Financial market development, market transparency, and IPO performance

Ying Sophie Huang, Mengyu Li, Carl R. Chen

PII: S0927-538X(19)30030-7
DOI: https://doi.org/10.1016/j.pacfin.2019.03.007
Reference: PACFIN 1130

To appear in: *Pacific-Basin Finance Journal*

Received date: 21 January 2019
Revised date: 4 March 2019
Accepted date: 11 March 2019

Please cite this article as: Y.S. Huang, M. Li and C.R. Chen, Financial market development, market transparency, and IPO performance, Pacific-Basin Finance Journal, https://doi.org/10.1016/j.pacfin.2019.03.007

Financial Market Development, Market Transparency, and IPO Performance

Ying Sophie Huang[1] sophiehuangying@zju.edu.cn, Mengyu Li[2,*] 3100104391@zju.edu.cn,

Carl R. Chen[3] rchen1@udayton.edu

[1]School of Management, Zhejiang University, Capital Market Research Center, Zhejiang University, Academy of Financial Research, Zhejiang University Hangzhou, Zhejiang 310058, China
[2]School of Economics, Zhejiang University Hangzhou, Zhejiang 310027, China
[3]Department of Economics and Finance, University of Dayton, Dayton, OH 45469-2251, United States

[*]Corresponding author.

JEL classification: G30

Ying Sophie Huang gratefully acknowledges the financial supports provided by the National Natural Science Foundation of China (Grant No. 71573228) and the Academy of Financial Research, Zhejiang University (Grant No. XK18001). All errors are our responsibility.

Abstract

In a pseudo-multinational setting, we test IPO performance for firms in locations with differential financial market development under one regulatory umbrella, mitigating the difficulties arising from observable or unobservable between-country heterogeneity. We find evidence that firms located in better-developed financial markets experience less underpricing and better long-run performance due to higher market transparency and less information asymmetry. Furthermore, we find greater benefits of financial market development on IPO initial pricing for financially constrained firms. Regulatory reforms reduce

underpricing and enhance the impact of financial market development on underpricing. Our results hold particularly well for non–state-owned private firms.

Keywords: Initial public offerings (IPOs); financial market development; market transparency

1. INTRODUCTION

Initial public offering (IPO) underpricing has been documented internationally and a number of studies have attempted to explain the varying abnormal initial returns across countries. Loughran et al. (1994) is the first to incorporate multinational setting and interpret the differing initial IPO returns from the perspective of market liberalization, contractual mechanisms and regulatory differences across different countries. Boulton et al. (2010) contribute to the debate by providing evidence that corporate governance measured by the relative position of insiders and investors matters for underpricing especially in less-developed countries. Country-specific legal factors, offering methods, earnings quality as well as changes in the financial market environment all are found to have important implications for a country's IPO performance (e.g., Banerjee et al., 2011; Chowdhry & Sherman, 1996; Engelen & Essen, 2010; Lin et al., 2013).

In this paper, we focus on the impact of financial market development on IPO performance. Financial market development benefits the financial environment by improving firm operating performance (Mitton, 2006), reducing the cost of equity capital (Bekaert & Harvey, 2000), and increasing stock market liquidity (Levine & Zervos, 1998). Specifically, a better developed financial market provides channels for the efficient use of savings, improves investment productivity by allocating funds based on market mechanism (Singh 1997; Singh & Weisse, 1998), and reduces the cost of information and thus strengthens the advantage of public financing (Madhavan, 1995; Subrahmanyam & Titman, 1999). The reduction in information asymmetry brought by financial market development mitigates the need for issuers to signal their quality by underpricing (e.g., Allen & Faulhaber, 1989; Chemmanur, 1993; Neupane & Poshakwale, 2012). The phenomenon exists particularly in firms that domicile themselves in segmented and less developed countries (Francis et al., 2010). Similarly, Banerjee et al. (2011) find that firms located in a country with better information dissemination mechanism exhibit less underpricing. Chowdhry & Sherman (1996) also provide evidence that the information asymmetry caused by various information leakage channels could explain the international difference on IPO underpricing. However, literature examining the relation between financial market development and IPO underpricing is still scant. Failing to control for factors such as heterogeneous institutional, regulatory and legal environments across countries, which are

shown to have an impact on cross-country level IPO underpricing (e.g., Banerjee et al., 2011), renders inferences less convincing.

The objective of this study is threefold. First, we attempt to examine the impact of financial market development on IPO underpricing and long-term performance. We believe financial market development is an important factor that explains IPO underpricing differentials across geographical boundaries. To conduct our test, we employ a unique dataset that all firms are within a unified regulatory environment, including legal conditions and offering methods, yet are subject to different financial market conditions. To this end, we assess the impact of different levels of financial market development on IPO stock performance when all Chinese IPO firms are subject to the same set of institutional and legal constraints, and changes in regulations. A key feature of the Chinese economy is that there are 31 province-level administrative units (excluding Hong Kong and Macau), with significant financial market development disparity. Within the last few decades, we have witnessed the emergence of highly developed cities/provinces, such as Beijing, Shanghai, and Guangdong, along with many underdeveloped areas. For example, the 2016 gross domestic product (GDP) of Guangdong province ($1.217 trillion) ranks only slightly behind that of Spain ($1.252 trillion), while Yunnan province is significantly behind at $238 billion. Although these provinces differ dramatically in growth and financial market development, firms in different regions are under one regulatory umbrella subjecting to the same set of regulations and laws in both the seasoned stock market and the IPO market. Therefore, the extent to which financial market development varies across provinces resembles that of a pseudo-multinational market, while it provides ideal natural experimental grounds for examining the impact of financial development on IPO returns without encountering other institutional heterogeneity. Disparities in geographical financial market development and new regulations enforced during our sample period allow us to uncover the dynamics of IPO return patterns over time, which is the main advantage of our database.

Second, we examine the channel through which financial market development influences IPO returns. We propose that companies located in provinces with differential financial market development have various levels of transparency and, hence, are exposed to differing degrees of information asymmetry, which, in turn, could lead to IPO underpricing disparity. To this end of the analysis, our paper sheds lights on the issue of firms' locations and asset pricing (Coval & Moskowitz, 2001; Loughran & Schultz, 2005;

Loughran, 2008; Malloy, 2005). Third, we contribute to the debate on IPO performance beyond initial underpricing. That is, we also examine if financial market development has effect on IPO performance beyond initial underpricing.

Our study contributes to the literature on the following fronts. First, financial market development has significant effects on IPO returns, and underpricing is largely reduced under better financial market conditions. Second, in line with our reasoning of market transparency, we observe a strong and negative relation between financial market development and stock idiosyncratic volatility and stock illiquidity, and a strong positive relation between financial market development and stock turnover ratio, analyst attention and number of underwriters within each province. As stock idiosyncratic volatility, stock illiquidity, stock turnover ratio, analyst attention and number of underwriters are associated with information asymmetry (Jin & Myers, 2006; Levine & Zervos, 1998), our findings indicate that financial market development does reduce information asymmetry and mitigates the need for firms to underprice.

Third, a distinct character of the Chinese economy is the existence of both private and state-owned enterprises (SOEs), it is interesting to examine the different response of these enterprises to the financial market development. We find that SOEs are less sensitive to financial market development compared to non-SOEs. This could be due to the fact that SOEs have easier access to capital from financial institutions that are also government owned. To this end, we shed lights on the debates on market liberalization. Consistent with this finding, we also show that the influence of financial market development on IPO underpricing is stronger if a firm is financially constrained. Finally, we provide evidence on IPO long-run performance. Our test of one-year and three-year buy-and-hold abnormal returns (BHAR) indicates that financial market development could also benefit IPO long-run performance.

The remainder of our paper is organized as follows. In Section 2, we discuss the institutional background of China's financial market development by describing provincial market development disparity and key reforms in the financial market. Section 3 introduces the data and IPO performance measurements. In Section 4, we present the empirical results, showing the channel through which financial market development impacts IPO underpricing. We also examine the effects of financial constraints and ownership structure. In Section 5, we test the relation between long-run underperformance and financial market development. Section 6 provides additional robustness checks and Section 7 concludes the paper.

2. INSTITUTIONAL BACKGROUND

2.1 Provincial Financial Market Development Disparity

Since the late 1970s, China has achieved astonishing economic growth, and the size of its economy is now second only to the United States. However, this growth has also been accompanied by an unbalanced distribution of resources, a widening income gap between coastal and inland regions, and large disparities in financial market development among different provinces. Fan et al. (2011) has developed a series of marketization indexes to measure regional disparities in institutional environment. Their index reading ranges from 0 to 10, with 1997 as the base year. In particular, their index of financial industry marketization is relevant to our research because it provides a quantitative measurement of financial market development disparity. This index is a weighted average of two ratios, the first being the percentage of non–state-owned financial institutions' deposits among all financial institutions' deposits and the second being the percentage of short-term loans in non–state-owned sectors among all short-term loans made by financial institutions. The index developed by Fan et al. (2011) reliably captures the market development disparity among various provinces since both SOE's privileges in gaining access to capital and information and the dominant role of banking system are unique to China (Allen et al., 2005; Sun & Tong, 2003). By identifying the difficulties for disadvantaged non-SOEs to reach for banking resources, the index provides us with a more precise reflection of the financial market conditions in China. An alternative measurement of financial market development by Demirgüç-Kunt & Levine (1996) and Love (2003), using market capitalization over GDP, might not be suitable for China, since it does not consider the special ownership structure of Chinese firms and is mostly used for country-level comparison.[1].

The index we employ has also been exploited by Jiang et al. (2010), Chen et al. (2017), among others. China's banking industry is dominated by state-owned commercial banks that have historically funneled financial capital into government-run projects, including SOEs. In the process of banking system reforms, commercial banks and joint-stock banks have been successively established to replace the old mono-banking system (Chong et al., 2013). The establishment of these banks, however, has not been an overnight

[1] The pair-wise correlation between the two measures is 0.656.

accomplishment. Special economic zones (e.g., Shenzhen) and coastal areas (e.g., Shanghai, Zhejiang province, Jiangsu province) were among the first beneficiaries of the banking system's development. Since self-fundraising and bank loans are the two most important financing channels in China (Allen et al., 2005), being located in a better-developed financing environment would offer a company more choices in external financing methods, and thus going public.

Table 1 shows the summary statistics of the financial market development index (FMDI) among 31 provinces/regions from 1997 to 2009.[2] We include the number of IPOs and average underpricing in these provinces in the last two columns. As can be seen, Shanghai, Guangdong, Beijing, Tianjin, and Zhejiang rank in the top five in terms of the mean FMDI. The underpricing of IPOs in these areas is relatively moderate compared to Sichuan (471.06%), Hubei (244.25%) and Shaanxi (171.88%). We note that more companies initiate their first public offerings in better-developed areas. The five locations with the highest numbers of IPOs cover nearly 50% of all IPOs in China: Guangdong (141 IPOs), followed by Zhejiang (117 IPOs), Beijing (110 IPOs), Jiangsu (107 IPOs) and Shandong (76 IPOs). Even though all areas in China have benefited from the financial sector's evolution (the mean FMDI surged from 2.5 in 1997 to 10.2 in 2009, a 308% increase), there is still distinct geographic disparity.

The main argument of this research is that a better-developed market enjoys greater transparency and information quality (Demirgüç-Kunt & Levine, 1996), which in turn could reduce information asymmetry and IPO underpricing. As later shown in Table 4, we find significant differences in the stock idiosyncratic volatility, stock illiquidity, stock turnover ratio, analyst attention, and the number of underwriters between firms in better- and less-developed provinces/regions. Generally, the stocks of companies in better-developed areas are more liquid, less volatile and attract more analyst attention and underwriters. This preliminary evidence is consistent with prior literature, in that information asymmetry is lower for local firms and/or firms in urban areas since fund managers and analysts prefer to have informational advantage offered by local firms and firms in big cities (e.g. Coval & Moskowitz, 2001; Loughran & Schultz, 2005; Malloy, 2005).

[2] There are minor reforms on IPO issuance and pricing mechanisms during our sample period. We alleviate the influence of these reforms by controlling year effects in all of our tests.

2.2 Key Financial Market Reform

China has undergone many financial market reforms. Major reforms include the non-tradable shares (NTSs) reform and reforms to increase the quality of listed companies, restructure securities firms, strengthen the role of institutional investors, and improve the legal and regulatory framework of the market. Among these reforms over the years, the NTS reform is by far the most revolutionary.

Ever since its establishment in 1990, China's split-share structure has been widely criticized for its detrimental effect on stock market liquidity and transparency (Beltratti et al., 2012). The small public float causes shares to be illiquid and vulnerable to manipulation. Such a structure also puts public investors at a disadvantage relative to controlling shareholders in making decisions regarding corporate policies and disposing of corporate profits. NTSs entrench incompetent corporate managers (Beltratti et al., 2012).

To protect the interests of investors and enhance the transparency of the stock market, on April 29, 2005, the China Securities Regulatory Commission (CSRC) issued the "Circular on Relevant Issues Regarding Pilot Programs of Non-Tradable Share Reform of Listed Companies" and initiated the NTS reform.[3] Consecutive pilot reform announcements were made by the CSRC in April and June 2005 and then expanded to all listed firms in August 2005 (Li et al., 2011; Liao et al., 2014). By the end of September 2017, the shares of listed Chinese companies totaled 6,001.6 billion, of which 851.0 billion shares, or 14%, were non-tradable, significantly reduced from 64% in 2004.[4]

Admittedly, the NTS reform constitutes a landmark event in the Chinese stock market. It enhances the market's transparency and efficiency by aligning the information and interests of the government and public investors (Liao et al., 2014), reducing controlling shareholders' tunneling activities, and enhancing corporate governance (Marcelin & Mathur, 2015). The disparity of financial market development among various provinces/regions along with the key stock market reform provide a natural background to test the impact of financial market development on IPO pricing.

[3] Consecutive experimental reforms were carried out in 1999 and 2001. In the first attempt, two companies were selected to sell their state shares to floating shareholders. The experiment did not meet the investors' expectations and, within 15 days of the announcement of the transfer program, the share prices of the two companies fell by about 40%. The second attempt also failed because the proposal envisaged equal pricing for tradable and NTSs.

[4] The statistics are based on the CSRC's monthly market review.

3. DATA AND PERFORMANCE MEASUREMENT

In this section, we describe our data source and explain how stock initial returns and long-run performance are measured. Our data are retrieved from the China Stock Market and Accounting Research (CSMAR) database and Fan et al. (2011). The sample consists of A-share IPOs, and the sample period spans from January 1997 to December 2009. We limit our data to 2009, since the original data for the financial market development index ended in 2009. Although the first publicly traded firm in China appeared in 1990, 1997 is the base year for the FMDI. After excluding financial firms and firms with insufficient data, our final sample contains 1,246 IPOs. We choose our control variables following related research (e.g., Cai et al., 2008). The definitions of all variables are summarized in the Appendix.

The IPO's initial return (underpricing) is defined as the percentage difference between the first day's closing price and the offering price:

$$UP_i = (P_i - O_i) / O_i \tag{1}$$

where UP_i is the initial return (underpricing if positive) for firm i, P_i is the closing price on the first trading day, and O_i is the offering price.[5]

Two approaches are widely employed for long-run performance measurement, namely, the BHAR and the calendar time portfolio approach. It has been documented that the calendar time portfolio approach can be misspecified in nonrandom samples, while the BHAR method is relatively robust (Lyon et al., 1999). Furthermore, the calendar time portfolio approach may be subject to measurement bias (Barber & Lyon, 1997). In contrast, the BHAR method is largely free of such bias and directly reflects investors' actual experience, especially for long-run returns. Thus, we measure stock long-run performance using the BHAR method.

Following the literature in measuring IPO long-run performance, we use firms matched by size and book-to-market ratio as benchmarks for each IPO firm. To be sure, each IPO firm is matched with a firm such that the absolute percentage difference between size and book-to-market ratio is minimal[6] (Barber &

---

[5] To avoid the possible impact of skewed distribution for IPO underpricing on our results, we also standardize the returns by subtracting the industry median. The results remain the same.

[6] We also tried propensity score matching as an alternative matching method. However, the sample size was reduced to nearly half of the original sample. Due to this drawback, we match firms by size and book-to-market.

Lyon, 1997; Loughran et al., 1994). The matching firm should be publicly traded for more than five years. To calculate the matching firm-adjusted BHAR for IPO firm i, we employ the equation below:

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

where $r_{i,t}$ is the monthly return of the IPO firm at time t and $r_{m,t}$ is the monthly return of the matching firm.

4. FINANCIAL MARKET DEVELOPMENT AND IPO UNDERPRICING

In this section, we develop our hypotheses on financial market development, market transparency, and IPO underpricing. The empirical results are presented after each hypothesis.

4.1 Relation between Financial Market Development and IPO Underpricing

As depicted in Table 1, firms located in different provinces show disparity in IPO underpricing. The underpricing for firms in Shanghai, Guangdong, Beijing, Tianjin, and Zhejiang is relatively moderate compared to that of firms in less-developed areas.

Financial market development is mostly discussed in the literature by analyzing its impact on market transparency. A more developed financial market enjoys greater transparency as well as higher information quality (Demirgüç-Kunt & Levine, 1996), which would reduce information asymmetry (Baskin, 1988; Loughran & Schultz, 2005). Greenwood & Smith (1997) claim that bankers, stockbrokers, insurance agents, realtors, and other agents require resource expenditures and tend to stay in better-developed areas while monitoring areas that are easy to cover.

Information asymmetry is one of the key factors driving IPO underpricing. Rock (1986) posits that information asymmetry exists between informed and uninformed investors and to entice the uninformed to participate, IPOs must be underpriced. Beatty & Ritter (1986) test the Rock's model by examining the relation between underpricing and ex ante uncertainty in firm value, and they argue that greater risk due to uncertainty must be compensated for with higher yields. We conjecture that the information asymmetry caused by disparity in financial market development influences the offering price of IPOs and consequently impacts the extent of underpricing. Ceteris paribus, companies located in less-developed markets are less

transparent and exhibit higher information asymmetry, hence greater uncertainty regarding their quality. Based on this reasoning, we propose the following hypothesis.

Hypothesis 1: *Firms headquartered in better-developed financial markets experience less IPO underpricing.*

In Table 2, we show preliminary univariate results for this hypothesis by categorizing all IPOs into two groups based on the FMDIs for their firms' locations. The first group includes the IPOs of firms in provinces with development scores above the median, while the second group contains IPOs from firms in provinces with development scores below the median. Panel A presents the differences of *FMDI*, *IPO Numbers*, *UP*, *BHAR1*, *BHAR3* and *BHAR5* between the two groups. The differences are statistically significant for *FMDI*, *IPO Numbers*, *UP*, *BHAR1* and *BHAR3* based upon *t*- and Wilcoxon *z*-tests. The difference for *BHAR5* is weaker. Nevertheless, this preliminary test is based upon univariate analysis, which does not consider other variables that may also have an impact on the long-term performance. Panel B compares firm characteristics such as *Firm Age*, *P/E Ratio*, *B/M Ratio*, *Ln(Assets)*, *List Lag*, *Ln(Offering Shares)*, *Public Ratio*, *SOE Share Ratio* and *Board Number* and shows that, in more developed areas, firms are typically older, have more shares traded publicly, shorter listing time lags, higher P/E values before going public, fewer assets and issue fewer shares.[7] In short, Table 2 shows distinct differences in both firm characteristics and stock performance on the first trading day for firms located in regions that differ in financial market development.

[Insert Table 2 here]

To further test our first hypothesis, we use multivariate analysis to examine the relation between IPO underpricing and the financial market development environment. We estimate the following equation by including the key explanatory factor *FMDI* and using *UP* (underpricing) as the dependent variable while controlling for other firm characteristics:

[7] The P/E of a firm before the IPO is available from the CSMAR database. We use the P/E at the end of the year before the firm goes public, where the price involved is the issue price.

$$UP_i = \alpha_1 + \beta_1 FMDI_i + \beta_2 Firm\ Age_i + \beta_3 P/E\ Ratio_i + \beta_4 B/M\ Ratio_i + \beta_5 Ln(Assets)_i + \beta_6 List\ Lag_i + \beta_7 Ln(Offering\ Shares) + \beta_8 Public\ Ratio + \beta_9 SOE\ Share\ Ratio + \beta_{10} Board\ Number + Year + Industry + u_i \quad (3)$$

where *FMDI* is financial market development index for the location of firm i. All firm-level independent variables are measured at the end of the preceding year. *Firm Age* is the number of years since the founding of the firm; *P/E Ratio* is the P/E before the firm goes public; *B/M Ratio* is the firm's book value of equity at the end of the fiscal year, divided by market value of equity; *Ln (Assets)* is the logarithm of firm's total assets by the end of the fiscal year; *List Lag* measures delay in floating the issue; *Ln (Offering Shares)* is the logarithm of shares offered; *Public Ratio* is the percentage of public shareholdings at the time of the IPO; *SOE Share Ratio* is percentage of shares issued to SOEs at the time of the IPO, calculated as the number of SOE shares over the total number of common shares and *Board Number* is the number of board members at the time of the IPO. Detailed definitions of the variables can be found in the Appendix. To alleviate possible impacts of regulation changes and political connections that have been documented to impact Chinese IPO performance, we include year fixed effect in each model. Since most local political leadership changes quite often (Fan et al., 2007), these possible undetected features thus could be captured by considering the year effect. Industry fixed effect is also controlled for in each model and standard errors are clustered at the year level. Additionally, Section 4.5 examines the difference between SOEs and non-SOEs, which implicitly incorporates the impact of political connection, as political connection is more prevalent in SOEs than in non-SOEs.

Table 3 presents the coefficients from the estimation of Equation (3). Columns (1) and (2) indicate that *FMDI* has a negative and significant impact on IPO underpricing with or without other controls. The effect of *FMDI* is also economically significant, since IPO underpricing is reduced by 0.05% for every 1% increase in *FMDI*. In Columns (3) and (4), we replace *FMDI* by *FMDI Dummy*, which equals one for firms located in a more developed area (the top half of the *FMDI* distribution) and zero otherwise. Again, a higher degree of financial market development is associated with less IPO underpricing. Therefore, the results in Table 3 support our first hypothesis, that IPO underpricing is lower for firms located in better-developed markets. Also consistent with Tian (2011), our regression results suggest greater IPO underpricing is

associated with a longer listing time lag. Offering shares are negatively related to IPO underpricing, which is in line with the literature, where the larger the issue, the greater relative bargaining power the issuer has and the less initial underpricing (Cheung et al., 2009). Additionally, when shares are allocated to SOEs, the issuer experiences less uncertainty in IPO success and thus initial underpricing of IPO would be lower.

4.2 Influence Mechanism: Market Transparency

The previous section shows that IPO underpricing is mitigated when the firm is located in a better-developed financial market. We now turn to the channel through which financial market development influences IPO returns. To this end, we propose that companies located in different provinces have various levels of transparency and information asymmetry, which, in turn, could lead to IPO underpricing disparity. Neupane & Poshakwale (2012) find that transparency in the offering mechanism leads to greater retail investor participation and, in turn, results in higher IPO prices. Akyol et al. (2014) study the effect of regulatory changes on European IPOs and find that IPO underpricing declined on Member State-regulated markets after the Member States adopted corporate governance codes containing Sarbanes-Oxley Act-like provisions. The authors conclude that elevating corporate governance standards increases transparency and reduces information asymmetry that affects IPO valuations. Based on these arguments, we expect firms located in higher-FMDI regions to exhibit better market transparency. This leads to our second hypothesis.

Hypothesis 2: *Better-developed financial markets have higher market transparency.*

In Table 4, we present the univariate analysis results on market transparency for firms in the low- and high-FMDI groups, using *t*- and Wilcoxon *z*-tests. The measurements of market transparency include stock idiosyncratic volatility (*Idiosyncratic Volatility*), Pástor -Stambaugh stock liquidity (*Stock Liquidity P-S*), Amihud stock illiquidity (*Stock Illiquidity Amihud*), stock turnover (*Turnover Ratio*) (Levine & Zervos, 1998), *Analyst Attention* (Jin & Myers, 2006) and number of underwriters within each province/district (*No. of Underwriters*). The definitions of these variables are in the Appendix. The results show significant differences in most of the transparency measures between the high- and low-FMDI groups. Specifically, both measurements of stock liquidity confirm that stocks are more liquid in the high-FMDI group, which suggests that firms located in better-developed areas could be more attractive to both underwriters and investors (Loughran, 2008). Consistent with Loughran & Schultz (2005) and Loughran (2008), we also find that firms located in better-developed areas enjoy more analyst attention and have more underwriters. Our

data show abnormally high average turnover ratios compared with that of the US market (Beck & Levine, 2004). However, it is in line with findings in the Chinese stock market (Wang & Xu, 2004).

In Table 5, we report the findings on the relation between financial market development and market transparency by running the following multivariate regression:

$$\begin{aligned} Market\ Transparency_i &= \alpha_1 + \beta_1 FMDI_i + \beta_2 Ln(Trading\ Volume)_i + \beta_3 Ln(Assets)_i \\ &+ \beta_4 B/M\ Ratio_i + \beta_5 Public\ Ratio + \beta_6 SOE\ Share\ Ratio \\ &+ \beta_7 Board\ Number + Year + Industry + u_i \end{aligned} \quad (4)$$

where the dependent variable is *Market Transparency*, measured by proxies, including *Idiosyncratic Volatility, Stock Illiquidity (Amihud), Stock Liquidity (P-S), Turnover Ratio, Analyst Attention* and *No. of Underwriters*. All firm-level independent variables, *Trading Volume, Assets,* and *B/M Ratio* are measured at the end of the preceding year. Detailed definitions of the variables can be found in the Appendix. Year and industry fixed effects are controlled for in each model and standard errors are clustered at the year level.

The results indicate that development in financial market improves market transparency across all measures of market transparency, strongly supporting our second hypothesis. From Columns (1) and (2) in Table 5, we find that a more developed financial market contributes to declining stock idiosyncratic volatility. In Columns (3) to (6), our empirical results suggest that stock liquidity is higher when a market is better developed. As suggested in Ellul & Pagano (2006), the expectation of higher liquidity in after-market would reduce IPO underpricing. In Columns (7) to (12), we find that stocks in better-developed areas have higher turnover ratios, receive more analyst attention and more underwriter resources. Our results imply that a better-developed financial environment enhances market transparency and thus reduces information asymmetry.

4.3 Impact of Financial Market Reforms

Although financial market development disparity exists among provinces, overall, market transparency has improved over time. After the 2005 NTS reform, many previously NTSs became tradable. As Akyol et al. (2014) find, regulatory changes in Europe improve IPO valuations. We therefore argue that the 2005 NTS reform increases market transparency and reduces information asymmetry, which leads to lower IPO underpricing. Therefore, we propose the following hypothesis.

Hypothesis 3: *Financial market reforms aiming at enhancing market transparency and information asymmetry reduction reduce IPO underpricing.*

To test our third hypothesis, we develop the following model:

$$\begin{aligned} UP_i = {} & \alpha_1 + \beta_1 FMDI\ Dummy_i + \beta_2 Reform\ Dummy_i + \beta_3 Reform\ Dummy_i \\ & * FMDI\ Dummy_i + \beta_4 Firm\ Age_i + \beta_5 P/E\ Ratio_i \\ & + \beta_6 B/M\ Ratio_i + \beta_7 Ln(Assets)_i + \beta_8 List\ Lag_i \\ & + \beta_9 Ln(Offering\ Shares) + \beta_{10} Public\ Ratio + \beta_{11} SOE\ ShareRatio \\ & + \beta_{12} BoardNumber + Year + Industry + u_i \end{aligned} \quad (5)$$

where the dependent variable, *UP*, is the firm's IPO underpricing; *FMDI Dummy* is defined to take on the value of one if the firm is located in a more developed area (the top half of the *FMDI* distribution) and zero otherwise; and *Reform Dummy* is a dummy variable used to measure the effect of the 2005 NTS reform that equals zero for years before 2005 and one otherwise. All firm-level independent variables are measured at the end of the preceding year and are defined as in Equation (3). Year and industry fixed effects are controlled for in each model and standard errors are clustered at the year level.

In Columns (1) and (2) of Table 6, we divide the sample into two subsamples (before and after the 2005 NTS reform, respectively) to compare the differences in the relation between financial market development and IPO underpricing. We find that, after the reform, financial market development plays a larger role in shaping IPO pricing (the magnitude of the coefficient increases from |0.180| to |0.524|), which is consistent with our prediction in Hypothesis 3. In Columns (3) and (4), we compare how the reform influences IPO underpricing in two groups of provinces classified by FMDI ranking. The magnitude of the *Reform Dummy* coefficient is near 400% higher in the high-FMDI group, implying that the reform helps reduce IPO underpricing to a greater extent in highly developed markets. In Column (5), we use all observations and conduct an additional test using a method that is similar to a difference-in-difference (DID) specification. The variable of interest is the interaction term of *FMDI Dummy* and *Reform Dummy*.[8] Since the coefficient of this interaction term is negative and significant, we conclude that the 2005 reform has

[8] The specification can be viewed via the following three equations. First, we specify UP = a + b FMDI and b = c + d Reform. Substituting the second equation into the first, we obtain UP = a + c FMDI + d FMDI*Reform.

enhanced the negative impact of financial market development on IPO underpricing. Hence, these evidences support our third hypothesis, that financial market reforms reduce IPO underpricing and financial market development plays a more significant role in IPO underpricing after the reform.

4.4 Effect on Financially Constrained Firms

We now investigate how the impact of financial market development on IPO pricing differs for firms with different financial strength. Previous works find that firms in China face severe financial constraints due to limited access to capital (Chong et al., 2013; Poncet et al., 2010). Firms rely more on external financing resources if they are financially constrained (Chaddad & Reuer, 2009). To obtain external capital, financially constrained firms may lower their initial offering price to ensure the success of their IPOs. However, the easier access to the credit market for firms located in better-developed regions helps mitigate the effect of financial constraints on IPO underpricing. Therefore, the benefit of better pricing due to location could be more evident for financially constrained firms. We propose that, if a firm faces financial constraints, the influence of financial market development on IPO underpricing will be stronger.

Hypothesis 4: *The benefits of financial market development on IPO underpricing are greater for financially constrained firms.*

To test this hypothesis, we follow Kaplan & Zingales (1997) and Hadlock & Pierce (2010) to construct the KZ index and the SA index of financial constraint for each firm. Detailed definitions and calculations are in the Appendix. Using the KZ index and SA index as proxies of *Financial Constraint*, we develop the following model.

$$\begin{aligned} UP_i = {} & \alpha_1 + \beta_1 FMDI_i + \beta_2 Financial\ Constraint_i * FMDI_i + \beta_3 Firm\ Age_i \\ & + \beta_4 B/M\ Ratio_i + \beta_5 Ln(Assets)_i + \beta_6 List\ Lag_i \\ & + \beta_7 Ln(Offering\ Shares) + \beta_8 Public\ Ratio + \beta_9 SOE\ ShareRatio \\ & + \beta_{10} BoardNumber + Year + Industry + u_i \end{aligned} \tag{6}$$

where the dependent variable, *UP*, is the firm's IPO underpricing, *FMDI* is the financial market development index following Fan et al. (2011), and *Financial Constraint* is the KZ (SA) index. Other control variables are defined as for Equation (3). All firm-level independent variables are measured at the

end of the preceding year. Year and industry fixed effects are controlled for in each model and standard errors are clustered at the year level.

We report our results in Table 7. In Columns (1) and (2), the coefficients of the interaction term between *FMDI* and *Financial Constraint* are all significantly negative, indicating that the benefits of financial market development on IPO underpricing are stronger for financially constrained firms. In Columns (3) and (4), *FMDI* is replaced by *FMDI Dummy,* which is defined to be one if the firm is located in a more developed area and zero otherwise. Columns (5) to (8) in Table 7 present the results by using SA Index as a proxy of *Financial Constraint*. In Columns (5) to (8), the coefficients of the interaction term between the *FMDI* and *Financial Constraint* are significantly negative, supporting Hypothesis 4.

4.5 Effect of Ownership Structure: SOEs versus Non-SOEs

SOEs and non-SOEs are unique institutional features in the Chinese market. Though the privatization of inefficient SOEs started during the past decade (Bai et al., 2006), state ownership is the mainstay of China's spectacular economic growth. China is still pushing ahead with partial privatization of SOEs in key industries to overhaul the state sector. Differences in IPOs between SOEs and non-SOEs are widely discussed and documented in the literature. Chen et al. (2004) find that IPOs with large proportions of governmental and legal entity shareholdings are associated with underpricing. In China, SOEs often enjoy favorable access to valuable information, as well as preferential financial treatment and less policy discrimination. Specifically, with governmental support, SOEs enjoy favorable access to bank loans (Cull & Xu, 2003) and lower cost of debt (Borisova & Megginson, 2011). Thus, in line with the financial constraint argument, we posit that all the privileges enjoyed by SOEs spare them from high reliance on the financial market's development. That is, IPO pricing of non-SOEs are more sensitive to financial market development than SOEs.

Hypothesis 5: *Compared to SOEs, the IPO pricing of private firms is more sensitive to financial market development.*

To test our fifth hypothesis, we partition our sample by firm ownership structure; our sample contains 547 SOEs and 699 non-SOEs. We extract our data on firm controlling shareholders from the CSMAR database, which identifies major equity blockholders and their control rights. We apply the same test as in Equation (3) on the subsamples. In Table 8, our results show that, compared to SOEs, non-SOEs are more

sensitive to financial market development. Specifically, in Columns (2) and (4), we see twice as large a decrease in IPO underpricing for non-SOEs compared to SOEs if they are located in better-developed areas. In fact, the *FMDI* values in Columns (3) and (4) have insignificant coefficients, suggesting that the IPO pricing of SOEs is not sensitive to financial market development.

5. IPO LONG-RUN PERFORMANCE

Besides underpricing, IPO long-run underperformance is also well documented in the literature (e.g., Chan et al., 2004; Ritter, 1991). In this section, we test whether IPO firms located in more developed areas perform better in the long-run.

As mentioned in the previous section, we measure IPO long-run performance using BHARs. Since Ritter (1991) finds that significantly underpriced IPOs underperform in the long-run, we also test if this "over-optimism" hypothesis holds in China against the backdrop of disparate financial market development in different regions. Thus, besides financial market development, we also include underpricing as an independent variable in our model of IPO long-run performance and the relevant hypothesis is stated as follows.

Hypothesis 6: *Financial market development improves IPO firm performance in the long run.*

To test this hypothesis, we specify our model as follows:

$$\begin{aligned} BHAR_i = {} & \alpha_1 + \beta_1 UP_i + \beta_2 FMDI_i + \beta_3 Firm\ Age_i + \beta_4 P/E\ Ratio_i \\ & + \beta_5 B/M\ Ratio_i + \beta_6 Ln(Assets)_i + \beta_7 List\ Lag_i \\ & + \beta_8 Ln(Offering\ Shares) + \beta_9 Public\ Ratio + \beta_{10} SOE\ ShareRatio \\ & + \beta_{11} BoardNumber + Year + Industry + u_i \end{aligned} \tag{7}$$

where, for firm i at time t, the dependent variable *BHAR* is the buy and hold abnormal returns calculated from the second day after the firm is publicly listed, and 1-, 3- and 5- year *BHAR*s are measured accordingly, denoted as *BHAR1*, *BHAR3* and *BHAR5*. *UP* is the firm's IPO underpricing, and *FMDI* is a measurement of financial market development. We exclude samples from bubble periods (i.e. 2005-2006) and financial crisis periods (i.e. 2008-2009). Evidence shows that correlations of stock returns increase significantly during periods of bubbles (e.g., Dong et al., 2011; Ritter & Welch, 2002). The heightened correlation has larger impact on the relation between long-run performance measures and *FMDI* than on three-day event

window returns. Since the *BHAR*s are computed using multiple years of data, the effect of increasing stock correlations during these turbulent years may be impounded in the yearly standard error clustering and thus overshadow the effect of variations in financial market development on *BHAR*s. Thus, excluding these turbulent years allows us to better examine the relation between *BHAR*s and *FMDI* in normal conditions. The Appendix presents the definitions or calculations of the control variables. All firm-level independent variables are measured at the end of the preceding year. Year and industry fixed effects are controlled for in each model and standard errors are clustered at the year level.

Table 9 presents the results of the impact of financial market development on IPO long-run performance. The results in Columns (1) and (2) show that IPO underpricing could help to explain IPO long-run performance in models of *BHAR1* and *BHAR3*. The results are consistent with Ritter (1991). More importantly, we show that for firms located in better developed areas, their *BHAR1* and *BHAR3* benefit from location choices. However, in 5-year models, both *UP* and *FMDI* are not statistically significant. These results suggest that financial market development benefits IPO firm performance for at least three years after the initial offering. The fact that *BHAR5* is no longer significantly impacted by *FMDI* indicates that in the longer run, other firm idiosyncratic performance may overshadow the location advantage of the firm. For example, as the firm grows stronger and becomes more profitable, the benefit of location diminishes. Our findings thus lend support to *Hypothesis 6*.

6. ROBUSTNESS CHECKS

In the previous sections, we reached the conclusion that firms located in better-developed financial markets are subject to less IPO underpricing and experience better long-run performance. In this section, we conduct additional analyses to ensure the robustness of our findings.

6.1 Self-selection Bias

A concern about the current research design is that firms choose their locations before going public, so there is a possibility that more transparent companies tend to locate themselves in better-developed financial markets. To mitigate concerns about this self-selection bias, we adopt the Heckman two-stage regression. In the first-stage regression, the dependent variable is *FMDI Dummy*, which equals one if a firm is located in a better-developed area and zero otherwise. Instrumental variables include *Labor Productivity*

following Sridhar & Wan (2010). Sridhar and Wan conclude that labor productivity could influence the location choice of firms in China. In addition to the variable in Sridhar & Wan (2010), we also include *Labor Structure*, measured by the percentage of employees in old industries, and *Provincial GDP in Finance Sector,* which could also have impact on firms' location choices. In the first stage, we test whether these features influence firms' choice of location. The definitions of the variables are summarized in the Appendix.

The resulting fitted values from the first-stage estimation are used to compute the Inverse-Mills ratio (*IM Ratio*), which is included in the second stage regression to test the relation between *UP* and *FMDI*. In Table 10, our results show that in the second stage, *FMDI* continues to be negative and significant, suggesting that our conclusions are not driven by self-selection bias.

6.2 Financial Market Development or Economic Growth?

Financial market development first caught the attention of researchers through its impacts on economic growth (e.g., Bekaert et al., 2001; Jayaratne & Strahan, 1996; King & Levine, 1993), with economic growth leading to the formation of developed markets (Greenwood & Smith, 1997). Since one could argue that financial market development may be embedded in economic growth, it is therefore important to distinguish whether IPO performance is mainly driven by financial market development or economic growth. We alleviate this concern by including four alternative measures of economic growth in our original test: *Provincial GDP, Provincial GDP in Finance Sector, Provincial GDP per Capita,* and *Provincial GDP Percentage Change*. Our results in Table 11 show that *FMDI* is still statistically and economically significant, while none of the GDP factors is significant.

6.3 Extreme Sample Bias and More Recent Sample Period

Since firms located in Sichuan province have an average underpricing of 471.06%, it is not clear whether our conclusions are driven by outliers. We therefore perform empirical analysis based on the samples that exclude Sichuan; Tibet, Qinghai, and Xinjiang; and Tibet, Qinghai, Xinjiang, and Sichuan, respectively. The results are, nevertheless, consistent with those reported in Table 3 and our conclusion that financial market development significantly lowers IPO underpricing still holds.

In addition, since our sample covers years from 1997 to 2009, which includes the price bubble period in 2005-2006 and the financial crisis period 2008-2009, we therefore rerun the main tests based on samples

excluding 2005-2006, and 2008-2009, respectively. The results are consistent with those reported in Table 3 and our conclusions continue to hold.

Moreover, our main results limit our data to 2009, since the original data on the provincial market development index end in 2009. In 2016, Fan et al. (2016), updated their marketization index from 2008 to 2014. We do not merge the two indices for the following reasons: (1) The data sources and base year for these two periods are not compatible; (2) For the overlapping period from 2008 and 2009, the rankings of FMDI in two versions are not the same. We rerun the main tests using the more recent sample and our conclusions still hold. These results are not tabulated to save space.

6.4 The Influence of Regulatory Quota Allocation

It is documented in the literature that Chinese IPO market is regulated by the central government in the earlier years (Cheung et al., 2009; Tian, 2011). CSRC, the main securities regulatory body in China, formulates regulations guiding IPO process and pricing. In particular, the CSRC restricts the supply of IPO shares and determines the quota allocation among provinces for new share issuance before 2001. To alleviate the concern that our results may be confounded by the regulatory quota allocation in early years of the sampling period, we carry out another robustness test using subsample analysis. Following Cheung et al., (2009) and Tian (2011), we divide the sample into three main periods: 1997-2000, 2001-2004 and 2005-2009. The results are, nevertheless, consistent with those reported in Table 3. Again, the results are not tabulated for brevity.

7. CONCLUSIONS

In a pseudo-multinational setting, we provide evidence that financial market development helps to reduce IPO underpricing and enhance long-run stock performance. We consider not only provincial disparities in financial market development, but also the impact of ownership structure and the NTS reform. Our main findings are summarized below.

First, with respect to IPO underpricing, our tests contribute to the literature by considering financial market development. It is well documented that IPO underpricing is influenced by different legal systems, institutional environments, and issuing methods (e.g., Banerjee et al., 2011). Our paper employs the setting of China's provincial financial market development disparity as an ideal field experiment that rules out the

influence of legal and regulatory differences. Our study is thus a pseudo-multinational study without the bias that can result from observable or unobservable between-country heterogeneity. In addition, our research design includes the impact of financial market reform as a dynamic check of our main results. Prior research proposes the information asymmetry hypothesis to explain the abnormal underpricing of IPOs and our arguments and evidence are rooted in this hypothesis. To be sure, we find evidence that financial market development reduces IPO underpricing through strengthened market transparency and reduced information asymmetry. Our research thus adds to the growing literature on the impact of market transparency on asset pricing.

Second, we provide evidence suggesting that SOEs have information and capital access advantages compared to non-SOEs, therefore, non-SOEs are more sensitive to financial market development. The original intention of Fan et al. (2011) in developing their marketization index was to capture the development of non-SOEs. Thus, our results suggest that, even though China has been rapidly developing in recent years, non-SOEs are still disadvantaged in terms of access to capital and information.

Third, this paper sheds additional light on financially constrained firms' financing decisions. Our results suggest that the impact of financial market development is greater for financially constrained firms, since they are more eager to ensure the success of their IPOs by means of underpricing. Finally, we find the impact of financial market development persists beyond IPO initial underpricing. The one-year and three-year *BHAR* results indicate that firms located in better-developed financial markets perform better in the long run.

References

Akyol, Alic C., Tommy Cooper, Michele Meoli & Silvio Vismara. 2014. Do regulatory changes affect the underpricing of European IPOs? *Journal of Banking and Finance*, 45: 43-58.

Allen, Franklin, & Gerald R. Faulhaber. 1989. Signaling by underpricing in the IPO market. *Journal of Financial Economics*, 23.2: 303-323.

Allen, Franklin, Jun Qian, & Meijun Qian. 2005. Law, finance, and economic growth in China. *Journal of Financial Economics*, 77.1: 57-116.

Amihud, Yakov. 2002. Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets*, 5.1: 31-56.

Ang, Andrew, Robert J. Hodrick, Yuhang Xing, & Xiaoyan Zhang. 2006. The cross-section of volatility and expected returns. *The Journal of Finance*, 61.1: 259-299.

Bai, Chong-En, Jiangyong Lu, & Zhigang Tao. 2006. The multitask theory of state enterprise reform: empirical evidence from China. *The American Economic Review*, 96.2: 353-357.

Banerjee, Suman, Lili Dai, & Keshab Shrestha. 2011. Cross-country IPOs: What explains differences in underpricing? *Journal of Corporate Finance*, 17.5: 1289-1305.

Barber, Brad M., & John D. Lyon. 1997. Detecting long-run abnormal stock returns: The empirical power and specification of test statistics. *Journal of Financial Economics*, 43.3: 341-372.

Baskin, Jonathan Barron.1988. The development of corporate financial markets in Britain and the United States, 1600–1914: overcoming asymmetric information. *Business History Review*, 62.2: 199-237.

Beatty, Randolph P., & Jay R. Ritter. 1986. Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics*, 15.1-2: 213-232.

Beck, Thorsten, & Ross Levine. 2004. Stock markets, banks, and growth: Panel evidence. *Journal of Banking & Finance*, 28.3: 423-442.

Bekaert, Geert, & Campbell R. Harvey. 2000. Foreign speculators and emerging equity markets. *The Journal of Finance*, 55.2: 565-613.

Bekaert, Geert, Campbell R. Harvey, & Christian Lundblad. 2001. Emerging equity markets and economic development. *Journal of Development Economics*, 66.2: 465-504.

Beltratti, Andrea, Bernardo Bortolotti, & Marianna Caccavaio. 2012. The stock market reaction to the 2005 split share structure reform in China. *Pacific-Basin Finance Journal*, 20.4: 543-560.

Borisova, Ginka, & William L. Megginson. 2011. Does government ownership affect the cost of debt? Evidence from privatization. *The Review of Financial Studies*, 24.8: 2693-2737.

Boulton, Thomas J., Scott B. Smart, & Chad J. Zutter. 2010. IPO underpricing and international corporate governance. *Journal of International Business Studies*, 41.2: 206-222.

Cai, Xiaoqiong, Guy S. Liu, & Bryan Mase. 2008. The long-run performance of initial public offerings and its determinants: the case of China. *Review of Quantitative Finance and Accounting*, 30.4: 419-432.

Chaddad, Fernando R., & Jeffrey J. Reuer. 2009. Investment dynamics and financial constraints in IPO firms. *Strategic Entrepreneurship Journal*, 3.1: 29-45.

Chan, Kalok, Junbo Wang, & KC John Wei. 2004. Underpricing and long-term performance of IPOs in China. *Journal of Corporate Finance,* 10.3: 409-430.

Chemmanur, Thomas J. 1993. The pricing of initial public offerings: A dynamic model with information production. *The Journal of Finance,* 48.1: 285-304.

Chen, Carl R., Yingqi Li, Danglun Luo, & Ting Zhang. 2017. Helping hands or grabbing hands? An analysis of political connections and firm value. *Journal of Banking & Finance,* 80: 71-89.

Chen, Gongmeng, Michael Firth, & Jeong-Bon Kim. 2004. IPO underpricing in China's new stock markets. *Journal of Multinational Financial Management,* 14.3: 283-302.

Cheung, Yan-leung, Zhiwei Ouyang, & Weiqiang Tan. 2009. How regulatory changes affect IPO underpricing in China. *China Economic Review,* 20.4:692-702.

Chong, Terence Tai-Leung, Liping Lu, & Steven Ongena. 2013. Does banking competition alleviate or worsen credit constraints faced by small-and medium-sized enterprises? Evidence from China. *Journal of Banking & Finance,* 37.9: 3412-3424.

Chowdhry, Bhagwan, & Ann Sherman. 1996. International differences in oversubscription and underpricing of IPOs. *Journal of Corporate Finance,* 2.4: 359-381.

Coval, Joshua D., & Tobias J. Moskowitz. 2001. The geography of investment: Informed trading and asset prices. *Journal of Political Economy,* 109.4: 811-841.

Cull, Robert, & Lixin Colin Xu. 2003. Who gets credit? The behavior of bureaucrats and state banks in allocating credit to Chinese state-owned enterprises. *Journal of Development Economics,* 71.2: 533-559.

Demirgüç-Kunt, Asli, & Ross Levine. 1996. Stock market, corporate finance, and economic growth: an overview. *The World Bank Economic Review,* 10.2:223-239.

Dong, Ming, Jean-Sébastien Michel, & J. Ari Pandes. 2010. Underwriter quality and long-run IPO performance. *Financial Management* 40.1: 219-251.

Ellul, Andrew, & Marco Pagano. 2006. IPO underpricing and after-market liquidity. *The Review of Financial Studies,* 19.2: 381-421.

Engelen, Peter-Jan, & Marc Van Essen. 2010. Underpricing of IPOs: Firm-, issue-and country-specific characteristics. *Journal of Banking & Finance,* 34.8: 1958-1969.

Fama, Eugene F., & Kenneth R. French. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics,* 33.1: 3-56.

Fan, Gang, Xiaolu Wang, & Hengpeng Zhu. 2011. *The report on the relative process of marketization of each region in China*. Economic Science Press, Beijing (in Chinese).

Fan, Gang, Xiaolu Wang, & Jingwen Yu. 2016. *The report on the relative process of marketization of each region in China*. Economic Science Press, Beijing (in Chinese).

Fan, Joseph PH, Tak Jun Wong, & Tianyu Zhang. 2007. Politically connected CEOs, corporate governance, and Post-IPO performance of China's newly partially privatized firms. *Journal of Financial Economics* 84.2: 330-357.

Francis, Bill B., I Hasan, J. R. Lothian, & X Sun. 2010. The signaling hypothesis revisited: Evidence from foreign IPOs. *Journal of Financial and Quantitative Analysis,* 45.1: 81-106.

Greenwood, Jeremy, & Bruce D. Smith. 1997. Financial markets in development, and the development of financial markets. *Journal of Economic Dynamics and Control*, 21.1: 145-181.

Hadlock, C. J., & J. R. Pierce. 2010. New evidence on measuring financial constraints: Moving beyond the KZ index. *The Review of Financial Studies*, 23.5: 1909-1940.

Jayaratne, Jith, & Philip E. Strahan. 1996. The finance-growth nexus: Evidence from bank branch deregulation. *The Quarterly Journal of Economics*, 111.3: 639-670.

Jiang, Guohua, Charles MC Lee, & Heng Yue. 2010. Tunneling through intercorporate loans: The China experience. *Journal of Financial Economics*, 98.1: 1-20.

Jin, Li, & Stewart C. Myers. 2006. R2 around the world: New theory and new tests. *Journal of Financial Economics*, 79.2: 257-292.

Kaplan, Steven N., & Luigi Zingales. 1997. Do investment-cash flow sensitivities provide useful measures of financing constraints? *The Quarterly Journal of Economics*, 112.1: 169-215.

King, Robert G., & Ross Levine. 1993. Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics*, 108.3: 717-737.

Levine, Ross, & Sara Zervos. 1998. Capital control liberalization and stock market development. *World Development*, 26.7: 1169-1183.

Li, Kai, Tan Wang, Yan-Leung Cheung, & Ping Jiang. 2011. Privatization and risk sharing: Evidence from the split share structure reform in China. *The Review of Financial Studies*, 24.7: 2499-2525.

Liao, Li, Bibo Liu, & Hao Wang. 2014. China's secondary privatization: Perspectives from the split-share structure reform. *Journal of Financial Economics*, 113.3: 500-518.

Lin, Hui Ling, Kuntara Pukthuanthong & Thomas John Walker. 2013. An international look at the lawsuit avoidance hypothesis of IPO underpricing. *Journal of Corporate Finance*, 19.1: 56-77.

Loughran, Tim, & Paul Schultz. 2005. Liquidity: Urban versus rural firms. *Journal of Financial Economics*, 78.2: 341-374.

Loughran, Tim, Jay R. Ritter, & Kristian Rydqvist. 1994. Initial public offerings: International insights. *Pacific-Basin Finance Journal*, 2.2: 165-199.

Loughran, Tim. 2008. The impact of firm location on equity issuance. *Financial Management*, 37.1: 1-21.

Love, Inessa. 2003. Financial development and financing constraints: International evidence from the structural investment model. *The Review of Financial Studies*, 16.3: 765-791.

Lyon, John D., Brad M. Barber, & Chih-Ling Tsai. 1999. Improved methods for tests of long ‐ run abnormal stock returns. *The Journal of Finance*, 54.1: 165-201.

Madhavan, Ananth. 1995. Consolidation, fragmentation and the disclosure of trading information. *The Review of Financial Studies*, 8.3: 579-603.

Malloy, Christopher J. 2005. The geography of equity analysis. *The Journal of Finance*, 60.2: 719-755.

Marcelin, Isaac, & Ike Mathur. 2015. Privatization, financial development, property rights and growth. *Journal of Banking & Finance*, 50: 528-546.

Mitton, Todd. 2006. Stock market liberalization and operating performance at the firm level. *Journal of Financial Economics*, 81.3: 625-647.

Neupane, Suman, & Sunil S. Poshakwale. 2012. Transparency in IPO mechanism: Retail investors' participation, IPO pricing and returns. *Journal of Banking & Finance*, 36.7: 2064-2076.

Pástor, Ľuboš, & Robert F. Stambaugh. 2003. Liquidity risk and expected stock returns. *Journal of Political Economy*, 111.3: 642-685.

Poncet, Sandra, Walter Steingress, & Hylke Vandenbussche. 2010. Financial constraints in China: firm-level evidence. *China Economic Review*, 21.3: 411-422.

Ritter, Jay R. 1991. The long-run performance of initial public offerings. *The Journal of Finance*, 46.1: 3-27.

Ritter, Jay R., & Ivo Welch. 2002. A review of IPO activity, pricing, and allocations. *The Journal of Finance*, 57.4: 1795-1828.

Rock, Kevin. 1986. Why new issues are underpriced. *Journal of Financial Economics*, 15.1-2: 187-212.

Singh, Ajit, & Bruce A. Weisse. 1998. Emerging stock markets, portfolio capital flows and long-term economie growth: Micro and macroeconomic perspectives. *World Development*, 26.4: 607-622.

Singh, Ajit. 1997. Financial liberalisation, stockmarkets and economic development. T*he Economic Journal*, 107.442: 771-782.

Sridhar, Kala Seetharam, & Guanghua Wan. 2010. Firm location choice in cities: Evidence from China, India, and Brazil. *China Economic Review*, 21.1: 113-122.

Subrahmanyam, Avanidhar, & Sheridan Titman. 1999. The going‐public decision and the development of financial markets. *The Journal of Finance*, 54.3: 1045-1082.

Sun, Qian, & Wilson HS Tong. 2003. China share issue privatization: the extent of its success. *Journal of Financial Economics*, 70.2: 183-222.

Tian, Lihui. 2011. Regulatory underpricing: Determinants of Chinese extreme IPO returns. *Journal of Empirical Finance*, 18.1: 78-90.

Wang, Fenghua, & Yexiao Xu. 2004. What determines Chinese stock returns? *Financial Analysts Journal*, 60.6: 65-77.

Appendix

Variable definitions

Variables	Definitions
Analyst Attention	The number of times a company is covered by analysts within a year.
BHAR1, BHAR3, BHAR5	1-, 3- and 5- year BHARs are calculated from the second day after IPO. The benchmark is selected as a firm of similar size and book-to-market ratio.
KZ Index	$KZ\ Index = -1.001909 \times CashFlows/K + 0.2826389 \times Q + 3.139193 \times Debt/TotalCapital - 39.3678 \times Dividends/K - 1.314759 \times Cash/K$
SA Index	$SA\ Index = -0.737 \times InflationadjustedSize + 0.043 \times InflationadjustedSize^2 - 0.040 \times Firm\ Age$
Firm Age	The number of years since the founding of the firm.
FMDI Dummy	The dummy is defined to be 1 if the firm is located in the top half of the *FMDI* distribution, and 0 otherwise.
FMDI	Financial market development index. This index is a weighted average of two ratios, the first being the percentage of non–state-owned financial institutions' deposits to all financial institutions' deposits and the second being the percentage of short-term loans to non–state-owned sectors over all short-term loans made by financial institutions.
List Lag	List lag measures the delay (in days) in floating the issue.
Ln (Assets)	The logarithm of firm's total assets by the end of the fiscal year.
B/M Ratio	The firm's book value of equity at the end of the fiscal year, divided by market value of equity.
IPO Numbers	The number of IPOs within the province.
SOE Dummy	The dummy equals 1 if the firm is an SOE and 0 otherwise.
Ln(Offering Shares)	The logarithm of the number of shares offered.
Ln(Trading Volume)	The logarithm of the stock's yearly total trading volume.
P/E Ratio	The P/E before the firm goes public.
Public Ratio	Percentage of public shareholdings at the time of the IPO, calculated as the number of publicly traded shares over the total number of common shares.
SOE Share Ratio	Percentage of shares issued to SOEs at the time of the IPO, calculated as the number of SOE shares over the total number of common shares.
Board Number	The number of board members at the time of the IPO.
Labor Productivity	The labor productivity of each province, retrieved from the CSMAR database.
Labor Structure	

	The percentage of employees working in old industries in a certain province, retrieved from the CSMAR database.
Reform Dummy	A dummy variable that indicates the 2005 NTS reform in China. For the years before 2004 (2004 included), it equals 0 and 1 otherwise.
Stock Illiquidity (Amihud)	Measured as the average daily ratio of the absolute stock return to the trading volume, following Amihud (2002). For each IPO firm, we calculate the yearly stock illiquidity in the year of IPO.
Stock Liquidity (P-S)	The liquidity measure for stock i at time t is the OLS estimate of $\gamma_{i,t}$ in the following regression: $r^{e}_{i,d+1,t} = \theta_{i,d,t} + \emptyset_{i,t} r_{i,d,t} + \gamma_{i,t} sign(r^{e}_{i,d,t}) \cdot v_{i,d,t} + \varepsilon_{i,d+1,t}, d = 1, \dots, D$ where, for stock i on day d in month t, $r_{i,d,t}$ is the stock return, $r^{e}_{i,d,t} = r_{i,d,t} - r_{m,d,t}$, $r_{m,d,t}$ is the return on the benchmark market return; and $v_{i,d,t}$ is the trading volume (Pástor & Stambaugh, 2003). For each IPO firm, we calculate the yearly stock liquidity in the year of IPO.
Idiosyncratic Volatility	Measured as the annualized standard deviation of residuals in monthly regressions of daily stock returns on the Fama–French (1993) three factors.
Turnover Ratio	The value of a share's trades divided by the total value of listed shares (Beck & Levine, 2004).
No. of Underwriters	The number of underwriters that have IPO business from 1997 to 2009 within each province.
Provincial GDP	The GDP in each province measured in trillion RMB, retrieved from the CSMAR database.
Provincial GDP in Finance Sector	Provincial level of GDP in the financial sector measured in trillion RMB, retrieved from the CSMAR database.
Provincial GDP per Capita	GDP per Capita in each province measured in thousand RMB, retrieved from the CSMAR database.
Provincial GDP Percentage Change	The annual percentage change in the GDP in each province, retrieved from the CSMAR database.
UP	Underpricing. The first-day initial return of the IPO, which is the percentage of the difference between the first-day closing price and the initial offering price over the initial offering price.

Table 1. Descriptive statistics of the sample of IPOs among 31 provinces

This table presents descriptive statistics for our sample of 1,246 observations drawn from the CSMAR database on listing firms. The variable *Provinces* contains 31 province-level administrative units (excluding Hong Kong and Macau) and *FMDI* is the FMD Index following Fan et al. (2011). The calculation is defined in the Appendix. All provinces are ranked by their mean *FMDI* from 1997 to 2009. Here, the reform is the NTS reform that took place in 2005, which changed the ownership structure and market transparency of the stock market. The means of *FMDI* before and after the reform are also presented. The variable *IPO Numbers* is the total number of all IPOs within a certain province from 1997 to 2009. The variable *UP* is the average underpricing of all IPOs within a certain province.

Provinces	**FMDI**				**IPO**	
	Rank	Mean	Mean before reform	Mean after reform	Numbers	UP
Shanghai	1	7.49	6.67	9.34	55	102.91%
Guangdong	2	7.06	6.61	8.06	141	126.56%
Beijing	3	7.02	6.28	8.69	110	126.63%
Tianjin	4	6.95	5.86	9.38	21	155.01%
Zhejiang	5	6.88	6.25	8.30	117	128.89%
Fujian	6	6.51	6.09	7.48	40	141.97%
Jiangsu	7	5.89	5.29	7.25	107	122.31%
Chongqing	8	5.45	4.74	7.04	19	142.76%
Liaoning	9	5.29	4.31	7.51	42	192.97%
Shandong	10	4.77	4.40	5.61	76	146.95%
Hunan	11	3.88	3.41	4.96	46	118.95%
Hainan	12	3.85	3.73	4.13	13	135.85%
Hubei	13	3.62	3.04	4.94	46	244.25%
Henan	14	3.49	2.95	4.71	37	133.31%
Sichuan	15	3.34	2.74	4.67	52	471.06%
Jiangxi	16	3.32	2.66	4.80	24	147.76%
Hebei	17	3.32	3.02	3.98	29	103.35%
Yunnan	18	3.30	2.72	4.62	22	147.86%
Anhui	19	3.07	2.44	4.51	47	149.02%
Shaanxi	20	2.98	2.56	3.90	22	171.88%
Shanxi	21	2.77	2.23	4.00	22	94.54%
Guangxi	22	2.63	2.23	3.52	21	228.34%
Ningxia	23	2.57	1.96	3.95	8	123.70%
Gansu	24	2.56	2.08	3.63	18	139.73%
Guizhou	25	2.31	1.68	3.75	15	90.52%
Inner Mongolia	26	2.29	1.60	3.84	17	95.16%
Xinjiang	27	2.24	1.82	3.19	28	151.70%
Jilin	28	2.04	1.49	3.26	20	118.71%
Heilongjiang	29	1.86	1.28	3.16	21	154.33%
Qinghai	30	1.70	1.10	3.06	5	186.99%
Tibet	31	1.58	1.22	2.12	5	213.96%
Average		3.94	3.37	5.20	40	152.6%

Table 2. Univariate comparisons between low- and high-FMDI groups

Panel A presents descriptive statistics for our sample, dividing all firms into low- and high-FMDI groups. The first group includes the IPOs of firms in provinces with development scores above the median, while the second group contains IPOs from firms in provinces with development scores below the median. The variable *FMDI* represents the FMD Index following Fan et al. (2011); *IPO Numbers* is the total number of IPOs within the province; *UP* is the first-day initial return of the IPO, which is the percentage of the difference between the first-day closing price and the initial offering price over the initial offering price; and *BHAR1*, *BHAR3* and *BHAR5* are the 1-, 3- and 5-year buy and hold abnormal returns calculated from the second day after IPO. The benchmark is selected as a firm of similar size and book-to-market ratio. Panel B presents the differences in IPO firm characteristics between the low- and high-FMDI groups. The variable *Firm Age* is the number of years since the founding of the firm; *P/E Ratio* is the P/E before the firm goes public; *B/M Ratio* is the firm's book value of equity at the end of the fiscal year, divided by market value of equity; *Ln (Assets)* is the logarithm of firm's total assets by the end of the fiscal year; *List Lag* measures delay in floating the issue ; Ln *(Offering Shares)* is the logarithm of shares offered; *Public Ratio* is the percentage of public shareholdings at the time of the IPO, calculated as the number of publicly traded shares over the total number of common shares; *SOE Share Ratio* is percentage of shares issued to SOEs at the time of the IPO, calculated as the number of SOE shares over the total number of common shares and *Board Number* is the number of board members at the time of the IPO. The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, using t- and Wilcoxon z-tests, respectively.

Panel A: IPO patterns and differences between the low- and high-FMDI groups

	FMDI group			
IPO Patterns	Low	High	t-Test	Wilcoxon Z-test
FMDI	4.037	10.042	-24.32***	-29.91***
IPO Numbers	33.978	68.386	-8.06***	-14.31***
UP	1.391	1.172	2.07**	5.94***
BHAR1	-0.232	0.184	-3.99***	-2.80**
BHAR3	0.880	1.327	-5.85***	-6.05***
BHAR5	-0.510	-0.352	-0.73	-2.12**

Panel B: IPO firm characteristics and differences between the low- and high-FMDI groups

	FMDI group			
IPO Firm Characteristics	Low	High	t-Test	Wilcoxon Z-test
Firm Age	3.565	5.881	-9.55***	-12.44***
P/E Ratio	23.978	31.615	-3.17***	-4.09***
B/M Ratio	0.552	0.632	-1.88*	-1.11
Ln(Assets)	14.598	14.362	2.22**	3.41***
List Lag	26.310	15.310	14.37***	14.31***
Ln(Offering Shares)	8.645	8.460	1.86*	5.46***
Public Ratio	0.830	0.923	-9.54***	-11.54***
SOE Share Ratio	0.001	0.001	0.84	0.01
Board Number	9.646	9.477	1.11	2.97***

Table 3. Impact of financial market development on IPO underpricing

This table presents the regression results from Equation (3). In this model, the dependent variable is the firm's IPO underpricing. The variable *FMDI* is the FMD Index following Fan et al. (2011). In Columns (3) and (4), *FMDI* is replaced with *FMDI Dummy,* which is defined to be one if the firm is located in the top half of the FMDI distribution, and 0 otherwise; *Firm Age* is the number of years since the founding of the firm; *P/E Ratio* is the P/E before the firm goes public; *B/M Ratio* is the firm's book value of equity at the end of the fiscal year, divided by market value of equity; *Ln (Assets)* is the logarithm of firm's total assets by the end of the fiscal year; *List Lag* measures delay in floating the issue ; Ln *(Offering Shares)* is the logarithm of shares offered; *Public Ratio* is the percentage of public shareholdings at the time of the IPO, calculated as the number of publicly traded shares over the total number of common shares; *SOE Share Ratio* is percentage of shares issued to SOEs at the time of the IPO, calculated as the number of SOE shares over the total number of common shares and *Board Number* is the number of board members at the time of the IPO. All firm-level independent variables are measured at the end of the preceding year. Year and industry effects are controlled for in each model and standard errors are clustered at the year level. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are in parentheses.

	(1)	**(2)**	**(3)**	**(4)**
Variables	UP	UP	UP	UP
FMDI	-0.053**	-0.034**		
	(0.019)	(0.013)		
FMDI Dummy			-0.124**	-0.143*
			(0.046)	(0.072)
Firm Age		0.001		0.001
		(0.006)		(0.007)
P/E Ratio		0.012***		0.013***
		(0.001)		(0.001)
B/M Ratio		0.003		0.001
		(0.054)		(0.055)
Ln (Assets)		0.075		0.069
		(0.091)		(0.086)
List Lag		0.642***		0.647***
		(0.091)		(0.091)
Ln (Offering Shares)		-0.254*		-0.250*
		(0.136)		(0.134)
Public Ratio		-0.516		-0.543
		(0.941)		(0.946)
SOE Share Ratio		-3.742***		-4.059***
		(0.910)		(0.890)
Board Number		0.015		0.016
		(0.012)		(0.011)
Constant	1.278***	1.695	1.042***	1.617
	(0.166)	(1.343)	(0.143)	(1.328)
Year Effect	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes
Observations	1,246	1,246	1,246	1,246
R-squared	0.168	0.671	0.174	0.669

Table 4. Univariate test between low- and high-FMDI groups on market transparency

This table presents differences in market transparency by dividing all firms into low- and high-FMDI groups. The first group includes the IPOs of firms in provinces with development scores above the median, while the second group contains IPOs from firms in provinces with development scores below the median. The variable *FMDI* is the FMD Index following Fan et al. (2011); *Idiosyncratic Volatility* is measured as the annualized standard deviation of residuals in monthly regressions of daily stock returns on the Fama–French (1993) three factors; *Stock Illiquidity (Amihud)* and *Stock Liquidity (P-S)* are two ways to measure the liquidity of a certain stock, following Amihud (2002) and Pastor & Stambaugh (2003), respectively; *Turnover Ratio* is the value of a share's trades divided by the total value of listed shares (Beck & Levine, 2004); and *Analyst Attention* is the number of times a company is covered by analysts within a year. *No. of Underwriters* is the number of underwriters that have IPO business from 1997 to 2009 within each province. The superscripts ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, using *t*- and Wilcoxon *z*-tests.

Market Transparency Characteristics	**FMDI group**			
	Low	High	t-Test	Wilcoxon z-test
FMDI	4.037	10.042	-24.32***	-29.91***
Idiosyncratic Volatility	1.491	1.332	1.30	2.12**
Stock Illiquidity (Amihud)	-17.829	-17.996	1.77*	1.82*
Stock Liquidity (P-S)	1.19e-06	2.58e-05	-4.49***	-5.72***
Turnover Ratio	446.625	456.530	-1.35	-1.47
Analyst Attention	2.214	8.251	-10.56***	-11.99***
No. of Underwriters	1.469	2.913	-7.91***	-25.25***

Table 5. Impact of financial market development on market transparency

This table presents the regression results from Equation (4). In this model, the dependent variable is *Market Transparency,* which is measured by *Idiosyncratic Volatility, Stock Illiquidity (Amihud), Stock Liquidity (P-S), Turnover Ratio, Analyst Attention* and *No. of Underwriters*. The variable *FMDI* is the FMD Index following Fan et al. (2011); *Idiosyncratic Volatility* is measured as the annualized standard deviation of residuals in monthly regressions of daily stock returns on the Fama–French (1993) three factors; *Stock Illiquidity (Amihud)* and *Stock Liquidity (P-S)* are two ways to measure the liquidity of a certain stock, following Amihud (2002) and Pastor & Stambaugh (2003), respectively; *Turnover Ratio* is the value of a share's trades divided by the total value of listed shares (Beck & Levine, 2004); and *Analyst Attention* is the number of times a company is covered by analysts within a year. *No. of Underwriters* is the number of underwriters that have IPO business from 1997 to 2009 within each province. Ln*(Trading Volume)* is the logarithm of the stock's yearly total trading volume; and Ln*(Assets)* is the logarithm of firm's total assets by the end of the fiscal year . *B/M Ratio* is the firm's book value of equity at the end of the fiscal year divided by market size. *Public Ratio* is the percentage of public shareholdings at the time of the IPO. *SOE Share Ratio* is the percentage of shares issued to SOEs at the time of the IPO. *Board Number* is the number of board members at the time of the IPO. *Trading Volume, Assets* and *B/M Ratio* are measured at the end of the preceding year. Year and industry effects are controlled for in each model and standard errors are clustered at the year level. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are in parentheses.

Variables	**(1) Idiosyncratic Volatility**	**(2) Idiosyncratic Volatility**	**(3) Stock Illiquidity (Amihud)**	**(4) Stock Illiquidity (Amihud)**	**(5) Stock Liquidity (P-S)**	**(6) Stock Liquidity (P-S)**	**(7) Turnover Ratio**	**(8) Turnover Ratio**	**(9) Analyst Attention**	**(10) Analyst Attention**	**(11) No. of Underwriters**	**(12) No. of Underwriters**
FMDI	-0.051*	-0.066**	-0.026**	-0.059***	0.122***	0.109***	-12.394**	-12.197***	1.249***	0.929***	0.186***	0.242***
	(0.028)	(0.026)	(0.010)	(0.008)	(0.018)	(0.027)	(5.093)	(4.647)	(0.088)	(0.111)	(0.025)	(0.034)
Ln(Trading Volume)		-0.924***		-1.114***		-0.564***		76.579***		-0.357		-0.339*
		(0.147)		(0.054)		(0.135)		(13.712)		(0.565)		(0.199)
Ln(Assets)		0.554***		0.228***		-0.135		-167.744**		3.135***		0.643***
		(0.137)		(0.042)		(0.122)		(15.506)		(0.507)		(0.203)
B/M Ratio		0.064		0.066		-0.087		-39.498**		0.026		0.172
		(0.116)		(0.068)		(0.139)		(16.910)		(0.600)		(0.256)
Public Ratio		-1.950*		0.689**		-1.540**		102.090		-8.000**		-0.665
		(1.052)		(0.310)		(0.720)		(68.514)		(3.385)		(0.829)
SOE Share Ratio		-4.534		-0.818		7.635		1,943.266*		-28.712**		-4.545
		(4.146)		(1.220)		(5.090)		(831.408)		(11.294)		(7.158)

Board Number		-0.003 (0.020)		-0.013 (0.009)		-0.087** (0.039)		6.567* (3.443)		-0.254** (0.113)		-0.043 (0.049)
Constant	0.826	3.077	-19.845***	-12.037***	-12.914***	-1.615	240.391***	2,156.108**	2.923	-37.462***	2.887***	-5.018*
	(0.743)	(1.908)	(0.428)	(0.697)	(0.828)	(1.810)	(62.873)	(206.137)	(2.563)	(8.756)	(0.599)	(2.595)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,246	1,246	1,246	1,246	1,246	1,246	1,246	1,246	608	608	1,246	1,246
R-Squared	0.089	0.203	0.109	0.738	0.094	0.253	0.095	0.251	0.238	0.432	0.077	0.131

Table 6. Impact of financial market development and reform on IPO underpricing

This table presents the regression results from Equation (5). In this model, the dependent variable is the firm's IPO underpricing. In Columns (1) and (2), we divide the sample into two subsamples (before and after the 2005 NTS reform) to compare the relation between financial market development and IPO underpricing. In Columns (3) and (4), we compare how the reform influences IPO underpricing short-term patterns in two different groups of provinces classified by the rank of *FMDI*. The variable *FMDI Dummy* is defined to be one if the firm is located in the top half of the FMDI distribution, and 0 otherwise. The variable *Reform Dummy* is a dummy variable that indicates the 2005 NTS reform in China. For the years before 2004 (2004 included), it equals 0 and 1 otherwise. The cross-term of *FMDI Dummy* and *Reform Dummy* is included in Column (5). The variable *FMDI* is the FMD Index following Fan et al. (2011); *Firm Age* is the number of years since the founding of the firm; *P/E Ratio* is the P/E before the firm goes public; *B/M Ratio* is the firm's book value of equity at the end of the fiscal year, divided by market value of equity; *Ln (Assets)* is the logarithm of firm's total assets by the end of the fiscal year; *List Lag* measures delay in floating the issue ; Ln *(Offering Shares)* is the logarithm of shares offered; *Public Ratio* is the percentage of public shareholdings at the time of the IPO, calculated as the number of publicly traded shares over the total number of common shares; *SOE Share Ratio* is percentage of shares issued to SOEs at the time of the IPO, calculated as the number of SOE shares over the total number of common shares and *Board Number* is the number of board members at the time of the IPO. All firm-level independent variables are measured at the end of the preceding year. Year and industry effects are controlled for in each model and standard errors are clustered at the year level. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are in parentheses.

	(1) Before Reform	**(2) After Reform**	**(3) Low FMDI**	**(4) High FMDI**	**(5) Total**
Variables	UP	UP	UP	UP	UP
FMDI Dummy	-0.180*	-0.524*			-0.185**
	(0.091)	(0.240)			(0.083)
Reform Dummy			-0.569**	-2.131***	
			(0.214)	(0.140)	
FMDI Dummy *Reform Dummy					-0.220*
					(0.104)
Firm Age	0.013	-0.011	0.023	-0.009	-0.001
	(0.011)	(0.007)	(0.020)	(0.007)	(0.008)
P/E Ratio	0.012***	0.004	-0.008	0.001	0.001
	(0.002)	(0.005)	(0.005)	(0.003)	(0.003)
B/M Ratio	-0.010	-0.195*	-1.083***	-0.141*	-0.230**
	(0.057)	(0.075)	(0.327)	(0.076)	(0.089)
Ln (Assets)	0.232	0.113	0.188	0.150*	0.203**
	(0.155)	(0.069)	(0.182)	(0.083)	(0.078)
List Lag	0.639***	0.212	0.782***	-3.956**	0.826***
	(0.112)	(7.723)	(0.029)	(1.710)	(0.017)
Ln (Offering Shares)	-0.438	-0.243*	-0.551***	-0.299**	-0.372***
	(0.252)	(0.112)	(0.158)	(0.104)	(0.099)
Public Ratio	-0.383	-0.472	0.394	-0.612*	0.031
	(1.107)	(0.398)	(0.301)	(0.326)	(0.305)
SOE Share Ratio	-4.000***		-4.601***	-0.808	-2.801***
	(1.020)		(0.754)	(0.733)	(0.548)
Board Number	0.017	0.005	0.030**	0.008	0.019
	(0.015)	(0.012)	(0.013)	(0.008)	(0.013)
Constant	1.120	1.713	2.915	3.386***	1.289
	(1.836)	(1.018)	(2.138)	(0.590)	(0.853)
Year Effect	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes
Observations	856	390	621	625	1,246
R-squared	0.691	0.431	0.643	0.419	0.455

Table 7. Impact of financial market development on financially constrained firms' IPO underpricing

This table presents the regression results from Equation (6). In this model, the dependent variable is the firm's IPO underpricing. The variable *FMDI* is the FMD Index following Fan et al. (2011) and *Financial Constraint* is the KZ index for Columns (1) to (4) and SA index for Columns (5) to (8) following Kaplan & Zingales (1997) and Hadlock & Pierce (2010) respectively. In Columns (3) ,(4), (7) and (8), *FMDI* is replaced with *FMDI Dummy*, which is defined to be one if the firm is located in the top half of the FMDI distribution, and 0 otherwise; *Firm Age* is the number of years since the founding of the firm; *P/E Ratio* is the P/E before the firm goes public; *B/M Ratio* is the firm's book value of equity at the end of the fiscal year, divided by market value of equity; *Ln (Assets)* is the logarithm of firm's total assets by the end of the fiscal year; *List Lag* measures delay in floating the issue ; Ln *(Offering Shares)* is the logarithm of shares offered; *Public Ratio* is the percentage of public shareholdings at the time of the IPO, calculated as the number of publicly traded shares over the total number of common shares; *SOE Share Ratio* is percentage of shares issued to SOEs at the time of the IPO, calculated as the number of SOE shares over the total number of common shares and *Board Number* is the number of board members at the time of the IPO. All firm-level independent variables are measured at the end of the preceding year. Year and industry effects are controlled for in each model and standard errors are clustered at the year level. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are in parentheses.

	KZ Index for Financial Constraint				**SA Index for Financial Constraint**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Variables	UP	UP	UP	UP	UP	UP	UP	UP
FMDI	-0.032**	-0.023**			-0.054**	-0.055***		
	(0.014)	(0.100)			(0.019)	(0.013)		
FMDI *Financial Constraint	-0.098*	-0.015**			-0.669***	-1.660*		
	(0.060)	(-0.005)			(0.182)	(0.864)		
FMDI Dummy			-0.222***	-0.157**			-0.170*	-0.224**
			(0.078)	(0.060)			(0.090)	(0.083)
FMDI Dummy *Financial Constraint			-0.093*	-0.004			-0.664***	-1.658*
			(0.056)	(0.046)			(0.188)	(0.883)
Firm Age		-0.007		-0.010		0.066		0.066
		(0.005)		(0.007)		(0.040)		(0.041)
B/M Ratio		-0.462***		-0.122**		-0.138*		-0.136*
		(0.121)		(0.047)		(0.066)		(0.065)
Ln (Assets)		0.151		0.106		0.226**		0.217**
		(0.184)		(0.070)		(0.079)		(0.080)
List Lag		3.320		2.665***		0.630***		0.636***
		(1.875)		(0.657)		(0.112)		(0.111)
Ln (Offering Shares)		-0.288		-0.250**		-0.551***		-0.542***
		(0.190)		(0.095)		(0.155)		(0.155)
Public Ratio		-0.986		-0.488		-0.012		-0.011
		(0.548)		(0.345)		(0.693)		(0.711)
SOE Share Ratio		-7.825***		-9.329***		-1.722*		-2.162**
		(0.878)		(1.087)		(0.808)		(0.820)
Board Number		0.021		0.023		0.026*		0.028**
		(0.013)		(0.014)		(0.013)		(0.012)
Constant	1.355***	2.294*	1.283***	2.022***	-0.755	7.739*	-0.917	7.588*
	(0.335)	(1.203)	(0.339)	(0.580)	(0.528)	(4.044)	(0.571)	(4.179)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	600	512	600	512	1,222	804	1,222	804
R-squared	0.313	0.227	0.313	0.404	0.183	0.558	0.177	0.554

Table 8. Impact of financial market development on IPO underpricing for SOEs and non-SOEs

This table presents the same test as in Equation (3) on the subsamples. The definitions of the variables are as in Table 3. All firm-level independent variables are measured at the end of the preceding year. Year and industry effects are controlled for in each model and standard errors are clustered at the year level. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are in parentheses.

	(1)	**(2)**	**(3)**	**(4)**
	Non-SOEs	**Non-SOEs**	**SOEs**	**SOEs**
Variables	UP	UP	UP	UP
FMDI	-0.049***	-0.066***	-0.013	-0.025
	(0.014)	(0.021)	(0.017)	(0.023)
Firm Age		0.004		-0.010
		(0.012)		(0.015)
P/E Ratio		0.012**		-0.002
		(0.006)		(0.005)
B/M Ratio		-0.157		-0.312***
		(0.136)		(0.105)
Ln (Assets)		0.290***		0.125
		(0.094)		(0.092)
List Lag		1.044*		-0.250
		(0.587)		(0.985)
Ln(Offering Shares)		-0.565***		-0.307***
		(0.102)		(0.087)
Public Ratio		0.422		-0.334
		(0.328)		(0.407)
SOE Share Ratio		-0.067		-5.584
		(2.052)		(5.431)
Board Number		0.047***		-0.005
		(0.017)		(0.019)
Constant	1.402***	1.199	0.997***	2.742**
	(0.214)	(1.224)	(0.163)	(1.089)
Year Effect	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes
Observations	699	699	547	547
R-squared	0.282	0.425	0.183	0.416

Table 9. Impact of financial market development on IPO long-run performance

This table presents the regression results from Equation (7). In this model, the dependent variable *BHAR* is buy and hold abnormal return which is calculated from the second day after IPO. The benchmark is selected as a firm of similar size and book-to-market ratio. *BHAR1, BHAR3,BHAR5* denote 1-, 3-, and 5- year long-run performance, respectively *UP* is the firm's IPO underpricing; *FMDI* is the FMD Index following Fan et al. (2011); *Firm Age* is the number of years since the founding of the firm; *P/E Ratio* is the P/E before the firm goes public; *B/M Ratio* is the firm's book value of equity at the end of the fiscal year, divided by market value of equity; *Ln (Assets)* is the logarithm of firm's total assets by the end of the fiscal year; *List Lag* measures delay in floating the issue; Ln *(Offering Shares)* is the logarithm of shares offered; *Public Ratio* is the percentage of public shareholdings at the time of the IPO, calculated as the number of publicly traded shares over the total number of common shares; *SOE Share Ratio* is percentage of shares issued to SOEs at the time of the IPO, calculated as the number of SOE shares over the total number of common shares and *Board Number* is the number of board members at the time of the IPO. Price bubble period (i.e. 2005-2006) and financial crisis period (i.e. 2008-2009) are excluded from the sample. All firm-level independent variables are measured at the end of the preceding year. Year and industry effects are controlled for in each model and standard errors are clustered at the year level. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are in parentheses.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Variables	BHAR1	BHAR3	BHAR5	BHAR1	BHAR3	BHAR5	BHAR1	BHAR3	BHAR5
UP	-0.040*	-0.017*	-0.038				-0.036*	-0.017*	-0.038
	(0.020)	(0.008)	(0.071)				(0.018)	(0.008)	(0.069)
FMDI				0.020**	0.025***	0.003	0.018**	0.024***	0.002
				(0.006)	(0.005)	(0.030)	(0.006)	(0.005)	(0.029)
Firm Age	-0.007*	-0.021	-0.030	-0.007**	-0.017*	-0.031	-0.007*	-0.016	-0.030
	(0.003)	(0.031)	(0.018)	(0.003)	(0.008)	(0.019)	(0.003)	(0.030)	(0.019)
P/E Ratio	-0.001*	-0.002*	-0.004*	-0.001**	-0.003**	-0.005**	-0.001	-0.002*	-0.004*
	(0.000)	(0.001)	(0.002)	(0.000)	(0.001)	(0.002)	(0.000)	(0.001)	(0.002)
B/M Ratio	0.020	0.058	-0.096	0.017	0.056	-0.097	0.018	0.056	-0.096
	(0.036)	(0.052)	(0.301)	(0.034)	(0.049)	(0.297)	(0.034)	(0.050)	(0.299)
Ln (Assets)	0.000	0.060	0.269	-0.014	0.047	0.261	-0.007	0.050	0.269
	(0.032)	(0.118)	(0.238)	(0.036)	(0.118)	(0.230)	(0.034)	(0.115)	(0.233)
List lag	0.026	0.069*	0.154	0.001	0.056*	0.130	0.023	0.066*	0.154
	(0.017)	(0.036)	(0.119)	(0.009)	(0.024)	(0.088)	(0.016)	(0.035)	(0.119)
Ln (Offering shares)	-0.024	-0.120	-0.274	0.004	-0.096	-0.257	-0.012	-0.103	-0.273
	(0.040)	(0.074)	(0.181)	(0.045)	(0.081)	(0.171)	(0.043)	(0.074)	(0.169)
Public Ratio	-0.053	-0.126	-0.609*	-0.029	-0.108	-0.592*	-0.044	-0.114	-0.608*
	(0.103)	(0.231)	(0.321)	(0.086)	(0.222)	(0.306)	(0.101)	(0.232)	(0.325)
SOE Share Ratio	-0.735***	-0.459	-0.368	-0.664***	-0.474	-0.245	-0.786***	-0.527	-0.373
	(0.147)	(0.704)	(1.193)	(0.188)	(0.652)	(1.171)	(0.176)	(0.690)	(1.129)
Board Number	-0.007	-0.006	0.002	-0.008	-0.006	0.002	-0.007	-0.006	0.002
	(0.005)	(0.007)	(0.012)	(0.006)	(0.008)	(0.012)	(0.006)	(0.008)	(0.012)
Constant	0.540	1.724	1.467	0.471	1.672	1.419	0.515	1.691	1.465
	(0.369)	(1.327)	(2.330)	(0.376)	(1.284)	(2.389)	(0.376)	(1.302)	(2.352)
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	983	983	983	983	983	983	983	983	983
R-squared	0.468	0.449	0.462	0.471	0.452	0.462	0.476	0.452	0.462

Table 10. Heckman two-step test for self-selection bias

This table presents the results from the two-step Heckman regression. In the first-stage regression, the dependent variable is *FMDI Dummy*, which is defined to be 1 if the firm is located in the top half of the *FMDI* distribution, and 0 otherwise. The explanatory variables include *Labor Productivity, Labor Structure, Provincial GDP in Finance Sector*. *Labor Productivity* is the labor productivity of each province, retrieved from the CSMAR database. *Labor Structure* is the percentage of employees working in old industries in a certain province, retrieved from the CSMAR database. *Provincial GDP in Finance Sector* is the provincial level of GDP in the financial sector, retrieved from the CSMAR database. The resulting fitted values from the first-stage estimation are used to compute the inverse Mills ratio (*IM Ratio*). In the second-stage regression, the *IM Ratio* is included in the regression to test the relation between *UP* and *FMDI*. All firm-level independent variables are measured at the end of the preceding year. Year and industry effects are controlled for in each model and standard errors are clustered at the year level. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are in parentheses.

	(1)	**(2)**
	Stage 1: Probit regression	**Stage 2: OLS regression**
Variables	FMDI Dummy	UP
Labor Productivity	-0.001	
	(0.007)	
Labor Structure	-0.069***	
	(0.008)	
Provincial GDP in Finance Sector	0.006***	
	(0.001)	
FMDI		-0.032**
		(0.013)
IM Ratio		0.053
		(0.046)
Firm Age		-0.002
		(0.008)
P/E Ratio		-0.001
		(0.002)
B/M Ratio		-0.229**
		(0.093)
Ln(Assets)		0.226**
		(0.085)
List Lag		0.819***
		(0.018)
Ln(Offering Shares)		-0.384***
		(0.106)
Public Ratio		0.056
		(0.287)
SOE Share Ratio		-2.113***
		(0.670)
Board Number		0.017
		(0.013)
Constant	-0.535	1.050
	(0.473)	(0.772)
Year Effect	Yes	Yes
Industry Effect	Yes	Yes
Observations	1,195	1,195
R-squared		0.454

Table 11. Financial market development or economic growth?

In this model, the dependent variable is the firm's IPO underpricing. The variable *FMDI* is the FMD index following Fan et al. (2011). Economic development is measured by *Provincial GDP, Provincial GDP in Finance Sector, Provincial GDP per Capita*, and *Provincial GDP Percentage Change*, and the results are presented in Columns (1) to (4), respectively. The *Provincial GDP* and *Provincial GDP in Finance Sector* are measured in trillion RMB. The *Provincial GDP per Capita* is measured in thousand RMB. *UP* is the firm's IPO underpricing; *FMDI* is the FMD Index following Fan et al. (2011); *Firm Age* is the number of years since the founding of the firm; *P/E Ratio* is the P/E before the firm goes public; *B/M Ratio* is the firm's book value of equity at the end of the fiscal year, divided by market value of equity; *Ln (Assets)* is the logarithm of firm's total assets by the end of the fiscal year; *List Lag* measures delay in floating the issue; Ln *(Offering Shares)* is the logarithm of shares offered; *Public Ratio* is the percentage of public shareholdings at the time of the IPO, calculated as the number of publicly traded shares over the total number of common shares; *SOE Share Ratio* is percentage of shares issued to SOEs at the time of the IPO, calculated as the number of SOE shares over the total number of common shares and *Board Number* is the number of board members at the time of the IPO. All firm-level independent variables are measured at the end of the preceding year. Year and industry effects are controlled for in each model and standard errors are clustered at the year level. The superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are in parentheses.

Variables	(1) UP	(2) UP	(3) UP	(4) UP
FMDI	-0.045**	-0.044**	-0.042**	-0.041***
	(0.017)	(0.017)	(0.014)	(0.020)
Provincial GDP	-0.046			
	(0.040)			
Provincial GDP in Finance Sector		0.257		
		(0.574)		
Provincial GDP per Capita			-0.001	
			(0.023)	
Provincial GDP Percentage Change				0.308
				(1.370)
Firm Age	-0.002	-0.001	-0.001	-0.001
	(0.007)	(0.007)	(0.008)	(0.008)
P/E Ratio	0.001	0.001	0.001	0.001
	(0.003)	(0.003)	(0.0033)	(0.003)
B/M Ratio	-0.229**	-0.236**	-0.234**	-0.235**
	(0.090)	(0.090)	(0.089)	(0.088)
Ln(Assets)	0.213**	0.212**	0.213**	0.214**
	(0.080)	(0.080)	(0.080)	(0.079)
List Lag	0.820***	0.816***	0.817***	0.818***
	(0.018)	(0.018)	(0.019)	(0.018)
Ln(Offering Shares)	-0.389***	-0.380***	-0.381***	-0.381***
	(0.101)	(0.101)	(0.102)	(0.102)
Public Ratio	0.046	0.054	0.047	0.050
	(0.288)	(0.286)	(0.290)	(0.282)
SOE Share Ratio	-2.516***	-2.398***	-2.447***	-2.480***
	(0.559)	(0.594)	(0.587)	(0.595)
Board Number	0.019	0.019	0.019	0.019
	(0.013)	(0.013)	(0.013)	(0.012)
Constant	1.377	1.310	1.315	1.009
	(0.841)	(0.848)	(0.827)	(1.008)
Year Effect	Yes	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes
Observations	1,246	1,246	1,246	1,246
R-squared	0.453	0.452	0.452	0.452

Highlights

- Financial markets development helps to reduce IPO underpricing
- Better-developed markets enjoy higher transparency, less information asymmetry
- Regulatory reforms in financial markets could reduce IPO underpricing
- Financially constrained or non-state-owned firms are more sensitive to financial market development
- Firms in better-developed financial markets perform better in the long run