same time, since securities firms' returns are linked to the changes in the new stock price, the co-investment system helps mitigate the behavior of excessively high IPO pricing. In practice, IPO offering prices on the STAR Market have seen a significant decline.

(3) Co-investment Lock-up Period Set at 24 Months

The *Business Guidelines* stipulate that the lock-up period for co-invested shares is 24 months from the date of the issuer's IPO and listing. The duration of the lock-up period is primarily based on two considerations: First, from the perspective of the securities firm's responsibilities. As a strategic investor, the securities firm is not only participating in co-investment but also assumes an important role in the due diligence and review process. Therefore, the lock-up period for the securities firm's co-investment must be longer than the 12 months typically required for strategic investors. From a responsibility standpoint, since

the securities firm's obligations to the issuer are lower than those of the actual controlling shareholders, the lock-up period for the securities firm should be shorter than the 36 months required for the controlling shareholders. Second, the lock-up period is designed to smooth market shocks. Unlike direct investments, the securities firm's co-investment is considered a passive investment, which also ties up some of the firm's capital. It is expected that after the lock-up period ends, the securities firm will sell off its shares. To avoid a concentrated sell-off at the end of the lock-up period, which could significantly impact the secondary market, the lock-up period is set to cover the year of the listing and the following one or two full fiscal years. By calculating the lock-up period from the day of the IPO, this approach balances the market volatility caused by share reductions.

(4) Co-investment System Strengthens the Securities Firm's Internal Controls

First, it enhances information disclosure by the securities firms. According to Article 21 of the *Business Guidelines*:

The issuer and the lead underwriter must disclose in the prospectus and preliminary inquiry announcement the total number of shares allocated to the sponsor's related subsidiaries, the subscription amount, the proportion of the total issuance, and the holding period." Additionally, "If the sponsor's related subsidiary fails to implement co-investment as stipulated by these guidelines and its commitments, the issuer must suspend the current offering and make a timely disclosure. (SSE, 2019, p.6)

Second, it requires securities firms to establish a "firewall" internally. The *Business Guidelines* state:

The sponsor's related subsidiary participating in the allocation must open a dedicated securities account to hold the allocated shares, and these must be effectively separated from the securities used in its proprietary trading, asset management, or other business operations, with separate management, accounting, and no mixing of operations. (SSE, 2019, p.7)

Third, it strengthens the securities firm's independence. The *Business Guidelines* stipulate that sponsoring institutions shall not charge the issuer, its controlling shareholders, or their affiliates any fees other than those related to the performance of sponsorship and underwriting duties in accordance with industry standards. They are also prohibited from using the shareholder status obtained through allocated shares to interfere with the issuer's normal production and operations, or from seeking control over the issuer during the lock-up period of the allocated shares.

In essence, the registration system reform has introduced systemic changes to the logic of issuance review, the market-based constraint mechanisms, and the composition of market

participants. However, when ultimately implemented in the primary-market pricing process, the most substantively influential components of the reform are concentrated in two institutional pillars: the reform of the inquiry mechanism and the mandatory co-investment arrangement for underwriters. The former reshapes the price-discovery process by constraining institutional quotation behavior and increasing the proportion of valid bids, while the latter directly affects underwriters' pricing decisions by strengthening risk sharing and incentive alignment. In this sense, these two mechanisms constitute the key instruments through which the registration system reform affects IPO pricing. Their effectiveness largely determines the extent to which IPO pricing efficiency can improve. Accordingly, the subsequent chapters of this thesis conduct systematic empirical analyses centered on the new inquiry rules and the co-investment mechanism, with the aim of revealing how investment banks' pricing behavior has changed under the registration system and how these changes influence IPO underpricing and pricing efficiency.

Chapter 4: Research Method

4.1 Theoretical analysis and research hypotheses

4.1.1 The impact of the new inquiry rules on investment bank's underwriting pricing behavior

Before the new rules' implementation, if the underwriter-set issuance price exceeded the "lowest of the four values" (see section 3.2.2) by some percentage, the underwriter was required to issue multiple special investment risk announcements and delay subscriptions per the deviation's extent. At that time, exceeding the "lowest of the four values" incurred high time costs. Moreover, institutional investors tended to cluster bids, leading to concentrated pricing that narrowed the underwriter's pricing space. Under various constraints, the underwriter's ability to independently set prices was limited. After the new rules took effect, however, if the issuance price exceeded the "lowest of the four values" on the ChiNext Market, only one special investment risk announcement needed to be issued pre-subscription, with no need to delay subscriptions. This encouraged lead underwriters to fully exercise their underwriting and pricing abilities. Institutional investors' bid prices became more dispersed, expanding upward-adjustment space, and underwriters gained autonomy in setting prices. At this point, underwriters could discuss with issuers to further adjust IPO prices based on institutional investors' inquiry results.

Scholars have theoretically analyzed that underwriters have motivations to both raise and lower the issuance price. On the one hand, earlier studies pointed out that, whether to encourage investors to provide valuable information during the inquiry process (Lawrence M. Benveniste & Spindt, 1989) or to mitigate the "winner's curse" risk and attract uninformed investors to participate in the inquiry (Rock, 1986), underwriters tend to underprice IPOs to ensure a smooth inquiry process and maintain their reputation. Additionally, underpricing also helps reduce the underwriting burden of the underwriter (David P. Baron, 1982). On the other hand, underwriters' underwriting and sponsorship fees are positively correlated with the final amount raised, so to increase underwriting income, they are likely to choose to raise the issuance price. However, underwriters' ultimate goal is to maximize total profit, and raising the price could also result in losses. In China's issuance market, underwriters face two main

types of losses: first, overpricing may lead to a failure of the IPO shortly after listing, which directly impacts the underwriter's reputation. Second, overpricing can lead to the failure of the issuance (Yuqin Huang et al., 2013). Therefore, there is no clear conclusion in the academic community regarding how underwriters adjust the issuance price.

Based on the analysis in previous chapters, before the implementation of the new inquiry rules, the level of the IPO price was relatively low, and the issue of insufficient funds raised was common. The lead underwriters had little incentive to lower their bids, as they only adjusted the price slightly below the "lowest of the four values" to avoid delaying the subscription. After the new rules were introduced, institutional investors' bids became more dispersed, and the market consensus price rose, significantly increasing the amount of capital raised and boosting the underwriting fees for the lead underwriter. At the same time, market conditions were sluggish, and the risk of IPO underperformance increased, raising the underwriter's risk of undertaking the entire offering, which also affected the underwriter's reputation. Therefore, the motivation for the lead underwriter to raise the issuance price weakened, and they were more inclined to lower the overly high bids. Based on this, this thesis attempts to verify how underwriters utilize the relaxed autonomy in pricing under the new rules and thus proposes the following research hypothesis:

H1: The implementation of the new inquiry rules increases the magnitude of underwriters' downward adjustment of the offer price.

4.1.2 The impact of the co-investment mechanism on investment bank's underwriting pricing behavior

The mandatory co-investment system on the STAR Market requires the sponsor's related subsidiaries participating in the allocation to sign an agreement with the issuer, committing to subscribe from 2% to 5% of the IPO shares at the issuance price. The specific proportion is determined based on the size of the IPO offering: for an offering size below 1 billion yuan, the co-investment ratio is 5%, but not exceeding 40 million yuan; for an offering size between 1 billion and 2 billion yuan, the co-investment ratio is 4%, but not exceeding 60 million yuan; for an offering size between 2 billion and 5 billion yuan, the co-investment ratio is 3%, but not exceeding 100 million yuan; for an offering size above 5 billion yuan, the co-investment ratio is 2%, but not exceeding 1 billion yuan. At the same time, the sponsor's related subsidiaries participating in the allocation must hold the shares for a full 24 months from the listing date. Additionally, the STAR Market requires mandatory co-investment for four types

of special enterprises (unprofitable companies, red-chip structure, special voting rights, and high-priced issuances) on the ChiNext Market.

The sponsorship + co-investment model grant the lead underwriter dual roles as both an underwriter and an investor. On one hand, from a sponsorship perspective, increasing the issuance price can generate more underwriting revenue, but it also exposes the underwriter to the risk of post-listing underperformance. On the other hand, under the co-investment mechanism, a lower issuance price can reduce investment costs, but the 24-month holding period makes the underwriter more focused on the company's long-term development. A reasonable issuance price can provide the company with more capital, promote long-term positive growth, and reduce the underwriter's co-investment risk. Therefore, the underwriter will comprehensively consider both the underwriting fees and co-investment returns to determine the issuance price.

In this context, the final issuance price is essentially the outcome of a rational trade-off made by the underwriter between underwriting fee income and the safety of co-invested capital. After the implementation of the new inquiry rules, although underwriters are able to set the issuance price based on the overall returns from sponsorship and co-investment, an increase in the co-investment ratio significantly enlarges their risk exposure, thereby heightening their emphasis on pricing safety margins. According to the regulatory framework, the co-investment ratio is negatively related to the offering size, meaning that higher co-investment ratios are mainly concentrated in smaller IPOs. In such projects, underwriters are required to commit a relatively larger proportion of their own capital, making them more sensitive to the risk of post-listing price declines. As a result, they are more inclined to reduce the issuance price in order to mitigate potential investment losses arising from overpricing. Although a higher co-investment ratio may, to some extent, serve as a signal of issue quality and underwriter confidence, under the constraints of the lock-up period and capital occupation, this signaling effect is insufficient to fully offset the downside risks associated with excessive issuance pricing (Qiu & Cao, 2020). This thesis attempts to verify the impact of the co-investment mechanism on underwriters' pricing behavior and proposes the following hypothesis:

H2: After the implementation of the new inquiry rules, the higher the co-investment ratio of the lead underwriter, the greater the downward adjustment of the issuance price.

4.1.3 The impact of the new inquiry rules and co-investment mechanism on IPO underpricing

The reform of the inquiry system is often aimed at addressing issues caused by the existing system, and thus it typically involves policy reversals. As a result of these reforms, the efficiency of IPO pricing tends to fluctuate.

China began implementing its “China-specific” IPO inquiry system in 2005. Due to imperfect policies, a series of issues emerged. Scholars have pointed out that a clear manifestation of the low pricing efficiency during this period was the high IPO underpricing rate (C. Wang & Wu, 2015). In the early stages of the inquiry system’s implementation, the average IPO underpricing rate in China reached as high as 155%. The strict regulatory policies on stock issuance prices at the time not only failed to address the issue of inflated stock prices in the secondary market but also increased the price gap between the primary and secondary markets. Investors became excessively enthusiastic about subscribing to new stocks, leading to significant distortions in market supply and demand(X. Yan, 2008). Later, the CSRC introduced reforms to address the high underpricing rate, gradually reducing the IPO underpricing rate to around 40%. While addressing the original issues, new problems also emerged, such as the “three highs” phenomenon—high P/E ratios, high issuance prices, and high over-raising rates (Yu et al., 2013).

In response to the frequent occurrence of the “three highs” phenomenon, the CSRC introduced a series of policies to strengthen the supervision of the inquiry process in an attempt to mitigate the issue of excessive bidding by offline institutional investors. This marked the beginning of a period of implicit price regulation. The increase in the proportion of offline inquiry allocations led institutional investors to place greater emphasis on securing a spot in the inquiry process. Under the regulation of high-price exclusions, institutional investors, in order to ensure their inclusion, often colluded to hide the true value of the new stocks during the inquiry, thus preventing the inquiry system from functioning as an effective information-gathering tool.

Especially after the implementation of the registration system pilot, the number of new stocks increased. However, the lead underwriters’ pricing autonomy remained restricted, giving the buyer’s market more leverage in the pricing process. As the inquiry mechanism continued to use the old system, issues began to emerge in the institutional framework. During this phase, investors were highly enthusiastic about participating in new IPOs, attempting to gain larger profits, and actively using the inquiry system's constraints on high

bids to manipulate the issuance price, thereby disrupting the issuance process. As a result, the underpricing rate remained abnormally high, and pricing efficiency was relatively low during this period.

The new inquiry rules introduced corresponding reform measures, requiring institutional investors to make reasonable bids as per the guidelines, prohibiting collusion on bid levels or price manipulation, which would alter the bidding structure and break the phenomenon of clustered bids. Specifically, after the reduction in the high-price exclusion rate, institutional investors' psychological concerns about their bids being excluded were alleviated. They began to actively express their true investment intentions, releasing real information about the new stocks, and their bids became more dispersed and reasonable. Furthermore, the adjustment of the "lowest of the four values" limitation broke institutional investors' expectations regarding a bidding ceiling and strengthened internal competition among the buyers. With more dispersed bids, the lead underwriter's pricing decision space increased, enhancing the seller's bargaining power and improving pricing efficiency.

Before the new inquiry rules, the "lowest of the four values" standard used to determine the issuance price was calculated after excluding the top 10% of bids. Now, with the reduction in the exclusion rate, more high bids are retained and included in the average calculation, leading to an increase in the reference price for the IPO issuance. In addition, due to the sluggish market environment, institutional investors with strong valuation abilities began to select high-quality companies and cautiously provide true valuations to reduce post-IPO losses. Investors with insufficient ability gradually withdrew from the market. The pricing strategy shifted from a "bid to win" approach that disregarded the issuer's quality to a more prudent assessment of the company's value, narrowing the gap between primary and secondary market prices. As a result, IPO returns returned to rationality, and the speculative "new stock frenzy" was curbed. In short, after breaking the clustered bidding phenomenon, the inquiry system's information-gathering function was restored, and IPO pricing efficiency improved.

Based on the above analysis, this thesis proposes the following hypothesis regarding the changes in IPO underpricing and pricing efficiency before and after the introduction of the new inquiry rules:

H3: The new inquiry rules reduced IPO underpricing.

Domestic and international literature indicates that in China's underdeveloped market environment, securities firms generally exhibit opportunistic behavior driven by the pursuit of personal gains (Gao et al., 2020; Shao et al., 2013; Shunlin Song & Tang, 2016; Yu et al.,

2013). As rational economic agents, securities firms are likely to collude with issuing companies to inflate the IPO price in order to maximize underwriting revenue (Xu et al., 2009), which negatively impacts the pricing efficiency of IPOs. Haixing Guo and Wan (2011) found that the opportunistic behavior of underwriters leads to a convergence of interests between underwriters and issuers, resulting in IPO prices deviating from their intrinsic value. X. Wang (2014) provided empirical evidence that securities firms pursued higher underwriting fees by increasing the overfunding of IPOs, specifically in 281 IPOs listed on the ChiNext Market from 2009 to 2011.

To regulate the opportunistic behavior of securities firms and better fulfill their role as the "gatekeeper" in the capital market, the *Shanghai Stock Exchange Guidelines for Stock Issuance and Underwriting Business on the STAR Market* introduced the co-investment system for sponsors' related subsidiaries, marking the first appearance of the co-investment mechanism in China's securities market.

How does the co-investment mechanism in the STAR Market affect IPO pricing? This thesis argues that it can be explained from three perspectives: agency theory, reputation theory, and cost-benefit theory.

First, the co-investment behavior enhances the governance function of securities firms, which helps to reduce the earnings management behavior of issuers. According to agency theory, during the IPO process, securities firms are entrusted by the issuers to use their information advantage regarding market supply and demand, as well as their professional valuation capabilities, to determine the pricing and allocation of shares in the primary market. Issuers aim to increase the pricing to raise more funds, while securities firms, in order to ensure a smooth issuance, tend to lower the price. This misalignment of interests leads to agency conflicts (Beatty & Ritter, 1986). It is common for companies to engage in earnings management during the IPO process(Sletten et al., 2018; Xu et al., 2009), and high levels of earnings management may lead to higher underpricing (Kothari et al., 2016). The earnings management behavior of issuers increases the degree of information asymmetry and adverse selection risks in the capital market for IPO companies (Abad et al., 2018), making it easier for securities firms and investors to deviate from the company's actual value when making pricing decisions, resulting in a decline in IPO pricing efficiency.

Unlike typical underwriting by securities firms, co-investing in a listed company is a significant investment, where the securities firm uses its own funds for co-investment, and its returns depend on the company's stock price performance. Co-investment introduces an additional "investor" role for securities firms, aligning their interests more closely with those

of investors, thereby strengthening the firm's supervisory governance function. To minimize risk and maximize returns, co-investing securities firms have enhanced underwriting responsibilities during the filing and advisory period, providing greater motivation and capacity to conduct thorough pre-investment screening. After acquiring shares, they also offer professional assistance in areas such as corporate governance and strategy, reducing earnings management by the issuer, which, in turn, improves the company's overall quality (Booth & Smith, 1986). The higher the co-investment ratio, the stronger the correlation between the securities firm's returns and the quality of the IPO company. Consequently, securities firms have greater incentives to enhance their supervisory responsibilities, strengthen the management of the pricing and allocation process, and fulfill their underwriting duties. During the two to three-year filing and advisory period, securities firms supervise the listed company to improve accounting quality and reduce earnings management. Under the firm's supervision, the issuer's performance quality becomes more standardized, and the pricing of the securities firm becomes more accurate. In other words, co-investment by securities firms improves IPO pricing efficiency by reducing earnings management behaviors of the issuer.

Second, co-investment by securities firms helps to strengthen the role of the reputation mechanism. As intermediaries for the provision and transmission of new stock information, the reputation of securities firms plays a significant role in the pricing efficiency of IPOs. According to reputation theory, a securities firm's reputation is a prerequisite for demonstrating the quality of its value certification. Securities firms pledge their reputation capital to the companies they sponsor (Carter & Manaster, 1990), and through the certification function of their reputation, they provide investors with a basis for judging the quality of the company (Kerl & Walter, 2008). Carter and Manaster (1990) empirically tested U.S. IPO data and confirmed this view, finding that high-reputation securities firms estimate IPO prices more accurately. Shao et al. (2013), based on data from China, also found that good reputation can mitigate the tendency of securities firms to inflate IPO prices. X. Zhang and Zhang (2018) further demonstrated that reputation damage leads to lower IPO pricing efficiency and long-term stock returns for securities firms. So, how does a securities firm's reputation influence IPO pricing?

On one hand, securities firms with high reputations are strong and have higher professional standards, so the IPO pricing efficiency of companies they sponsor and underwrite should be higher. Co-investment strengthens the securities firm's focus on its reputation. In the case of co-investment, a securities firm's reputation can increase the probability of the IPO's successful issuance, enhance market recognition of the issuing

company, and bring financing convenience to the issuer. At the same time, the good performance of the IPO in the secondary market, driven by the securities firm's reputation, can bring substantial investment returns to both investors and the securities firm. The higher the co-investment ratio, the better the economic benefits derived from the securities firm's reputation. Therefore, co-investment reduces the conflict of interest between the securities firm, investors, and issuers, improving the certification effect of the reputation mechanism. There is a positive correlation between the co-investment ratio and the certification effect of the reputation mechanism.

On the other hand, reputation also brings "rents" to the securities firm. Once a securities firm's reputation is damaged, investors will question the firm's certification function, leading to a decrease in the IPO price, which directly threatens the securities firm's future market share and long-term profits(Yunsen Chen & Song, 2018; Chua, 2014; Dai et al., 2014). Co-investment further amplifies the signaling function and penalty mechanism of reputation. Under the registration system, co-investment aligns the securities firm's interests with the company's interests. If the certification is false, once this fraudulent behavior is recognized by the market, it will result not only in reputational loss but also in investment loss. The higher the co-investment ratio, the more severe the consequences of reputation penalties. From the perspective of the reputation mechanism, co-investment strengthens the securities firm's awareness of maintaining its reputation, enhances the positive certification function of its reputation, and reduces the consequences of the reputation penalty mechanism, thereby improving the securities firm's IPO pricing efficiency.

Third, co-investment behavior changes the securities firm's utility function. According to the rational economic agent hypothesis, securities firms, as decision-makers, aim to maximize their own profits, and opportunistic behavior often arises in the market. Prior to the introduction of the co-investment system, the primary benefit for securities firms in the IPO pricing process was underwriting revenue, while the primary cost was reputational damage caused by pricing failures. Securities firms would typically weigh the additional underwriting income from raising the price against the reputational costs of inaccurate pricing, and then determine the IPO issuance price that maximized profits.

After the introduction of the co-investment system on the STAR Market, the securities firm's utility function changed. In addition to underwriting income, the securities firm now also gains income from co-investment, and the costs now include not only reputational loss but also investment failure-related losses. Under this new utility function, assuming that securities firms still pursue profit maximization, co-investment behavior will enhance the

securities firm's IPO pricing efficiency, making the new stock issuance price closer to the company's intrinsic value.

On the one hand, securities firms' co-investment curbs the motivation to raise prices. Although a higher IPO price may yield excess underwriting income in the short-term, in the long-term, stock price will revert to its true value, and inflated IPO price will increase the risk of stock price declines. Co-investment returns could be negative. Additionally, price inflation would damage the firm's reputation and increase co-investment costs, making raising the price suboptimal for securities firms. On the other hand, co-investment also curbs the motivation to underprice. In the short-term, lowering the price directly reduces securities firms' underwriting income; in the long-term, although lowering the price can reduce co-investment costs, it directly harms issuers' interests and intensifies competition among investors in the new stock market, which could hinder long-term cooperation with investors and issuers and damage securities firms' future earnings. Therefore, under profit maximization strategy, underpricing is also not the optimal choice for securities firms.

Thus, from a cost-benefit theory perspective, under the co-investment system, the optimal pricing strategy for securities firms to maximize their own profit is to increase the accuracy of the IPO price. The higher the co-investment ratio, the greater the losses caused by raising or lowering the price, and the stronger the incentive for the securities firm to reasonably determine the IPO price, which in turn helps improve IPO pricing efficiency.

In conclusion, based on governance motives, under the mandatory co-investment system, securities firms will further enhance their underwriting responsibilities and better leverage their asset pricing advantages, thereby improving IPO pricing efficiency. Therefore, the following research hypothesis is proposed:

H4: The co-investment mechanism reduces IPO underpricing.

To provide a clear overview of the hypotheses developed in this study, a summary is presented in Table 4.1.

Table 4.1 Summary of research hypotheses

Hypothesis	Description
H1	After the implementation of the new inquiry rules, the degree of underpricing by the underwriters increases.
H2	After the implementation of the new inquiry rules, the higher the co-investment ratio of the lead underwriter, the greater the downward adjustment of the issuance price.
H3	The new inquiry rules reduced IPO underpricing.
H4	The co-investment system reduces IPO underpricing.

4.2 Research sample and data sources

This thesis focuses on the ChiNext Market's reform under China's registration system. On August 24, 2020, the first batch of registration system pilot enterprises listed on the ChiNext Market, marking China's capital market formally entering a new stage centered on market orientation, rule of law and information disclosure. Taking this milestone as the cutoff, it selects ChiNext-listed companies with IPOs in the three years before and after the registration system's launch (August 1, 2017 – August 31, 2023). This time span enables a thorough analysis of how registration system-driven institutional changes affected the market pricing mechanism.

The study manually compiles quotation data from the preliminary inquiry phase of IPOs, along with their statistical characteristics, and collects data on the sample firms' basic information, financial indicators, and first-day market performance. To ensure data completeness and comparability, firms that adopted only online issuance or had missing key data were excluded, resulting in a final effective sample of 666 IPOs. All data were obtained from the Wind database and cross-verified with publicly available documents such as prospectuses and listing announcements.

The new inquiry rules were officially implemented on September 18, 2021, one year after the ChiNext pilot registration system took effect. To examine the impact of the new inquiry rules on underwriters' price adjustment behavior and IPO underpricing, Hypotheses 1 and 3 are established. IPO firms listed on the ChiNext Market between August 24, 2020, and August 31, 2023, are selected as the sample to ensure that no other institutional changes occurred during this period apart from the inquiry rule reform.

The co-investment mechanism for securities firms was implemented simultaneously with the registration system reform on the ChiNext Market. To analyze the impact of the co-investment ratio on underwriters' pricing behavior and IPO underpricing, Hypotheses 2 and 4 are formulated, using ChiNext IPOs issued between August 24, 2020, and August 31, 2023, as the research sample. During the empirical regression analysis, some observations were automatically excluded from the estimation because of missing values in key explanatory or control variables, or because certain observations failed to meet the requirements of model specification during variable construction (such as logarithmic transformations or ratio calculations). As a result, the final sample used for regression analysis and hypothesis testing consists of 484 observations. This reduction in sample size reflects a

common form of technical sample loss in empirical regression analysis and does not materially affect the consistency or robustness of the research findings.

Based on the temporal features and institutional design of the ChiNext registration system reform, this thesis establishes a systematic research sample and data framework, laying a solid empirical foundation for the subsequent analysis of underwriters' pricing behavior and IPO pricing efficiency under the registration system.

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Chapter 5: Empirical Results and Analysis

5.1 Research design

The empirical analysis in this chapter examines the effects of the new inquiry rules and the mandatory co-investment mechanism, focusing on whether these reforms have altered institutional investors' quotation behavior and underwriters' pricing strategies. Specifically, using ChiNext IPOs issued between August 2017 and August 2023, the study manually compiles detailed data on preliminary inquiry quotations, offering prices, offline subscriptions and allocations, and matches these with first-day trading information to construct a comprehensive micro-level database covering the quotation, pricing, and post-listing performance stages.

Based on this dataset, the study employs multiple linear regression models, using the policy dummy for the new inquiry rules and the co-investment ratio as the core explanatory variables. The dependent variables include IPO underpricing, adjusted underpricing, and issuance price adjustment degree, through which the analysis systematically evaluates the impact of these regulatory adjustments on pricing efficiency in the primary market. Furthermore, by examining secondary-market indicators such as the first-day break rate and turnover, the study assesses whether these reforms have improved price coordination between the primary and secondary markets.

5.1.1 Variable design

5.1.1.1 Dependent variables

(1) IPO Underpricing (UP)

This thesis uses the deviation between the closing price on the first day of trading and the issuance price, which is commonly used in the literature, to calculate the IPO underpricing rate. This is used to measure the efficiency of IPO pricing, as shown in equation 5.1:

$$\mathbf{UP_i} = \frac{\mathbf{p1_i - p0_i}}{\mathbf{p0_i}} \times \mathbf{100}\% \tag{5.1}$$

where $p1_i$ represents the closing price of stock i on its first trading day, and $p0_i$ represents the issuance price of stock i.

At the same time, considering the relatively long interval between the IPO issuance date and the listing date in China, during which market conditions may experience substantial fluctuations, the IPO underpricing rate is adjusted using market returns.

The adjusted IPO underpricing rate (UP_MKT) is calculated using the formula shown in equation 5.2:

$$\mathbf{UP_MKT_i} = \left(\frac{\mathbf{p1_i - p0_i}}{\mathbf{p0_i}} - \frac{\mathbf{M1_i - M0_i}}{\mathbf{M0_i}}\right) \times \mathbf{100\%} \quad (5.2)$$

where $M1_i$ represents the market index on the listing day of stock i, and $M0_i$ represents the market index on the issuance day of stock i. The market index used is the Wind All A-Share Index, which includes all A-share stocks listed on the Shanghai, Shenzhen, and Beijing stock exchanges and is weighted by free-floating market capitalization to comprehensively reflect the overall performance of all A-share listed companies. This thesis also uses the ChiNext Index to make sector-level adjustments (UP_IND) to ensure the robustness of the adjusted results. The market indices are shown in Figures 5.1 and 5.2.



Figure 5.1 Trend of the Wind all A-Share index

Source: Author's calculation based on Wind database.



Figure 5.2 Trend of the ChiNext index

Source: Author's calculation based on Wind database.

(2) Issuance Price Adjustment Degree (PRICEADJ)

Following the method of Shunlin Song (2022), the deviation of the issuance price from the lowest of the four values (the median and weighted average of the remaining bids from offline investors after excluding the highest bid, as well as the median and weighted average of the bids from public funds, social security funds, pension funds, enterprise annuity funds, and insurance funds) is calculated to measure the role of underwriters in the pricing stage. The formula is shown in equation 5.3:

$$\mathbf{PRICEADJ_i} = \frac{\mathbf{p0_i} - \mathbf{p2_i}}{\mathbf{p2_i}} \tag{5.3}$$

where $p2_i$ represents the lowest value between the weighted average and median of the remaining bids for stock i after excluding the highest bid in the preliminary inquiry.

The notation and definitions of the dependent variables are presented in Table 5.1.

Table 5.1 Dependent variables

Variable Name	Variable Symbol	Variable Description
IPO Underpricing	UP	(First day closing price - Issue price) / Issue price × 100%
Adjusted IPO Underpricing 1	UP_MKT	((First day closing price - Issue price) / Issue price - Market return based on the Wind All A-Share Index) × 100%
Adjusted IPO Underpricing 2	UP_IND	((First day closing price - Issue price) / Issue price - Market return based on sector index) × 100%
Issuance Price Adjustment Degree	PRICEADJ	(Issuance price - Lowest of the four pricing values) / Lowest of the four pricing values × 100%

5.1.1.2 Explanatory Variables

(1) Policy Dummy Variable (NEW_INQ)

This thesis sets a policy dummy variable to distinguish whether the IPO issuance is affected by the introduction of the new inquiry rules in September 2021. A value of 0 for the policy dummy variable indicates that the stock was issued before the new inquiry rules in September 2021, with a maximum exclusion rate of no less than 10%, and underwriters' pricing was subject to implicit regulation. A value of 1 indicates that the stock was issued after the new inquiry rules in September 2021, with the maximum exclusion rate changed to "no more than 3% and no less than 1%", granting underwriters greater autonomy in pricing.

(2) Co-investment Ratio of Securities Firms (COINV)

Based on the preliminary offline allocation results and the online subscription results published by companies listed on the ChiNext Market, the number of shares issued by underwriters (as sponsors) participating in the initial strategic allocation is obtained. The ratio

of the final strategic allocation by the underwriters (sponsors) to the total issuance is calculated and used as a measure of the underwriters' co-investment ratio.

The notation and definitions of the explanatory variables are presented in Table 5.2.

Table 5.2 Explanatory variables

Variable Name	Variable Symbol	Variable Description
Policy Dummy Variable	NEW_INQ	A value of 0 indicates the stock was issued before the September 2021 inquiry rule was implemented, and 1 indicates it was issued after the rule was implemented.
Underwriter Co-investment Ratio	COINV	The proportion of the strategic allotment received by the underwriter as the initial strategic investor relative to the total issuance.

5.1.1.3 Control Variables

This chapter employs a multiple linear regression framework to evaluate the impact of the new inquiry rules on institutional investors' quotation behavior and underwriters' pricing decisions. Following prior domestic and international literature and taking into account the characteristics of firms listed on the ChiNext Market, the control variables are constructed across three dimensions: firm characteristics, financial indicators, and IPO issuance and market-related attributes.

(1) Firm characteristics.

Firm age (AGE) measures the number of years from establishment to listing and reflects the firm's lifecycle stage; TOP10 denotes the shareholding ratio of the top ten shareholders, capturing ownership concentration and potential internal governance risks; LN_ASSETS, the logarithm of total assets, proxies for firm size; and RD_EXP, the ratio of R&D expenditure to operating revenue, reflects the firm's innovation input and technological capability.

(2) Financial indicators.

ROA measures the proportion of operating income available to all providers of capital relative to total assets and serves as a benchmark for profitability across peer firms; EPS is a widely used indicator of corporate earnings performance and reflects the profitability attributable to common shareholders; LEV, the asset-liability ratio, captures the proportion of total assets financed through debt.

(3) IPO issuance and market-related attributes.

PE_OFFER measures the valuation level implied by the offering price relative to the issuer's earnings; PE_PEER reflects the valuation benchmark of comparable listed firms in the same industry; LN_SHARES, the logarithm of the number of shares issued, captures IPO size; WINRATE represents online subscription success rates and indicates market demand for the new issue; TURNOVER1 measures trading activity on the first day of listing;

ALLOT_OFF captures the allocation ratio of valid offline institutional bids, representing institutional investors' participation intensity; LN_FEES, the logarithm of offering expenses, reflects the cost borne by the issuer in the IPO process; and UW_REP, an underwriter reputation dummy variable, captures the market standing and professional capability of the lead underwriter.

The notation and definitions of the control variables are presented in Table 5.3.

Table 5.3 Control variables

Variable Name	Variable Symbol	Variable Description
Company Age	AGE	Listing year - Company establishment year
Top 10 Shareholders' Holding Ratio	TOP10	Sum of the holdings of the top 10 shareholders / Total shares of the company × 100%
Total Assets	LN_ASSETS	Average total assets disclosed in the financial reports of the company over the past three years, in ten thousand units, processed with a logarithm
R&D Expenses	RD_EXP	Proportion of R&D expenditure to operating income before the company's listing
Return on Assets	ROA	Average return on assets disclosed in the company's financial reports over the past three years
Earnings Per Share	EPS	Average earnings per share disclosed in the company's financial reports over the past three years
Debt-to-Asset Ratio	LEV	Average debt-to-asset ratio disclosed in the company's financial reports over the past three years
Issuance P/E Ratio	PE_OFFER	Issue price × First day closing total shares / Latest disclosed net profit from the annual report prior to the offering
Comparable P/E Ratio	PE_PEER	Comparable industry P/E ratio disclosed in the prospectus
Issuance Quantity	LN_SHARES	Number of newly issued shares in ten thousand units, processed with a logarithm
Online Subscription Rate	WINRATE	Online allotment quantity / Total valid online subscription quantity × 100%
First Day Turnover Rate	TURNOVER1	First day trading volume / Circulating A-shares
Offline Effective Subscription Allocation Ratio	ALLOT_OFF	Offline allotment quantity / Total valid offline subscription quantity × 100%
Issuance Expenses	LN_FEES	Total issuance expenses, in ten thousand units, processed with a logarithm
Underwriter Reputation	UW_REP	Dummy variable: a value of 1 indicates the lead underwriter is ranked in the top 10, and 0 indicates it is not.

5.1.2 Model specification

This thesis aims to study the impact and underlying reasons of the new inquiry rules and co-investment mechanism on underwriters' underwriting behavior and IPO underpricing in

the context of the registration system. The following multiple linear regression model is established for analysis.

H1 describes the relationship between the new inquiry rules policy and the degree of underwriting price adjustment by the underwriters. To test whether H1 holds, this thesis uses the degree of issuance price adjustment as the dependent variable, the policy dummy variable as the independent variable, and CV represents the control variables. The model is constructed as follows in equation 5.4:

$$\mathbf{PRICEADJ_i = \beta_0 + \beta_1 NEW_INQ_i + \beta_2 CV_i + \varepsilon_i} \quad (5.4)$$

H2 describes the relationship between the co-investment mechanism and the degree of underwriting price adjustment by the underwriters. In this thesis, the degree of issuance price adjustment is used as the dependent variable, the co-investment ratio of the underwriter is used as the independent variable, and CV represents the control variables. The model is constructed as follows in equation 5.5:

$$\mathbf{PRICEADJ_i = \beta_0 + \beta_1 COINV_i + \beta_2 CV_i + \varepsilon_i} \quad (5.5)$$

H3 describes the relationship between the new inquiry rules policy and IPO underpricing. To test whether H3 holds, this thesis uses IPO underpricing as the dependent variable, the policy dummy variable as the independent variable, and CV represents the control variables. The model is constructed as follows in equation 5.6:

$$\mathbf{UP_i = \beta_0 + \beta_1 NEW_INQ_i + \beta_2 CV_i + \varepsilon_i} \quad (5.6)$$

H4 describes the relationship between the co-investment mechanism and IPO underpricing. To test whether H4 holds, this thesis uses IPO underpricing as the dependent variable, the co-investment ratio of the underwriter as the independent variable, and CV represents the control variables. The model is constructed as follows in equation 5.7:

$$\mathbf{UP_i = \beta_0 + \beta_1 COINV_i + \beta_2 CV_i + \varepsilon_i} \quad (5.7)$$

5.2 Descriptive statistics

This study first conducts descriptive statistics on all ChiNext-listed companies within the full sample period to capture the overall distributional characteristics of the data. Subsequently, the sample is divided into two sub-periods—before and after the implementation of the registration system. By comparing the key variable characteristics between the two subsamples, the structural changes brought about by the registration system reform can be visually illustrated. The detailed statistical results are presented in Tables 5.4 to 5.6.

Table 5.4 Descriptive statistics for the full sample

Variables	Mean	Std. Dev.	Min	Max
UP	1.180	1.746	-0.246	19.426
UP_MKT	1.180	1.744	-0.188	19.412
UP_IND	1.180	1.742	-0.188	19.374
PRICEADJ	-0.042	0.050	-0.282	0.027
NEW_INQ	0.443	0.497	0.000	1.000
COINV	0.001	0.006	0.000	0.050
AGE	16.494	5.899	5.000	42.000
TOP10	0.631	0.124	0.232	0.929
LN_ASSETS	12.349	0.795	9.739	18.066
RD_EXP	0.044	0.041	0.000	0.526
ROA	0.050	0.054	-0.171	0.364
EPS	0.680	0.999	-2.833	12.096
LEV	0.304	0.169	0.028	0.842
PE_OFFER	34.807	24.038	7.98	333.390
PE_PEER	36.058	13.612	0.000	147.210
LN_SHARES	7.990	0.584	6.839	10.901
WINRATE	0.022	0.010	0.009	0.114
TURNOVER1	0.493	0.294	0.000	0.890
ALLOT_OFF	0.024	0.021	0.000	0.188
LN_FEES	8.863	0.472	7.512	10.272
UW_REP	0.419	0.494	0.000	1.000

Table 5.5 Descriptive statistics for the ChiNext sample before the implementation of the registration system

Variables	Mean	Std. Dev.	Min	Max
UP	0.440	0.000	0.439	0.441
UP_MKT	0.432	0.055	0.195	0.539
UP_IND	0.426	0.072	0.147	0.559
PRICEADJ	-0.006	0.035	-0.239	0.000
NEW_INQ	0.000	0.000	0.000	0.000
COINV	0.000	0.000	0.000	0.000
AGE	15.344	5.249	6.000	32.000
TOP10	0.544	0.127	0.232	0.871
LN_ASSETS	12.583	0.995	9.739	18.066
RD_EXP	0.036	0.045	0.000	0.252
ROA	0.042	0.061	-0.150	0.249
EPS	0.664	1.429	-0.923	12.096
LEV	0.367	0.179	0.054	0.842
PE_OFFER	22.069	1.954	13.950	22.990
PE_PEER	37.651	12.683	14.550	94.150
LN_SHARES	7.983	0.575	6.908	10.309
WINRATE	0.028	0.015	0.012	0.114
TURNOVER1	0.002	0.004	0.000	0.041
ALLOT_OFF	0.012	0.017	0.000	0.134
LN_FEES	8.542	0.362	7.784	9.811
UW_REP	0.450	0.499	0.000	1.000

Table 5.6 Descriptive statistics for the ChiNext sample after the implementation of the registration system

Variables	Mean	Std. Dev.	Min	Max
UP	1.353	1.888	-0.246	19.426
UP_MKT	1.355	1.883	-0.188	19.412
UP_IND	1.356	1.878	-0.188	19.374
PRICEADJ	-0.049	0.050	-0.282	0.027
NEW_INQ	0.611	0.488	0.000	1.000
COINV	0.001	0.007	0.000	0.050
AGE	16.919	6.058	5.000	42.000
TOP10	0.660	0.110	0.268	0.929
LN_ASSETS	12.262	0.707	11.030	16.953
RD_EXP	0.047	0.040	0.000	0.526
ROA	0.053	0.051	-0.171	0.364
EPS	0.688	0.807	-2.833	6.980
LEV	0.282	0.161	0.028	0.784
PE_OFFER	39.005	26.781	7.980	333.390
PE_PEER	35.385	13.737	0.000	147.210
LN_SHARES	7.991	0.592	6.839	10.901
WINRATE	0.019	0.006	0.009	0.057
TURNOVER1	0.650	0.116	0.330	0.890
ALLOT_OFF	0.026	0.019	0.000	0.188
LN_FEES	8.968	0.458	7.512	10.272
UW_REP	0.410	0.492	0.000	1.000

As shown in Tables 5.4 to 5.6, there is a significant IPO underpricing phenomenon in China's new issue market, with the mean underpricing rate reaching 118% for the full sample. The grouped analysis reveals a structural difference in underpricing levels before and after the ChiNext registration system reform: the average underpricing rate was 441% before the reform, rising sharply to 135.3% afterward, with the maximum value expanding to 1,942.6%. This change aligns with the institutional adjustment that removed the daily price fluctuation limit on the first trading day under the registration system.

The relaxation of pricing constraints under the registration system has allowed optimistic investors to dominate the pricing process. Their overly positive expectations regarding firms' growth prospects generate positive feedback through secondary-market price mechanisms, thereby widening IPO underpricing. As shown in Figures 5.3 (a) to (c), the market-adjusted underpricing measures (UP_MKT and UP_IND) exhibit an upward trend, indicating that the systematic increase in underpricing is directly associated with institutional changes under the registration system, such as greater pricing marketization and the relaxation of price-limit restrictions. The variation in first-day turnover presented in Figure 5.3 (d) further corroborates the rise in secondary-market trading activity following the reform.

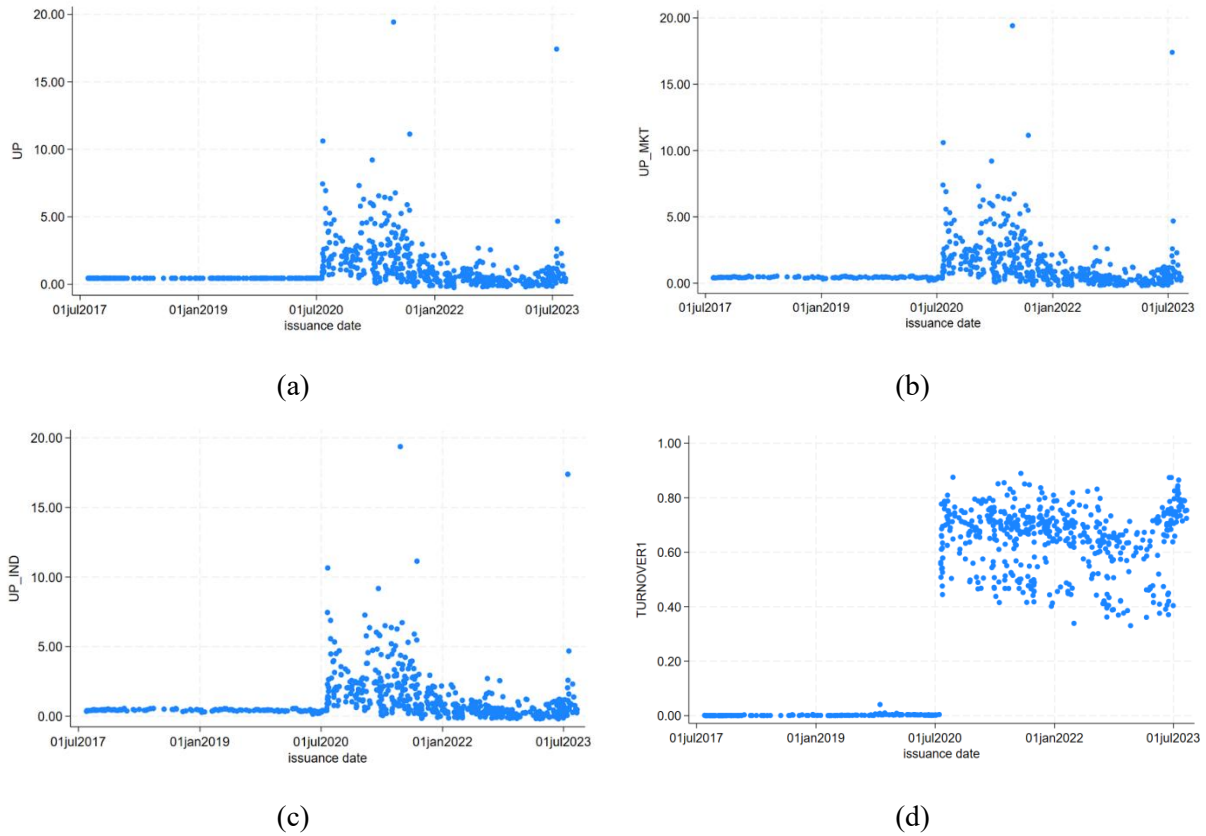


Figure 5.3 Changes in relevant indicators before and after the registration system reform. (a) Changes in IPO underpricing (b) Changes in IPO underpricing adjusted by market index (c) Changes in IPO underpricing adjusted by sector index (d) Changes in turnover rate

Source: Author's calculation based on the sample data.

As shown in Tables 5.4 to 5.6, the mean value of the offering price adjustment variable (PRICEADJ) for the full sample is –0.042, indicating that IPO offering prices are generally set below the lower bound of the initial inquiry range. As illustrated in Figure 5.4, the grouped analysis reveals that the magnitude of negative price adjustment deepened significantly after the registration system reform, and the range of minimum values also widened, reflecting underwriters' increasingly conservative pricing behavior under the new regulatory environment.

From the perspective of principal–agent theory, underwriters, acting as agents of issuers, face a dual-objective conflict: they must maximize the issuer's financing proceeds while simultaneously minimizing the risk of post-listing price declines. Although the registration system reform strengthened information disclosure requirements, the heightened valuation uncertainty of innovative enterprises has led underwriters to adopt risk-averse strategies—intentionally expanding downward price adjustments to hedge against market volatility.

Further analysis from the reputation theory perspective suggests that underwriters are highly sensitive to reputational losses resulting from post-listing price declines. Under the approval system, the regulatory review process provided implicit credit endorsement for IPOs, rendering the risk of price drops relatively controllable. However, under the registration system, where information disclosure serves as the core regulatory principle, underwriters face greater compliance responsibilities. Once a stock falls below its offering price, it not only exposes the underwriter to potential investor lawsuits but also undermines its reputation among institutional investors in the inquiry process, thereby jeopardizing future underwriting opportunities. This institutional shift has become a key factor driving underwriters toward more conservative pricing behavior.

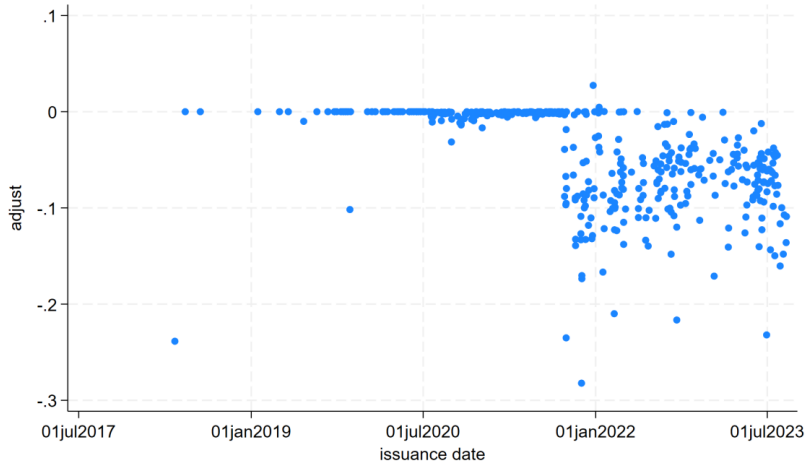


Figure 5.4 Changes in the degree of offering price adjustment

Source: Author's calculation based on the sample data.

Among the control variables, the offering P/E ratio (PE_OFFER) exhibits a significant structural change. The full-sample mean is 34 times, but it shows substantial dispersion, ranging from 7 to 333, with a range exceeding 40 times. The grouped analysis reveals a clear difference before and after the registration system reform: prior to the reform, the average P/E ratio remained stable below the 23× level, whereas after the reform, it rose sharply to 39×. This change vividly reflects the deregulatory effect of the registration system on the administrative control over P/E ratios.

Under the approval system, the implicit 23× P/E ratio constraint provided market participants with a stable pricing anchor. The registration system reform broke this constraint, leading to a reconstruction of the market valuation framework, which manifested in both an overall upward shift in P/E ratios and increased volatility. The implementation of the new inquiry rules in September 2021 completely lifted the 23× limit. Accordingly, this study takes that point in time as a policy node and reports the key variable characteristics before and after

the implementation of the new inquiry rules, as shown in Tables 5.7 and 5.8, to more accurately capture the market impact of the policy adjustment.

Table 5.7 Descriptive statistics for the sample before the implementation of the new inquiry rules

Variables	Mean	Std. Dev.	Min	Max
UP	2.636	2.327	0.077	19.426
UP_MKT	2.629	2.326	0.076	19.412
UP_IND	2.620	2.327	0.054	19.374
PRICEADJ	-0.001	0.002	-0.017	0.000
NEW_INQ	0.000	0.000	0.000	0.000
COINV	0.000	0.000	0.000	0.000
AGE	16.155	5.488	5.000	30.000
TOP10	0.633	0.118	0.268	0.909
LN_ASSETS	12.194	0.696	11.030	14.645
RD_EXP	0.040	0.026	0.000	0.183
ROA	0.043	0.059	-0.171	0.364
EPS	0.469	0.854	-2.833	4.877
LEV	0.330	0.174	0.038	0.784
PE_OFFER	24.582	12.490	7.980	94.990
PE_PEER	37.112	14.876	0.000	147.210
LN_SHARES	7.952	0.575	6.839	10.137
WINRATE	0.016	0.004	0.009	0.033
TURNOVER1	0.663	0.109	0.415	0.890
ALLOT_OFF	0.018	0.019	0.000	0.188
LN_FEES	8.672	0.385	7.512	10.150
UW_REP	0.323	0.469	0.000	1.000

Table 5.8 Descriptive statistics for the sample after the implementation of the new inquiry rules

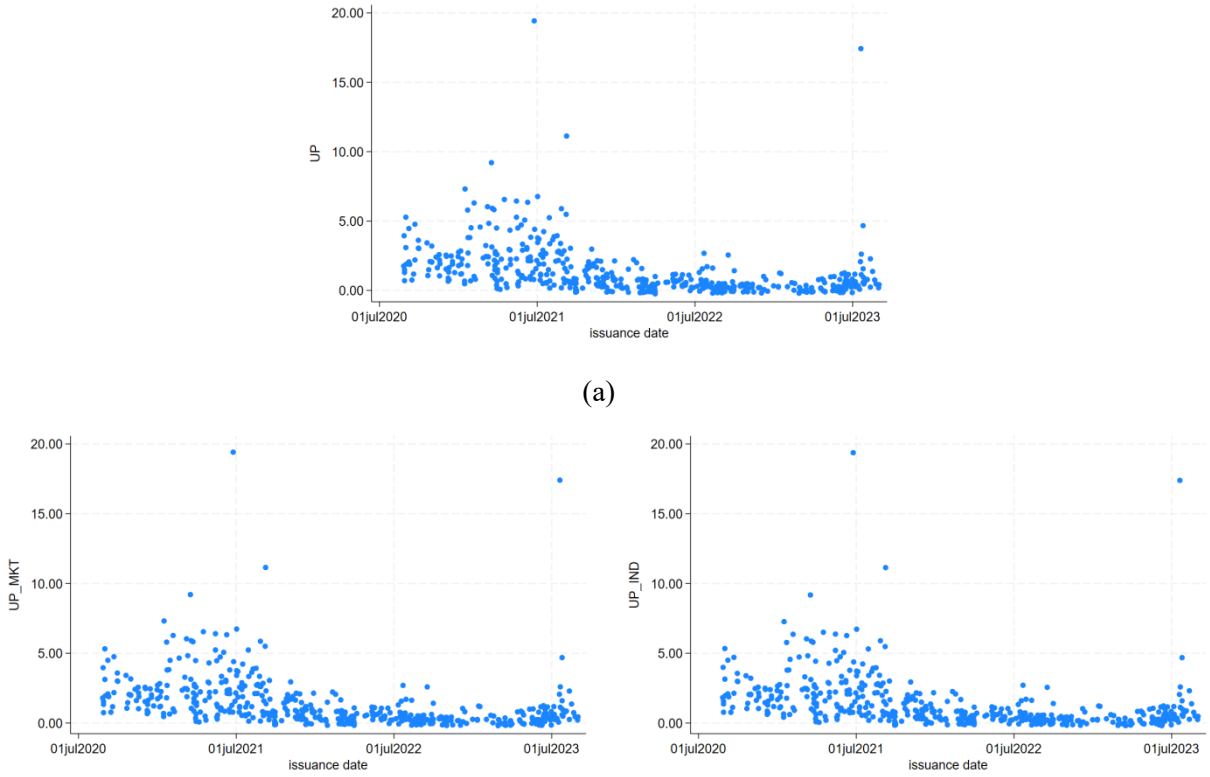
Variables	Mean	Std. Dev.	Min	Max
UP	0.675	1.345	-0.246	17.425
UP_MKT	0.683	1.343	-0.188	17.405
UP_IND	0.690	1.339	-0.188	17.391
PRICEADJ	-0.072	0.046	-0.282	0.027
NEW_INQ	1.000	0.000	1.000	1.000
COINV	0.002	0.009	0.000	0.050
AGE	17.152	6.272	5.000	42.000
TOP10	0.676	0.100	0.379	0.929
LN_ASSETS	12.278	0.645	11.221	14.840
RD_EXP	0.050	0.046	0.000	0.526
ROA	0.057	0.042	-0.096	0.260
EPS	0.781	0.662	-2.123	4.633
LEV	0.260	0.146	0.028	0.679
PE_OFFER	45.950	29.509	11.160	333.390
PE_PEER	33.911	13.045	0.000	111.010
LN_SHARES	7.998	0.593	6.908	10.511
WINRATE	0.021	0.007	0.010	0.056
TURNOVER1	0.640	0.122	0.330	0.874
ALLOT_OFF	0.029	0.016	0.000	0.104
LN_FEES	9.121	0.420	7.948	10.272
UW_REP	0.440	0.497	0.000	1.000

A comparative analysis of Tables 5.7 and 5.8 indicates that the implementation of the new inquiry rules on September 18, 2021, had a significant impact on the IPO market. Empirical results show that, following the adoption of the registration system on the ChiNext Market,

the average IPO underpricing rate (UP) decreased markedly—from 263.6% before the implementation of the new inquiry rules to 67.5% afterward—supporting the theoretical hypothesis that the new inquiry rules help reduce IPO underpricing.

Regarding the offering P/E ratio (PE_OFFER), the policy effect is even more pronounced. The data reveal that the mean P/E ratio increased sharply from 24.58× before the new inquiry rules to 45.95× after their implementation, representing an 86.9% rise. Meanwhile, the upper bound of the P/E ratio range expanded from 95× to 333×, rapidly breaking away from the long-standing 23× limit.

Focusing on the post-reform period under the registration system, as illustrated in Figure 5.5, the IPO underpricing indicators on the ChiNext Market remained at a persistently high level after the implementation of the registration system due to the removal of the first-day price fluctuation limit. However, following the introduction of the new inquiry rules, the underpricing rate declined sharply, indicating a clear suppressive effect of the new inquiry rules on IPO underpricing.



(a)

(b)

(c)

Figure 5.5 Changes in IPO underpricing before and after the new inquiry rules under the registration system. (a) Changes in IPO underpricing (b) IPO underpricing adjusted by market index (c) Changes in IPO underpricing adjusted by sector index

Source: Author's calculation based on the sample data.

5.3 Multicollinearity test

Because multicollinearity can reduce the statistical significance and estimation accuracy of regression coefficients, conducting a multicollinearity diagnostic prior to regression analysis is essential for ensuring the reliability of empirical results. Accordingly, this study performs a multicollinearity test on all explanatory and control variables before estimating the regression models. The results are presented in Table 5.9.

Table 5.9 Results of the multicollinearity test

Variables	VIF
NEW_INQ	2.290
COINV	1.160
AGE	1.040
TOP10	1.280
LN_ASSETS	3.440
RD_EXP	1.620
ROA	3.070
EPS	3.630
LEV	2.080
PE_OFFER	2.070
PE_PEER	1.220
LN_SHARES	2.740
WINRATE	2.560
TURNOVER1	1.310
ALLOT_OFF	1.520
LN_FEES	2.410
UW_REP	1.100
Mean VIF	2.030

Based on the test results, all variables exhibit VIF values below 5, and the mean VIF is 2.030, which is well below the commonly used thresholds of 5 or 10 in the academic literature. This indicates that no substantial linear correlations exist among the explanatory variables in the regression models, and therefore multicollinearity is not a concern. Consequently, the coefficient estimates in the subsequent regression analyses are unlikely to be materially biased due to multicollinearity, and the statistical significance, coefficient signs, and economic interpretations of the regression results can be regarded as reliable and robust.

5.4 Analysis of the impact of the new inquiry rules on underwriters' pricing behavior

To examine the impact of the new inquiry rules policy variable (NEW_INQ) on the degree of underwriters' offering price adjustment (PRICEADJ) after the implementation of the new

inquiry rules, this study applies the regression model specified in Equation (5.4). The results are presented in Table 5.10.

Table 5.10 Regression results of the impact of the new inquiry rules on underwriters' pricing behavior

Variables	PRICEADJ	t-value
NEW_INQ	-0.078***	-14.720
AGE	0.000	0.890
TOP10	0.018	1.100
LN_ASSETS	-0.003	-0.700
RD_EXP	-0.059	-1.160
ROA	0.027	0.420
EPS	-0.006	-1.270
LEV	0.013	0.920
PE_OFFER	0.000***	4.300
PE_PEER	-0.000*	-1.800
LN_SHARES	-0.002	-0.390
WINRATE	-0.821*	-1.730
TURNOVER1	-0.026	-1.540
ALLOT_OFF	0.350**	2.530
LN_FEES	0.001	0.230
UW_REP	-0.001	-0.340
Constant	0.053	0.960
Observations	484	
R-squared	0.555	

Notes: *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

The regression results indicate that the overall model demonstrates a good fit, and both the policy variable and control variables exhibit significant linear relationships with the degree of offering price adjustment. The coefficient of the core explanatory variable—NEW_INQ —is significantly negative at the 1% level, suggesting that after the policy implementation, underwriters significantly increased the magnitude of downward price adjustments.

From the perspective of policy rationale, the new inquiry rules aim to optimize primary market pricing efficiency by adjusting the quotation constraint mechanism and strengthening information disclosure requirements. Specifically, by reducing the proportion of high-price exclusions and standardizing quotation behavior, the new rules encourage institutional investors to submit bids closer to firms' intrinsic values. However, this adjustment also heightened underwriters' concerns regarding post-listing price declines. The empirical findings show that underwriters significantly increased the downward adjustment of offering prices after the policy implementation, reflecting a trade-off between market-based pricing and the prevention of post-listing losses. This result is consistent with Hypothesis 1, which posits that the implementation of the new inquiry rules strengthens underwriters' incentives to lower offering prices.

The regression results for the control variables provide a more comprehensive analytical perspective:

(1) The offering P/E ratio (PE_OFFER) has a significantly positive effect on the degree of price adjustment (PRICEADJ) at the 1% level, indicating that for firms with higher offering P/E ratios, underwriters tend to reduce the extent of downward price adjustment. This may reflect the market's optimism toward highly valued firms, which reduces perceived post-listing risk.

(2) The comparable industry P/E ratio (PE_PEER) is significantly negative at the 10% level, implying that when the issuer's P/E ratio deviates substantially from that of comparable firms—especially when the issuer's own valuation is lower—underwriters tend to make greater downward price adjustments to mitigate potential risks associated with relative valuation discrepancies.

(3) The offline valid subscription and allocation ratio (ALLOT_OFF) is significantly positive at the 5% level, suggesting that under the registration system, when valuation uncertainty for newly listed ChiNext firms is high, a higher allocation ratio signals institutional recognition of the firm's value. This alleviates information asymmetry and reduces the underwriter's underwriting risk, ultimately leading to smaller downward adjustments in offering prices.

5.5 Analysis of the impact of the co-investment mechanism on underwriters' pricing behavior

To examine the impact of the co-investment mechanism on underwriters' pricing behavior (PRICEADJ) under the registration system, as proposed in Hypothesis 2, this study further applies the regression model specified in Equation (5.5). The regression results are presented in Table 5.11.

Table 5.11 Regression results of the impact of the co-investment mechanism on underwriters' pricing behavior

Variables	PRICEADJ	t-value
COINV	-0.541**	-2.000
AGE	0.000	0.020
TOP10	-0.002	-0.110
LN_ASSETS	0.003	0.550
RD_EXP	-0.031	-0.490
ROA	0.059	0.730
EPS	-0.003	-0.580
LEV	0.034*	1.870
PE_OFFER	0.000	1.320
PE_PEER	0.000	-0.610
LN_SHARES	0.020***	3.030
WINRATE	-3.958***	-7.150
TURNOVER1	0.009	0.440
ALLOT_OFF	0.496***	2.840
LN_FEES	-0.028***	-4.090
UW_REP	-0.004	-0.950
Constant	0.051	0.720
Observations	484	
R-squared	0.294	

Notes: *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

The overall regression model exhibits a good fit, indicating a significant linear relationship between the co-investment mechanism (COINV), the control variables, and the degree of offering price adjustment (PRICEADJ). The coefficient of the core explanatory variable—co-investment mechanism (COINV)—is significantly negative at the 5% level, suggesting that following the implementation of this mechanism, underwriters increased the magnitude of downward price adjustments, thereby confirming Hypothesis 2.

From an institutional perspective, the co-investment mechanism links securities firms' interests to the long-term performance of newly listed companies. Since underwriters must invest their own capital in the IPO, they consider not only short-term underwriting income but also the potential impact of post-listing price volatility on co-investment returns. To avoid losses from post-listing price declines and the associated reputational damage, underwriters tend to adopt more prudent pricing strategies, increasing the extent of price cuts to mitigate secondary market volatility risks.

The lot-winning rate (WINRATE) is significantly negative at the 1% level, indicating that when market subscription demand is strong, underwriters tend to further lower offering prices to guard against short-term speculative risks. In contrast, profitability indicators such as return on assets (ROA) and earnings per share (EPS), as well as the debt-to-asset ratio (LEV), do not show significant effects. This suggests that under the registration system, underwriters'

pricing decisions focus more on firms' growth potential and market acceptance rather than relying solely on historical financial metrics.

5.6 Analysis of the impact of the new inquiry rules and the co-investment mechanism on IPO underpricing

To examine the impact of the new inquiry rules on IPO underpricing (UP) under the registration system, as proposed in Hypothesis 3, this study further applies the regression model specified in Equation (5.6). In addition, the IPO underpricing variable is adjusted separately using the market index and the ChiNext sector index, resulting in two adjusted indicators: the market-index-adjusted IPO underpricing (UP_MKT) and the sector-index-adjusted IPO underpricing (UP_IND). The regression model (5.6) is then executed for each of these indicators, and the regression results are presented in Table 5.12.

Table 5.12 Regression results of the impact of the new inquiry rules on IPO underpricing

	(1)	(2)	(3)
Variables	**UP**	**UP_MKT**	**UP_IND**
NEW_INQ	-1.297***	-1.287***	-1.273***
	(0.175)	(0.175)	(0.175)
AGE	-0.019*	-0.018*	-0.018*
	(0.010)	(0.010)	(0.010)
TOP10	-1.073*	-1.084*	-1.058*
	(0.620)	(0.620)	(0.620)
LN_ASSETS	0.045	0.045	0.040
	(0.176)	(0.176)	(0.176)
RD_EXP	0.080	0.024	0.033
	(1.903)	(1.903)	(1.905)
ROA	-2.943	-3.114	-3.177
	(2.494)	(2.494)	(2.496)
EPS	0.237	0.244	0.247
	(0.165)	(0.165)	(0.165)
LEV	-0.368	-0.382	-0.381
	(0.537)	(0.537)	(0.538)
PE_OFFER	0.000	0.000	0.000
	(0.003)	(0.003)	(0.003)
PE_PEER	-0.008	-0.008	-0.008
	(0.005)	(0.005)	(0.005)
LN_SHARES	0.467**	0.470**	0.471**
	(0.204)	(0.204)	(0.204)
WINRATE	-1.717	-1.688	-2.151
	(18.525)	(18.524)	(18.538)
TURNOVER1	5.477***	5.470***	5.496***
	(0.608)	(0.608)	(0.609)
ALLOT_OFF	-0.666	-0.727	-0.632
	(4.491)	(4.491)	(4.495)
LN_FEES	-1.203***	-1.202***	-1.190***
	(0.220)	(0.220)	(0.220)

Table 5.12 Regression results of the impact of the new inquiry rules on IPO underpricing (continued)

Variables	(1) UP	(2) UP_MKT	(3) UP_IND
UW_REP	0.174	0.170	0.168
	(0.130)	(0.130)	(0.130)
Constant	6.460***	6.426***	6.338***
	(2.161)	(2.161)	(2.163)
Observations	484	484	484
R-squared	0.505	0.503	0.500

Notes: *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. T-values are reported in parentheses.

The regression analysis results indicate that the overall model demonstrates a good fit, suggesting that both the policy variable and the control variables have strong explanatory power for IPO underpricing. In the regression models for IPO underpricing (UP), market-index-adjusted IPO underpricing (UP_MKT), and sector-index-adjusted IPO underpricing (UP_IND), the core explanatory variable—the new inquiry rules (NEW_INQ)—shows a significantly negative effect on all three dependent variables at the 1% significance level. This finding indicates that the implementation of the new inquiry rules significantly reduced the degree of IPO underpricing, thereby confirming the corresponding research hypothesis.

From the perspective of the policy transmission mechanism, the new inquiry rules effectively compressed the room for IPO underpricing. By constraining the proportion of high-price exclusions and regulating institutional quotation behavior, the policy encouraged quotations to align more closely with firms' intrinsic values, thereby reducing pricing deviations in the primary market. This mechanism optimized the price discovery process during book-building, enabling offering prices to better reflect firms' fundamental values and ultimately reducing excessive returns in the secondary market. The results demonstrate that the implementation of the new inquiry rules is consistent with the market-oriented pricing objectives of the registration system reform.

Regarding the control variables, the turnover rate (TURNOVER1) exhibits a significantly positive effect on IPO underpricing at the 1% level, indicating that higher turnover tends to amplify speculative behavior among investors, thereby widening the deviation between market price and offering price. This supports the notion that trading behavior has a magnifying effect on underpricing levels. The shareholding ratio of the top ten shareholders (TOP10) is significantly negative at the 10% level, suggesting that firms with more concentrated ownership structures tend to exhibit stronger corporate governance stability. Such governance characteristics send positive signals of control security and decision-making

efficiency to the market, which reduce investors' required risk premiums and, consequently, lower IPO underpricing.

In contrast, financial indicators such as return on assets (ROA), earnings per share (EPS), and debt-to-asset ratio (LEV) are not statistically significant, indicating that under the registration system—where information disclosure and market-based pricing are emphasized, especially in the ChiNext IPO market—primary market pricing and secondary market trading behavior are less dependent on traditional financial metrics.

Further analysis reveals that both the market-index-adjusted IPO underpricing (UP_MKT) and the sector-index-adjusted IPO underpricing (UP_IND) remain significantly negative at the 1% level, with regression coefficients consistent across adjustment methods. This result suggests that the new inquiry rules not only improved overall market pricing efficiency but also strengthened the pricing coordination effect among firms within the same sector, further confirming the robustness of the research findings.

To examine the impact of the co-investment mechanism on IPO underpricing (UP) under the registration system, as proposed in Hypothesis 4, this study further applies the regression model specified in Equation (5.7). The analysis adjusts IPO underpricing by both the market index and the ChiNext sector index to construct the market-index-adjusted IPO underpricing (UP_MKT) and sector-index-adjusted IPO underpricing (UP_IND) indicators, respectively. The empirical results are presented in Table 5.13.

Table 5.13 Regression results of the impact of the co-investment mechanism on IPO underpricing

	(1)	(2)	(3)
Variables	UP	UP_MKT	UP_IND
COINV	-19.414**	-19.339**	-19.666**
	(9.495)	(9.487)	(9.482)
AGE	-0.025**	-0.025**	-0.025**
	(0.011)	(0.011)	(0.011)
TOP10	-1.416**	-1.425**	-1.394**
	(0.651)	(0.650)	(0.650)
LN_ASSETS	0.273	0.272	0.263
	(0.183)	(0.182)	(0.182)
RD_EXP	0.187	0.130	0.134
	(2.004)	(2.002)	(2.001)
ROA	-1.159	-1.343	-1.427
	(2.612)	(2.610)	(2.609)
EPS	0.122	0.130	0.134
	(0.173)	(0.172)	(0.172)
LEV	-0.276	-0.290	-0.290
	(0.566)	(0.565)	(0.565)
PE_OFFER	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.003)
PE_PEER	-0.004	-0.004	-0.004
	(0.005)	(0.005)	(0.005)

Table 5.13 Regression results of the impact of the co-investment mechanism on IPO underpricing (continued)

Variables	(1) UP	(2) UP_MKT	(3) UP_IND
LN_SHARES	0.756***	0.757***	0.756***
	(0.214)	(0.214)	(0.213)
WINRATE	-60.342***	-59.912***	-59.934***
	(18.440)	(18.425)	(18.414)
TURNOVER1	5.446***	5.439***	5.469***
	(0.642)	(0.641)	(0.641)
ALLOT_OFF	1.185	1.113	1.219
	(4.759)	(4.755)	(4.752)
LN_FEES	-1.685***	-1.680***	-1.662***
	(0.220)	(0.220)	(0.220)
UW_REP	0.139	0.135	0.134
	(0.137)	(0.137)	(0.137)
Constant	6.331***	6.296***	6.197***
	(2.285)	(2.283)	(2.282)
Observations	484	484	484
R-squared	0.452	0.450	0.448

Notes: *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. T-values are reported in parentheses.

The regression results show that the overall model exhibits a good fit, indicating that the core explanatory variable—the co-investment mechanism (COINV)—and the control variables have strong explanatory power for IPO underpricing. In the regression analyses for IPO underpricing (UP), market-index-adjusted IPO underpricing (UP_MKT), and sector-index-adjusted IPO underpricing (UP_IND), the co-investment mechanism (COINV) variable shows a significantly negative effect on all three dependent variables at the 5% significance level. This finding demonstrates that the implementation of the co-investment mechanism on the ChiNext Market significantly reduces the degree of IPO underpricing, thereby confirming the research hypothesis.

From the perspective of institutional design, when underwriters participate in IPOs with their own capital, their performance becomes directly linked to the post-listing market performance of the issuers. To avoid potential investment losses and protect their market reputation, underwriters tend to assess firms' intrinsic values and market expectations more prudently during the pricing process. This cautious behavior leads to more rational pricing decisions, which in turn help curb speculative trading in the secondary market. The empirical evidence shows that higher co-investment ratios significantly reduce IPO underpricing, consistent with the theoretical expectation that the co-investment mechanism effectively mitigates IPO underpricing.

The results also indicate that the offering P/E ratio (PE_OFFER) has a significant negative effect on IPO underpricing (UP) at the 1% level. This finding supports the issuance

pricing efficiency hypothesis, which posits that when firms are issued at higher P/E ratios, their growth expectations are already incorporated into the offering price, thereby reducing excess returns in the secondary market and leading to lower underpricing. However, the comparable industry P/E ratio (PE_PEER) is not statistically significant. This may be attributed to the innovation-driven characteristics of ChiNext firms—these companies often possess unique growth trajectories and competitive barriers, making it difficult to accurately capture their intrinsic value using industry-based P/E comparisons, thus reducing the explanatory power of this variable.

Regarding the control variables, the online winning rate (WINRATE) is significantly negative at the 1% level, suggesting that lower winning rates may encourage underwriters, under the constraints of the co-investment mechanism, to adopt more cautious pricing strategies, thereby dampening speculative behavior and reducing IPO underpricing. Meanwhile, the turnover rate (TURNOVER1) shows a significantly positive relationship with IPO underpricing at the 1% level, further supporting the amplifying effect of secondary market trading sentiment and speculative activity on underpricing. The offering P/E ratio (PE_OFFER) again exhibits a negative but statistically insignificant coefficient, consistent with the pricing efficiency hypothesis that higher offering P/E ratios reflect investors' growth expectations, thereby reducing the magnitude of IPO underpricing.

The shareholding ratio of the top ten shareholders (TOP10) is significantly negative at the 5% level, indicating that firms with more concentrated ownership structures tend to have more stable governance mechanisms, which can reduce investors' risk premiums and consequently lower underpricing. In contrast, financial indicators such as return on assets (ROA), earnings per share (EPS), and debt-to-asset ratio (LEV) remain statistically insignificant, a result consistent with earlier analyses and therefore not further elaborated here. Similarly, the non-significance of the comparable P/E ratio (PE_PEER) again reflects the limitations of using industry benchmarks to evaluate innovation-driven ChiNext firms.

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Chapter 6: Conclusions

6.1 Research conclusions

Based on a sample of ChiNext IPOs issued between August 2017 and August 2023, this study systematically examines the impact of the new inquiry rules and the co-investment mechanism on investment banks' underwriting and pricing behavior as well as on IPO underpricing under the registration system. Through theoretical analysis and empirical testing, the study addresses the research questions proposed in this thesis and arrives at the following key conclusions.

First, the results show that after the introduction of the new inquiry rules, the average P/E ratio of ChiNext IPOs quickly surpassed the long-standing ceiling of 23 times, allowing issuers and underwriters to determine offering prices more freely based on firm fundamentals, industry prospects, and market demand. This policy shift effectively broke the entrenched pricing anchor effect and restored the P/E ratio's essential function of reflecting intrinsic enterprise value. After the reform, the average IPO P/E ratio on the ChiNext Market surged from 25.165× to 46.932×, an increase of 86.5%, while the maximum P/E ratio rose from 115.56× to 333.39×, demonstrating a significant broadening of market pricing space. Fundamentally, this change embodies the principle that "the market plays the decisive role in resource allocation," marking a key step toward the maturation and marketization of China's capital market.

From the perspective of institutional economics, the 23× P/E restriction represents a typical case of *path dependence*. Under the approval system, administrative intervention generated a behavioral inertia that shaped stable pricing expectations among market participants. The new inquiry rules disrupted this inertia by introducing an institutional innovation that shifted the IPO pricing mechanism from being administratively constrained to being information-driven and market-driven. The distortions caused by the 23× limit—such as high underpricing and misallocation of resources—created strong pressure for market-oriented reform, and the new inquiry rules emerged as a critical institutional response in this transformation.

Second, the findings indicate that the registration system reform has significantly reshaped underwriters' pricing logic. The relaxation of P/E ratio constraints, together with strengthened information disclosure requirements, has shifted underwriters from a compliance-oriented "defensive pricing" approach toward a more "value-oriented pricing" framework that relies on firm fundamentals, industry prospects, and market demand.

The co-investment mechanism plays a central role in this transition. The empirical results show that the co-investment ratio is significantly associated with underwriters' tendency to revise offering prices downward at the 5% significance level, suggesting that the mechanism guides underwriters toward more prudent pricing through a chain of risk-sharing, reputational discipline, and long-term incentive alignment.

Third, empirical results indicate that both the new inquiry rules and the co-investment mechanism significantly influenced underwriters' pricing behavior after the reform. The new inquiry rules and the co-investment mechanism are statistically significant at the 1% and 5% levels, respectively, in explaining underwriters' downward price adjustments. Mechanistically, the new inquiry rules reshaped the information environment, leading to greater valuation uncertainty and inducing underwriters to adopt more conservative pricing strategies. Under the framework of information asymmetry, when institutional quotations become highly dispersed, underwriters face difficulty in identifying the market's true valuation center. To mitigate the risk of post-listing price drops, the rational strategy is to expand the downward adjustment of offering prices. The co-investment mechanism, on the other hand, reconfigures the incentive structure by linking underwriters' income to the long-term performance of their invested shares, shifting their objective from short-term underwriting fees toward a balance between long-term investment returns and underwriting income. The interaction between these two mechanisms further reinforces the transformation of pricing logic: the market-based pricing flexibility introduced by the new inquiry rules provides the operational foundation for optimized pricing under the co-investment mechanism, while the latter's risk-sharing design mitigates the potential for excessive pricing arising from deregulation. Nevertheless, the combination of dispersed quotations and capital lock-in also heightens underwriters' *loss aversion*, leading them to adopt more cautious, risk-averse pricing strategies—manifesting as a tendency toward conservative pricing.

Finally, the study reveals a synergistic effect between the new inquiry rules and the co-investment mechanism in jointly mitigating IPO underpricing. Both institutional reforms significantly reduced IPO underpricing rates. Descriptive statistics show that the IPO underpricing rate on the ChiNext Market initially rose from 72% before the reform to 130%

after the launch of the registration system, reflecting short-term speculative reactions to the relaxation of price controls and the temporary removal of daily price limits. However, following the full implementation of the new inquiry rules, the average underpricing rate declined to 59.2%, indicating the market's adaptive adjustment and the stabilizing effect of the new regulatory framework.

Theoretically, the synergistic mechanism of these two policies can be explained through a threefold analytical framework:

(1) Information asymmetry theory suggests that IPO underpricing represents a risk premium for investors' information disadvantage. The new inquiry rules enhance quotation dispersion, and the co-investment mechanism strengthens underwriters' valuation responsibility—both effectively reducing information asymmetry.

(2) Principal–agent theory posits that the co-investment mechanism converts underwriters into shareholders, mitigating the short-term profit orientation of traditional underwriting, while the pricing autonomy granted by the new inquiry rules creates space for this long-term incentive alignment.

(3) Signaling theory holds that underwriters' co-investment behavior conveys confidence in the issuer's value to the market, and the market-based pricing under the new inquiry rules enhances the credibility of this signal, forming a reinforcing feedback loop.

In addition, this study has several limitations. First, the sample covers only the ChiNext Market and does not include data from the STAR Market or the Main Board; future research could be expanded to conduct cross-market comparative studies. Second, the analysis focuses solely on the short-term effects of institutional variables during the period from 2019 to 2023, lacking a follow-up examination of the long-term impacts of the registration system. Third, the study does not conduct an in-depth analysis of the relevant mediating effects.

Future research could expand in the following directions:

(1) Employing a difference-in-differences (DID) model to compare pricing efficiency under the registration and approval systems while controlling for sample selection bias;

(2) Applying machine learning techniques to identify key factor combinations influencing IPO underpricing;

(3) Incorporating behavioral finance experiments to explore the psychological dynamics between underwriters and investors in pricing games.

These extensions would contribute to a more comprehensive understanding of the micro-level effects of the registration system reform and provide stronger theoretical support for the high-quality development of China's capital market.

6.2 Policy recommendations

Based on the above findings and in light of the institutional context and operational characteristics of China’s capital market, this study puts forward a set of systematic policy recommendations. These suggestions aim to further advance the reform of the registration system, enhance the market orientation and effectiveness of IPO pricing in China, and, at the same time, achieve an appropriate balance between pricing efficiency and risk control so as to foster a more rational and disciplined pricing environment.

(1) Optimize the inquiry mechanism design and build a dynamic pricing constraint system.

To address the problem of overly conservative pricing by underwriters following the implementation of the new inquiry rules, it is recommended to establish a dual-track mechanism that combines flexible exclusion ratios and quotation quality assessments. Specifically, drawing on the concept of countercyclical regulation, the proportion of high-price exclusions could be linked to market volatility. For instance, when the monthly volatility of the ChiNext Index exceeds 10%, the exclusion ratio could be temporarily increased from 3% to 5%, preventing both excessive collusion among institutional investors and over-dispersion of quotations that might lead to unnecessary price reductions by underwriters.

At the same time, an evaluation system for the quotation quality of offline investors should be introduced, linking allocation eligibility to quotation deviation. Institutions whose quotations deviate by more than 20% from the industry average for multiple consecutive rounds could face a one- to three-month inquiry restriction, encouraging more value-based quotation behavior. The inquiry process should also be refined by introducing a post-inquiry price communication stage, allowing underwriters and institutional investors to adjust extreme quotations. This would maintain pricing flexibility while reducing mispricing caused by information asymmetry. For technology-based or unprofitable firms with high valuation uncertainty, an industry expert review mechanism could be added to provide professional valuation references, mitigating the risk of excessive pricing conservatism due to information insufficiency. In addition, the “lowest of four valuation metrics” restriction could be moderately relaxed, allowing underwriters to proceed with issuance at a higher price if they enhance disclosure obligations—such as publishing risk-specific statements—rather than delaying issuance, thus improving pricing efficiency.

(2) Improve the co-investment mechanism to strengthen interest alignment and risk sharing.

To further enhance the disciplinary effect of the co-investment requirement on underwriters, regulators may explore differentiated co-investment arrangements or more flexible lock-up structures. Given the higher valuation uncertainty associated with unprofitable firms and technology-intensive issuers, a tiered or progressive co-investment framework could be considered to encourage greater prudence from underwriters when pricing offerings with elevated uncertainty. Likewise, for firms in strategic emerging industries, it may be beneficial to examine the use of longer or phased lock-up periods to better align underwriters' incentives with the long-term value of the issuer rather than short-term market fluctuations.

At the same time, to alleviate potential liquidity pressure caused by mandatory co-investment, a preparatory funding mechanism could be explored, allowing underwriters to allocate a portion of underwriting income as a designated reserve for future co-investment obligations. This approach would help reduce capital strain without weakening the intended disciplinary effect.

(3) Strengthen market infrastructure and foster an ecosystem of information transparency and rational investment.

Given the persistence of information asymmetry under the registration system, a disclosure evaluation framework centered on incremental information should be developed. IPO prospectuses could include a dedicated section on innovation indicators, requiring firms to detail the specific use of R&D expenditures, patent quality, and technological barriers, thereby lowering information acquisition costs for investors. The weak correlation between R&D investment and underpricing suggests inadequate disclosure effectiveness, which can be improved through targeted disclosures that enhance the signaling value of innovation inputs.

Additionally, policies such as tax incentives and broadened participation channels should be introduced to attract long-term institutional investors—such as pension funds and social security funds—into IPO subscriptions, with the goal of raising their share to over 50%, thereby mitigating speculative distortions by short-term investors. Investor education should also be strengthened by developing a risk classification system for new stock investments and implementing investor suitability management for high-risk IPOs to encourage rational participation and reduce speculative shocks to pricing outcomes.

(4) Establish a coordinated institutional evaluation mechanism to dynamically optimize policy interactions.

To ensure the synergistic effectiveness of reform measures, it is recommended to establish an evaluation framework incorporating multiple dimensions—such as pricing efficiency, underpricing rate, and market activity. A single underpricing indicator alone is insufficient to fully capture reform outcomes, whereas multidimensional evaluation can better reflect the balance between marketization and risk control. The degree of constraint imposed by the inquiry and co-investment mechanisms could then be adjusted accordingly.

Underwriters could also be allowed to exercise overallotment options for IPOs with high risk of price declines, buffering early-stage market volatility and mitigating investor losses. Furthermore, a cross-departmental policy coordination mechanism should be established to integrate the regulatory resources of the CSRC, stock exchanges, and industry associations, avoiding policy overlaps or conflicts and ensuring consistent implementation standards for the new inquiry rules and the co-investment mechanism, thereby enhancing the stability of market expectations.

(5) Deepen the application of regulatory technology (RegTech) to enhance market governance modernization.

Leveraging big data and artificial intelligence, an intelligent inquiry supervision platform should be established to monitor offline investor quotation behavior in real time, detect collusive bidding or price manipulation, and improve regulatory precision. Machine learning models could be applied to score the rationality of institutional quotations, with persistently low-scoring institutions placed under enhanced supervision, thereby compelling them to improve pricing professionalism.

A pricing quality archive for underwriters could also be developed, linking pricing deviation rates to business qualifications—restricting project participation for firms with consistently high pricing deviations, thus strengthening reputational discipline.

In addition, data-sharing mechanisms among the CSRC, stock exchanges, and the China Securities Depository and Clearing Corporation should be promoted to create an integrated regulatory system covering the entire IPO process. By analyzing investor subscription and trading behavior, authorities can identify high-frequency speculative accounts and implement differentiated regulatory measures—such as higher transaction costs or subscription restrictions—to curb speculation. Finally, blockchain technology could be utilized to record and authenticate the inquiry process, ensuring that quotation records are tamper-proof, enhancing market transparency and credibility, and providing robust technological support for the ongoing registration system reform.

6.3 Contributions

Against the backdrop of the ongoing implementation of the registration system reform and the continuous refinement of IPO issuance and pricing mechanisms, this study systematically examines how institutional changes influence underwriters' behavior and pricing efficiency in the primary market—an issue that has received sustained attention in the literature but remains insufficiently resolved. Through a combination of theoretical analysis and empirical testing, this thesis investigates investment banks' pricing behavior and the associated institutional constraint mechanisms under the registration system. On this basis, the main academic contributions of this thesis are summarized as follows.

First, this thesis incorporates the two core institutional arrangements under the registration system—the new inquiry rules and the mandatory co-investment mechanism for securities firms—into a unified analytical framework, examining their respective impacts on underwriters' pricing behavior and IPO underpricing. Most prior studies have focused on a single institutional arrangement and lacked a systematic investigation of their combined effects, resulting in an incomplete understanding of how underwriters behave under changing institutional environments. By analyzing both systems within a unified institutional context, this study provides a more comprehensive view of how the registration system reform influences underwriting models and market pricing efficiency. The empirical findings show that the new inquiry rules make underwriters more cautious during the quotation stage, leading to a significant increase in the downward adjustment of issue prices, while the co-investment mechanism, by reinforcing risk-sharing responsibilities, encourages underwriters to adopt more rational pricing decisions and increases the extent of downward adjustments. These findings not only confirm the intended objectives of the institutional design but also offer new empirical evidence on how the reform affects the functioning of the market.

Second, this thesis integrates multiple research approaches—combining literature review and institutional comparison to reveal theoretical logic and institutional evolution, and employing descriptive statistics and multiple linear regression models for empirical testing. This mixed-methods design ensures logical completeness while enhancing the scientific rigor and robustness of the findings through data-driven quantitative analysis. Compared with previous studies that tend to rely heavily on qualitative discussions, this research provides

solid empirical evidence on the significant relationships between institutional factors and pricing outcomes.

Third, this study selects IPO cases from the ChiNext Market before and after the implementation of the registration system as its research sample, focusing on the evaluation of institutional effects within this specific board. Unlike previous studies that often use the STAR Market or the entire A-share market as samples, this targeted focus on ChiNext is both practically relevant and institutionally representative. As a key pilot market for the registration system, ChiNext reflects, to a large extent, the system's role in facilitating financing for small and medium-sized enterprises and promoting market-based pricing. The findings reveal that following the reform, the overall level of IPO underpricing on ChiNext has declined, and market pricing efficiency has improved. These results not only enrich the empirical evidence on the registration system reform but also highlight the heterogeneity of its effects across different market segments, providing a foundation for future cross-board comparative studies.

Fourth, this research carries significant practical implications. The findings reveal that while institutional reforms enhance market-oriented pricing efficiency, they may also induce a tendency among underwriters toward conservative pricing. This observation suggests that regulators should maintain a balance between promoting marketization and controlling systemic risks when refining the registration system's institutional design. The empirical results provide theoretical justification and empirical evidence for policymakers seeking to optimize the registration system and offer valuable insights for investment banks in developing underwriting strategies and for investors in understanding quotation logic. Ultimately, as the reform aims to enhance the capital market's efficiency in resource allocation and its capacity to serve the real economy, this study contributes meaningful academic and policy-oriented insights toward achieving that goal.

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