Market-based Financing Reforms and Shareholder Valuations: Event Study Evidence from the Chinese Science and Technology Innovation Board

Qin, Yaohua and Xiao, He and Zhang, Yifei

Beijing Normal University-Hong Kong Baptist University United International College, Beijing Normal University-Hong Kong Baptist University United International College, Beijing Normal University-Hong Kong Baptist University United International College

19 May 2019

Market-based Financing Reforms and Shareholder Valuations: Event Study Evidence from the Chinese Sci-Technology Innovation Board

Yaohua Qin, He Xiao, Yifei Zhang

Beijing Normal University-Hong Kong Baptist University United International College

July 31, 2019

Abstract

This paper studies the impact of the newly introduced sci-technology innovation board (STAR) on stock valuations in China. This Nasdaq-style board features a market-based IPO system that contrasts with the current approved-based arrangement. Event study approach shows that A-share firms pertaining to STAR related industries increased significantly after the reform announcement. The effect is stronger for Non-SOEs and firms with higher R&D capacity. By taking the announcement of STAR market as an exogenous shock, we employ a difference-in-differences (DD) identification strategy to explore the channel of the increased CAR from the reduced information asymmetry. The quasi-natural experiment results show that the financial analyst, research report, and broker company coverage on the STAR related firms surged significantly while KV index decreased. A further triple difference (DDD) is applied to estimate the heterogenous effects for firm-level characteristics. The results echo to our regression findings and show that the information asymmetry of the non-SOEs and firms with stronger R&D capacity lessened even sharper. Public shareholders of the firms filing the STAR IPO applications experienced salient growth in their abnormal returns while their industry competitors suffered price drops.

Keywords: China's financial reform, Registration-based IPO system, Sci- technology innovation board in China, Chinese financial markets.[*]

JEL Classification Codes: G18, G38, N25, O16.

[*] The authors thank Xin Chen, Wenrui Liang, and Weijing Lin for their excellent research supports and delicate data collection efforts.

"The detailed rules for a Nasdaq-style start-up board in Shanghai have fueled hopes among early-stage companies the new regime could bring about positive changes in China's stance towards raising equity that investors have been seeking…… If successful, the board could also position Shanghai as a capital-raising competitor to Hong Kong and New York, who between them accounted for 68.7 percent of the money raised through Chinese IPOs last year……"

——————— *Reuters (February 11, 2019)*

1. Introduction

China's economic reform over the last four decades has unleashed an unprecedented economic development. Meanwhile, its financial system demands a corresponding progress to support and promote the economic rise (Levine, 1999; Rousseau & Wachtel 2000; Beck & Levine, 2004). The Chinese stock market, whose total market capitalization ranked the second and the third in the world at the end of year 2017 and 2018 respectively, has witnessed a long-lasting prosperity ever since its establishment in 1991 (Franklin et al., 2018). Yet, the relatively lag of financial market accessibility contrasts with the rapid growth of its depth, as evidenced by the indices of financial market depth (FMD) and access (FMA) of China in Figure 1. Since the ability of firms to access financial market is pivotal in measuring one country's financial system development and the prosperity of the economy (Levine, 2005; Svirydzenka, 2016), further reforms become urgent for both the short-run and long-run growth of Chinese economy. Chinese financial market accessibility, mainly featured by the initial public offering (IPO) system, however, is being widely challenged by its inefficient selection rules and process (Johanssona et al., 2017).

Under current practices, IPO applications need to respond to restricted and selected IPO qualifications, including profitability, cash flow, and asset quality, before formally approved by the Public Offering Review Committee of the Chinese Security Regulatory

Commission (CSRC) (Chen & David, 2013; Song, Tan, & Yang, 2014)[1]. Inefficient allocation during the IPO process is also detected and political connections are found to have a strong association with the approval and processing speed of initial public offering (IPO) activities in China (Li & Zhou, 2015; Hafiz & Shaolong, 2019). Joseph et al. (2014) show that larger state-owned firms tend to have superior government connections and they are more likely to take advantages in IPO process. Thus, China's current IPO system calls for a transition from the approval-based arrangement toward a market-based mechanism (Cheng, Ouyang, & Tan, 2009; Cohn & Yinzhi, 2018).

Echoing such increasing demand, president Xi Jinping officially announced, on November 5, 2018, the establishment of the sci-technology innovation board (STAR) that pilots the registration-based system during the First China International Import Expo. China Securities Regulatory Commission (CSRC) later officially issued the IPO guidelines for STAR in the evening of January 30, 2019 after the formal endorsement by the Central Comprehensively Deepening Reforms Commission, the highest Chinese national policy maker. Besides the U.S. style registration system, the purpose of STAR, as claimed by the regulatory body, is to host companies in technology and emerging industries. Firms with growth potentials but experienced temporary financial losses are also eligible to be listed in the new board. CSRC is responsible for overseeing the filing firms and promoting full public disclosure and it will focus on the accuracy of information disclosure rather than firms' past performances. It is widely believed to be one of the most important financial reforms in Chinese market and the Shanghai and Shenzhen Composite rise about 5.23% and 9.90% in wake of CSRC announcement within the five trading days respectively.

[1] According to CSRC current requirements, IPO companies should maintain their profits at an aggregate amount of more than RMB 30 million for the last three years; and their cumulative cash flows from operating activities for the last three years must exceed RMB 50 million or their cumulative operating income for the last three years must exceed RMB 300 million. For the requirements of asset quality, IPO company intangible assets (excluding land use rights, marine cultivation rights, and mining rights) can not surpass 20% of the net assets at the end of the latest year.

In this paper, we shed light on shareholder valuations of this financial reform by analyzing the stock market reactions. According to the efficient-market hypothesis (EMH), stock markets respond instantly to policy shocks, as investors revise their beliefs momentarily. Thus, the prospects of the financial reform viewed by rational shareholders are indicated by the changes in stock valuations. The channels through which financial reform affects the cumulative average abnormal return (CAAR) are also examined by exploring the reduction of the information asymmetry through market attention and information quality. We also study the significant market performance from incorporating the potential heterogeneous impacts of the reform on different firms pertaining to various firm characteristics.

Our work finds that the CAAR of the STAR related industries increased significantly by 0.318% and 0.605% in one-day and three-day window respectively after the official IPO guidelines announcement, which shows an optimism for high-tech industry. In order to eliminate the effect from market speculations, we examine the long-term market responses through buy and hold abnormal return (BHAR) following classical long-term event studies (Loughran, 1995; Fama, 1998). The results show that BHAR roars 6.72% over 90 days, indicating that investors have a long run positive expectation over the value of the high-tech related industry firms. Firm-level regression models further detect heterogeneous impacts of firms' characteristics on the cumulative abnormal return (CAR). Non state-owned enterprises (Non-SOEs) and firms with higher R&D capacity also reacted positively in response to the reform announcement.

In order to identify channel of the positive market reaction, we employ a difference-in-differences (DD) estimation to examine the variation of information asymmetry after the announcement of STAR market, since a higher information disclosure standard is emphasized by STAR market regulations. Following the spirits from Frankel and Li (2004), Armstrong et al (2011), and Ascioglu et al (2005), we use financial analyst, research report, broker company coverage, and KV index as proxies to measure firm information asymmetry. The DD results demonstrate that the analyst, research report, and broker company coverage on the STAR related firms grew significantly while KV index dropped compared with their counterparts in the main board. The channel of heterogeneous effect for firm-level characteristics are examined through a DDD framework, which shows that the information asymmetry of non-SOEs and firms with stronger R&D capacity decreased faster compared with their counterparts in STAR related industries. Both outcomes indicate that the channel of the market reaction went through the variation of the information asymmetry for the STAR related firms after the STAR announcement.

Loosening the selection process is considered to be the most distinguished feature of the STAR, which creates more potential financing opportunities and hence improves firms' market value. We then directly investigate the investors' valuations of potential relaxations of firms' market financing accessibilities by focusing on the sample firms which have ownerships of the firms filing IPO applications. Many high-tech firms rushed into filing applications to STAR after CSRC's announcement.[2] Using hand-collected data from their official prospects, ownership involvements by the A-share firms are detected. By adopting the event study approach again on individual filing date announced by the Shanghai Stock Exchange, we find significantly positive market responses in one-day and three-day event windows. Our result is also supported by empirical works that a positive valuation effect of parent firms exists when announcing carve-out decisions (Schipper & Smith 1986; Slovin et al., 1995; Allen, 1998; Hulbert et al., 2002). By employing firm characteristics, we demonstrate that the one-day and three-day CAR of Non-SOE companies were better than their SOE peers while listed companies with higher R&D expenditures growth rate in the past benefited more from the event.

Increasing competitions due to the financial reform could be the only "downside", which harms the incumbents that directly compete with the firms that are eligible to be

[2] As of May 19, 2019, there are 109 companies submitting their application in STAR according to the WIND database.

listed in the STAR. Existing literature finds that publicly traded industry competitors in the market experience negative stock returns in responses to their industry rivals' successful IPOs and positive stock price responses to their IPO withdrawal (Akhigbe, Johnston, & Madura, 2006; Hsu, Reed, & Rocholl 2010). Hulburt, Miles, and Woolridge (2002) echoes the evidences from competitors of carve-out parent firms by showing the negative announcement-period returns after the announcements of equity carve-outs. Our results, consistent with previous studies, display a significantly negative stock return of the competitors listed in the main board after the announcement of IPO applications to STAR and the negative CAR was stronger for applicants issuing relative larger shares.

Our study relates to the existing literature in several folds. First of all, we are among the first studies targeting on the influences of registration-based system reform in financial market from emerging countries, while existing literatures mainly focused on financial regulatory policy changes and how it could promote market efficiency (Angelini & Cetorelli, 2003; Kroszner & Strahan, 2011; De Frutos & Manzano, 2014). Our research develops current financial regulatory policy literatures by targeting on financial reform that systematically change from approved-based to registration-based system. We also deepen out study through how emerging financial markets would react to this significant financial shock, as well as how firm characteristics could affect the extent of this market reaction. Second, our paper explores the literatures regarding the role played by information asymmetry on firm market performance. We examine the channel of positive market reaction through the effect of information asymmetry with the proxies of financial analyst, research report, broker coverage, and KV index. The finding confirms the significant impact of information asymmetry on the variation of the related market performance. Third, our study extends IPO literatures by considering the impact of announcement of potential IPO participants on financial market and how this financial reform could improve IPO efficiency while most of studies concentrated on IPO company characteristics, firm performance, as well as inefficient IPO policies

(Ritter & Welch, 2002; Joseph et al., 2007; Tian, 2011; Song, Tan, & Yang, 2014). Fourth, our study supplements the existing research which mainly concerns how government subsidy program support high-tech company (Wallsten, 2000; Howell, 2017) since high-tech firms in many countries are struggling with financial constrains for R&D and innovation (Hall, 2002; Himmelberg & Petersen, 1994; Bond, Harhoff, & Reenen, 2003). We, on the other hand, focus on how financial market was functioned by the government to financially support high tech companies.

2. Background and Significance of the Events

In order to improve its overall efficiency and allocation of capital of the market, the Chinese financial reform has been launched since the initiation of the security market in 1990. Tradition reforms for Chinese financial regulatory framework normally initiated from over-restrictive to over-unrestrictive, and then revised by supplementary regulations (Cheung, Ouyang, & Tan, 2009)[3]. The significant reforms in Chinese stock market history, as shown in Table 1, have made great contributions to the Chinese stock market. For example, the split-share reform in 2006 converted a large number of non-tradable shares to tradable shares in the market thus stimulating stock markets and promoting SOE firm performance (Li et al, 2011; Kai et al, 2011; Liao et al, 2014;).

In spite of decades of financial reforms in China that have led the regulations more market-based, the selection procedure for IPOs is still more inclined to merits, which follows case-by-case evaluation systems being strictly supervised by the government (Johanssona et al., 2017; Li & Zhou, 2015). A further and deeper financial reform was considered to be necessary during the recent decades to further reduce financial frictions and constrains, to make a more financial liberalized and marketized Chinese security market, and to financially support national economy to grow healthily and

[3] The over-restrictive regulations could generally screen ill-performed firms and thus protect investors. On the other hand, they also create high barriers preventing many small but promising companies from going public. At the same time, over-unrestrictive regulations, which allow more companies to enter into the capital markets, might also carry underqualified firms for investors (Cheung, Ouyang, & Tan, 2009).

solidly (Farrell, Lund, & Morin, 2006; Chan, Dang, & Yan, 2012; Sandra, Walter, & Vandenbussche, 2010). Moreover, the financial reforms are expected to channel more funds to private companies and small, medium companies, and high-tech initiatives, all of which has been regarded as the engine of growth in China's economy (Chen, Ke, Wu, & Yang, 2016). Such reforms with more financial opportunities would also be anticipated to provide Chinese savers substantially higher returns and thus elevate living standards and possibly consumption throughout the country (Chen & David, 2013).

These urgent requests stimulated a major financial reform of the Chinese capital market Back to December, 2015, the Standing Committee of the National People's Congress announced the authorization of the stock pilot registration system. The progress, however, grinded to a standstill in 2017. November 5, 2018, president Xi Jinping, officially announced the establishment of STAR and pilot registration system and depicted the promising development of this new-established financial market. And on January 30, 2019, the CSRC issued the guidelines of implementation of STAR and the pilot registration-based system in Shanghai Stock Exchange. According to the guidelines, STAR has no rigid requirements for the profits and capital structures of the IPO applicants, which fundamentally supports various technological innovations in the country[4]. STAR mainly targets on small and medium-sized technology start-ups and strategic emerging sectors with great growth potentials.

On March 1, 2019, the details of pilot registration-based System were released to further emphasize market information transparency and the roles of the CSRC, including the oversight on listed firms and possible illegal activities in the new board

[4] The China Securities Regulatory Commission "CSRC", (Jan 30, 2019). "Opinions on the Implementation of Establishing the Sci-Technology Board and Pilot Registration System in Shanghai Stock Exchange". Retrieved from http://www.csrc.gov.cn/pub/zjhpublic/zjh/201901/P020190130725847011706.pdf

such as fraudulent IPO and false financial statement[5]. This registration-based system follows the US IPO mechanism that provides more flexibilities for stock issuance, trading, and delisting, while releasing certain capital constraints of IPO companies (Barth & Jahera, 2010; Wright, 2002).[6]

3. Data, Sample, and Methodology

3.1 Event Study Methodology

Event study methodology is pervasive in assessing shareholders' valuation of some exogenous shocks based on efficient market hypothesis. Chinese market is functioning relatively efficiently since the prices of Chinese securities are strongly connected with listed firm fundamentals and the fluctuation of stock prices are as informative about future earnings as they are in the American market (Carpenter et al., 2018). Thus, Lin et al. (2018) analyzes the stock market response of China's anti-corruption movement while Fisman et al. (2014) estimates the abnormal return after the interstate frictions between China and Japan. Stock market reaction can also be gauged the potential impact of financial reforms. Hackbarth et al. (2015) adopts this method to assess the financial reforms relating the 1978 Bankruptcy Reform Act and the subprime crisis respectively. Following MacKinlay (1997), we utilize the single factor market model in the main analysis. The results are consistent if employing the Fama-French three-

---

[5] The China Securities Regulatory Commission "CSRC", (Mar 1, 2019). "Measures for the Administration of the Registration of IPO Stocks on the Sci-Technology Innovation Board (for Trial Implementation)". Retrieved from http://www.csrc.gov.cn/pub/zjhpublic/zjh/201903/t20190301_351633.htmlThe China Securities Regulatory Commission "CSRC", (Mar 1, 2019). "Measures for the Continuous Supervision of Companies Listed on the Sci-Technology Innovation Board (for Trial Implementation)". Retrieved from http://www.csrc.gov.cn/pub/zjhpublic/zjh/201903/t20190302_351634.htm

[6] The financial accessibilities of high-tech enterprises grow with stronger market inclusiveness, and more diversified market functions (Brown, Fazzari, & Petersen, 2009; Padilla-Ospina et al., 2018). Information asymmetry in IPO is anticipated to be lessened by the involvement of the market investors and the influences of IPO companies and its CEO competencies (Gounopoulos et al., 2018).

factor model (1993), following the spirit of Fisman et al., (2014) and Wang and Xu (2005).

In our event study, we use January 31 as T0 since the announcement of the financial reform is in the evening of January 30. We did not select the event date of November 5 since the market has not clearly detected any details of the implementation of the STAR program on that early date. While the event date of March 1 could not catch all the effects since the market expectation has already been perceived after the event of January 31. The [-10, +10] days are selected as the event window to do our test. We also estimate the event window for [-7, +7], [-5, +5], [-3, +3], [-1, +1], [-1, +1], [0, +1], [0, +3], [0, +5], [0, +7], [0, +10]. The estimation window is set to be [-180, -30] days.

3.2 Sample and Summary Statistics

The initial sample starts with public A share firms listed on the Shanghai and Shenzhen Stock Exchange. Financial, "special treatment" ("ST"), and National Equities Exchange and Quotations (NEEQ-listed) companies are excluded. All stock returns, ownerships, analyst forecasts, and the relevant financial data are extracted from the CSMAR and Resset database. The summary of the key variables of the study are shown in Table 2.

3.2.1 Measures on Firm Characteristics

Industries Related to STAR

To investigate the possible impacts of the reform on listed firms, various proxies on firms' characteristics are examined through the event studies. First, we identify the listed firms who are classified to the same industries that are highly welcome to be listed in the STAR. According to the announcement issued by CSRC, the related high-tech industries were selected based on OECD industry classification, following the study from Galindo-Rueda and Verger (2016). These companies and their corresponding CSRC industry codes (2012) are presented in Table 3.

SOE and Non-SOE Firms

As non-state-owned firms (Non-SOEs) have relative disadvantages in accessing credit markets (Song et al., 2011), the financial reform that provides better environment for fund raising could relieve the credit constraint of Non-SOE firms more that of the state-own enterprises (SOEs). Therefore, we distinguish the SOE and Non-SOE firms by the code of equity nature provided by the CSMAR.

R&D

Eberhart, Maxwell, and Siddique (2004) identified that firms' shareholders would expect significantly positive abnormal return after the increase of R&D expenditures of their companies, while R&D intensity has also been considered as a major effect of firm performance (Lin, Lee, & Hung, 2006). Hence, we also study the influences of R&D growth rate and intensity (measured by R&D/Sales) towards CAR of the events.

Related Firms

Empirical work supports a positive valuation effect of parent firms when announcing carve-out decisions (Schipper & Smith, 1986; Slovin et al., 1995; Allen, 1998; Hulbert et al., 2002). To carry out the study of the abnormal returns of the listed firms that are shareholders of the potential IPO firms, we select related firms that are recorded by the WIND database. Besides, all financial data of the potential IPO firms are from the WIND database as well. The number of related firms is 53 (as of May 19, 2019) and their names and stock code are listed in Appendix I.

Competitor

As shown by Hsu et al., (2011) and Lee et al., (2011), the incumbents that directly compete with the potential IPO firms might be adversely affected. To quantify such impact, we manually collected the competitor information from the IPO prospects. Appendix II shows the IPO companies as well as their listed business competitors.

Analysts

A typical concern of the event study approach employed above is that investors' over and under-reaction could be overlooked (De Bondt & Thaler, 1985; Hirshleifer & Subrahmanyam, 1998), even after the adjustment of size and beta (Chopra et al., 1992).

These biases are also detected during the announcement of public policies (Bernanke & Kuttner, 2005). In emerging markets, Bailey et al. (2003) and Boubaker et al. (2015) find heterogeneous responses between analysts and stock market following a financial regulatory reform. Therefore, we take analyst into consideration in our research. As presented by Derrien and Kecskés (2013), analyst coverage on listed firms declines as a result of the real effects of financial shocks and the decline of analyst coverage would later aggregate information asymmetry and thus rises the cost of capital. Conrad et al., (2006) mentioned analysts are inclined to update their recommendation as large stock price increases or major news announced. Our research followed those research tracks and looked at the changes of analyst attention for the event, including analyst coverage and research report coverage. Analyst coverage is the number of analysts actively tracking and publishing opinions on firms within one month. Report coverage is the number of reports tracking and analyzing firms within one month. Broker coverage is the number of investment banks or security companies which track and analyze firms within one month.

4. Empirical Framework and Results

4.1 The Market Reaction to the Policy Announcement

The event study methodology employed shows consistently and significantly positive stock market reactions for firms belonging to the related industries. Table 4 shows that CAAR for three-day [0,3], five-day [0,5], and seven-day [0,7] is all significantly positive. Figure 2 demonstrates the trends of the CAAR through window [-10, 10] is moving upward around T0. The results show that investors consider the event as an important and good news to the market. Event study using three-factor also matches this positive market reaction.

The short term significantly positive result may come from market speculations. Therefore, we extend the post event window to a longer period [0, 90] and adopt buy and hold abnormal return (BHAR) following classical long-term event studies (Loughran, 1995; Fama, 1998). As the result shown in Table 5, long-term market reaction BHAR roars 6.72% over 90 days. Figure 3 further shows that BHAR exhibits an obvious upward trend over 90 days post event window, indicating that investor's positive expectation about the value of the high-tech related industry firms persist for a long run.

4.2 The Channel of the Positive Market Reaction

We try to exploit the possible channel of the positive market performance of the related industry firms in the main board. Since one distinguishable characteristic of the STAR market is that STAR has a strict requirement on information disclosure for its listed companies, main board firms which are in the STAR related industry would have a relatively higher information disclosure quality since the industry standard has been elevated. As a result, the positive return for the STAR related firm performance could be attributed to the expectation of lessening of the information asymmetry and increasing of the information disclosure quality of those industries because the degree of information asymmetry is strongly correlated with the cost of the capital of the firms and thus affect their market performance (Diamond & Verrecchia, 1991; Armstrong et al, 2011; Lambert et al, 2011).

Information asymmetry could be affected through various ways. From the market perspectives, information asymmetry could be lessened by more research and wider coverage. Frankel and Li (2004) found that large analyst following and report coverage are able to reduce information asymmetry of the covered firms.

Following the methodologies adopted by Frankel and Li (2004) and Armstrong et al (2011), our research uses financial analyst coverage as a proxy of information asymmetry to explore the channel of related companies' positive CAR. We adopt a quasi-natural experiment methodology and treat the announcement of STAR market as an exogenous shock to the main board due to policy information asymmetry between the government and investors. The following DD estimation was conducted to assess the impact of the announcement STAR on analysist coverage of the STAR related companies compared with the other list companies,

(1) $$Anacov_i = \beta_1\, Post_t * Treat_i + \beta_2 Post_t + \beta_3 Treat_i + a_i + \epsilon_i$$

(2) $$Rescov_i = \beta_1\, Post_t * Treat_i + \beta_2 Post_t + \beta_3 Treat_i + a_i + \epsilon_i$$

(3) $$Seccov_i = \beta_1\, Post_t * Treat_i + \beta_2 Post_t + \beta_3 Treat_i + a_i + \epsilon_i$$

The dependent variable, $Anacov_i$, $Rescov_i$, and $Seccov_i$denotes analysts coverage, research coverage, and broker company coverage, measuring for the numbers of the analyst, research, and security company monthly coverage of $Firm_i$. $Treat_i$ is a dummy variable that equals one if it is the STAR related company and zero otherwise. $Post_t$ is a dummy variable that equals one in the period after the event date, Jan 31, 2019, and zero otherwise. a_i represents a full set of firm and month fixed effects, with standard errors clustered at the firm level to account for any correlations of the error terms within each firm.

As the results shown in Table 6, after the shock, analyst coverage, research coverage, and broker coverage of STAR related firms increase significantly compared with its counterparts in the market, by 2.058, 0.34, and 0.248 per month, respectively. Besides the analysist coverage, we also consider another channel for the expected decreasing information asymmetry, which is the improvement of information disclosure quality actively done by the listed companies. From the listed companies' perspectives, the established STAR requires high information disclosure standards, which further stimulates the STAR related firms in main board paid an increasing attention on their voluntary information disclosure. More voluntary information disclosure could lessen market information asymmetry and thus reduce asymmetric information costs of trading and agency costs (Healy & Palepu, 2001; Ascioglu et al, 2005).

Following the practices of Ascioglu et al (2005), we adopt Kim and Verrecchia (KV) (Kim & Verrecchia, 2001) index as a proxy to measure information disclosure practices. KV represents the slope coefficient of the regression of log absolute returns on abnormal volume, as shown in the following ordinary least squares regression. As the study of Ascioglu et al (2005), the KV measurement of firm disclosure is computed as 10,000 times the slope coefficient.

(4) $$Ln|\Delta p_t/p_{t-1}| = \alpha + \beta(Vol_t - Vol_0) + \epsilon_i$$

where $p_t$is the closing price on day t, $Vol_t$is the daily trading volume in shares on day t, and Vol_0 is the mean of expected trading volume in shares for one-month sample period. Firms with a negative β and $\Delta p_t = 0$ are excluded from our research.

Since volume declines when firms have shown better information disclosure quality, market savers rely less on volume for information and more on the disclosure, including audited financial statements (Ascioglu et al, 2005).

We further conduct a DD (difference-in-difference) model to identify the causal inference that the event made to the KV of the STAR related companies.

(5) $$KV_i = \beta_1\, Post_t * Treat_i + \beta_2 Post_t + \beta_3 Treat_i + a_i + \epsilon_i$$

KV_i refers to the information disclosure quality. $Post_t$ is a dummy variable that equals one in the period after the event date, Jan 31, 2019, and zero otherwise. $Treat_i$ is another dummy variable that equals one for the STAR related companies and zero otherwise. The coefficient, β_1, indicates the impact of the establishment of STAR on information disclosure quality KV index. A negative and significant β_1 suggests that the establishment of STAR exerts a positive effect on the degree of information disclosure quality, while a positive and significant $\beta_1$indicates that the establishment of STAR pushed information disclosure quality in the other direction. We control the firm fixed effect and cluster the standard errors at the firm level.

The DD results from Table 6 show that after the STAR announcement, KV index of STAR related firms decrease by 0.016 compared with other companies in the market. The outcome shows that the information disclosure quality of STAR related firms surges significantly since investors make transactions of these traded companies depending less on the information of their trading volumes after the shock.

In sum, the positive CAR for the STAR related companies is achieved based on the effect their increasing information disclosure quality and decreasing information asymmetry to the market investors. This channel, on the one hand, could come from the greater attention from the market including wider coverage from analysts, analyst research, and broker companies after the shock. On the other hand, it could come from STAR related companies' active release of the information to follow the high standard of STAR market as a decreasing KV index indicates.

4.3 Firm-level Regressions of CAR for the Policy Announcement Date

Following Fisman et al., (2014), we incorporate the CAR generated from the event study to investigate the potential factors that affects the CAR. The regression model, which contains various firm characteristics, is stated as follows:

$$CAAR_i = \alpha + \beta_1 \, firm\ characteristics_i + \beta_2 \, firm\ control_i + \gamma_i + \epsilon_i \quad (6)$$

where $CAAR_i$ is the cumulative average abnormal return over the event window specified above. $firm\ characteristics_i$ includes the possible factors such as state-ownership dummy and R&D intensity and growth rate. Firm-level control variables are ROA, age, the logarithm of total assets, leverage ratio, and sales growth. We further control for industry fixed effects and the standard error is clustered at industry level. We first focus on firms pertaining to the industries that are highly likely to be listed in the STAR.

Table 7 shows that non SOE companies have a significantly higher CAR for both one-day [0,1] and three-day [0,3] event window, compared to SOE companies. The result reflects that non SOE could expect more benefits based on the signals of this new event, compared to the traditional advantages of SOE. The R&D intensity is also significantly positively related to CAR for both one-day [0,1] and three-day [0,3] event window, while R&D growth rate is significantly positively related to CAR for one-day [0,1]. Also, the companies with higher R&D growth rate received more market investments after the events. The significant result of the interaction item, SOE* R&D growth rate, demonstrates that CAR of SOE company is less sensitive to its R&D growth rate.

In addition to the subsample analysis, we analyze the conceivable causes that affect firms that not only belongs to the aforementioned industry, as the financial reform could potentially benefits all firms listed in the exchanges by sending a positive signal to the whole market. Table 8 presents the significant results for the whole market, which echo to the outcomes from the related companies in the state-own natures, R&D growth rate, and interaction item SOE* R&D growth rate.

4.4 The Channel of the Effect of Firm Characteristics

In order to explore the heterogeneity of the firm characteristics on the variation of market responses, we further conduct a DDD (triple-difference) framework to test the possible channel of information disclosure quality as discussed above:

(7) $Anacov_i = \beta_1\, Post_t * Treat_i * firm\ characteristics_i + \beta_2 Post_t + \beta_3 Treat_i + a_i + \epsilon_i$

(8) $Rescov_i = \beta_1\, Post_t * Treat_i * firm\ characteristics_i + \beta_2 Post_t + \beta_3 Treat_i + a_i + \epsilon_i$

(9) $Seccov_i = \beta_1\, Post_t * Treat_i * firm\ characteristics_i + \beta_2 Post_t + \beta_3 Treat_i + a_i + \epsilon_i$

where $Anacov_i$, $Rescov_i$, and $Seccov_i$ means analyst coverage, research coverage, and broker company coverage. $firm\ characteristics_i$ includes state-ownership dummy and R&D growth rate. $Treat_i$, is a dummy variable that equals one if it is the STAR related company and zero otherwise. $Post_t$ is a dummy variable that equals one in the period after the event date, Jan 31, 2019, and zero otherwise. a_i represents a full set of firm and month fixed effects, with standard errors clustered at the firm level.

As results presented in the Table 9, the significantly negative interaction item regarding SOE and analyst and broker coverage shows that the analyst and broker coverage is less than SOE STAR related firms compared with the non-SOEs. The significantly positive interaction item regarding R&D growth rate and analyst, report, and broker coverage demonstrates that there is a sharper increase of the analyst, report, and broker coverage for STAR related firms with higher R&D growth rate compared with the ones with lower R&D growth rate. Therefore, the channel of heterogenous effect is further confirmed that the information asymmetry for STAR related firms is reduced since there is a wider coverage from analyst, report, and brokers.

4.5 The Related Parties' Reaction on the Prospectus Releasing Dates

We then investigate the investors' valuations of potential relaxations of firms' market financing accessibilities. To show the direct effects of relaxations of firms' market financing accessibilities, we look at the CAAR of the listed firms that have ownerships of firms filing IPO prospectus. According to the event study result, as shown in Table 10 and Figure 4, the event window [-3,3], [-1,1], [0,1], and [0,3] all present significantly positive responses. That implies stronger financing accessibilities for these shareholders in the market and justifies the positive vision of future market as the previous study indicated.

As for competitors of the listed firms (Competitor lists are shown in Appendix II) that have ownerships of firms filing IPO prospectus, they experienced a significantly negative CAR in all of event windows (seen in Table 11 and Figure 5). These represent that these competitors are facing a worse financial situation in the market.

4.6 Firm-level Regressions of CAR for the Prospectus Releasing Dates

To specify the heterogenous impacts, the following familiar regression framework is proposed:

$$CAR_i = \alpha + \beta_1\, R\&D\ growth_i + \beta_2\, issue\ shares_i + \beta_3\, firm\ control_i + \gamma_i + \epsilon_i \quad (10)$$

where i refers to those related firms which own shares of the STAR potential firms. $R\&D\ growth_i$ and $issue\ shares_i$ are the average R&D growth rate for the past three years and the listed companies' share proportions of the STAR companies, respectively. Similar firm-control variables and industry fixed effects are specified. The standard error is clustered at industry level.

The corresponding results are reported in Table 12 that both average R&D growth rate and the number of patents is positively correlated with the amount of CAR, which means the higher research expenditures and capacity, the higher market returns companies could generate. In this event, issue share percentages, on the other hand, present a negative correlation, which shows that higher issuing share percentages in STAR could dilute the ownership percentages of the shareholders.

The regression results for the significant firm characteristics that impact competitors CAR are shown in Table 11. It shows that issue share percentages are significantly negatively correlated with CAR[-7,7], CAR[-5,5], and CAR[-3,3] of the competitors， which implies that higher capitals that IPO applicants could raise, the lower market performance the competitors encountered.

5 Conclusion

This article investigates the Chinese stock market reactions to the establishment of the STAR with the pilot registration-based system. We find significantly positive abnormal returns following the policy announcement for related high-tech industries. Further regression models show that CAR is higher for non-SOEs and firms with higher R&D capacity in both the whole market and related high industry industries. The implication of these findings is that non-SOEs and firms with stronger technology and innovation could receive more recognitions from the market since the event. To identify the channel of the positive market reaction, we examine the effect of the STAR policy announcement on the variation of information asymmetry of the STAR related firms. Applying analyst, research report, broker company coverage, and KV index as proxies to measure firm information asymmetry, we find that information asymmetry reduced significantly after the STAR policy announcement. The channel of heterogeneous effect for firm-level characteristics were investigated that the information asymmetry of non-SOEs and firms with stronger R&D capacity decreased faster compared with their counterparts in STAR related industries. Both outcomes indicate that the channel of the positive market reaction went through the variation of the information asymmetry for the STAR related firms after the STAR announcement.

A variety of high-tech companies actively respond to the policy by submitting their applications. We then continue our investigations of the investors' valuations of potential relaxations of firms' market financing accessibilities by targeting on the sample firms with the shares of the firms filing IPO applications. Regarding the prospectus releasing day, public shareholders of the firms filing STAR IPO applications experienced positive cumulative abnormal returns while their competitors suffered from negative ones. These abnormal returns are positively correlated with IPO applicants' R&D intensity and negatively related to the size of issue. This result shows that investors view the potential relaxations of firms' market financing accessibilities as a significant signal for the related parties.

As the research result shown, this significant financial reform stimulates the performance of the Chinese financial market and strengthen both investors' and analysts' confidences in the market and STAR related industries and companies. This will be a strong support for the Chinese financial system since the current approved-based IPO system is inefficient and incompatible with the China's gigantic stock market capitalization. The STAR is also aligned with national strategies in supporting high-tech industries with strong technology and innovation capacity, promising developmental prospects, and decent market recognitions. It will be a key ingredient of the "Made in China 2025" strategic plan. Meanwhile, the reform also shows a move made by the Chinese government to counter U.S. economic sanctions and restrictions on China's technology progression, including tightening rules around intellectual property theft and technology transfers. Thus, the development of STAR and future financial reforms is paramount importance for China's future economic growth. Our research provides confident evidences of the positive feedback from the market.

References

Akhigbe, A., Johnston, J., & Madura, J. (2006). Long-term industry performance following IPOs. *The Quarterly Review of Economics and Finance, 46*(4), 638-651.

Allen, J. W., (1998), Capital markets and corporate structure: the equity carve-outs of Thermo Electron, *Journal of Financial Economics* 48, 99-124.

Angelini, P., & Cetorelli, N. (2003). The effects of regulatory reform on competition in the banking industry. *Journal of Money, Credit, and Banking*, *35*(5), 663-684.

Ascioglu, A., Hegde, S. P., & McDermott, J. B. (2005). Auditor compensation, disclosure quality, and market liquidity: Evidence from the stock market. *Journal of Accounting and Public Policy* 24, 325-354.

Bailey, W., Li, H., Mao, C. X., & Zhong, R. (2003). Regulation fair disclosure and earnings information: Market, analyst, and corporate responses, *The Journal of Finance* 58, 2487-2514.

Barth, J., & Jahera, J. (2010). US enacts sweeping financial reform legislation, *Journal of Financial Economic Policy* 2, 192-195.

Bernanke, B. S., & Kuttner, K. N. (2005). What explains the stock market's reaction to Federal Reserve policy, *The Journal of Finance* 60, 1221-1257.

Beck, T., & Levine, R. (2004). Stock markets, banks, and growth: Panel evidence, *Journal of Banking & Finance* 28, 423-442.

Boubaker, S., Farag, H., & Nguyen, D. K. (2015). Short-term overreaction to specific events: Evidence from an emerging market, *Research in international business and Finance* 35, 153-165.

Bond, S., Harhoff, D. & Van R. (2003). *Corporate R&D and Productivity in Germany and the United Kingdom*. London: LSE Research Online.

Carpenter, J.N., Lu, F. & Whitelaw, R. F. (2018). The Real Value of China's Stock Market, *BOFIT Discussion Paper*.

Chan, K. S., Dang, V. Q. T., & Yan, I. K.M. (2012). Financial reform and financing constraints: Some evidence from listed Chinese firms, *China Economic Review* 23, 482-497.

Chen, J., Ke, B., Wu, D. & Yang, Z. (2016). The Consequences of Shifting the IPO Offer Pricing Power from Securities Regulators to Market Participants in Weak Institutional Environments: Evidence from China, *Journal of Corporate Finance* 50, 349-370.

Chen S. & David B. (2013). An evaluation of the impact of stock market reforms on IPO under-pricing in China: The certification role of underwriters, *International Review of Financial Analysis* 28, 20-33.

Cheung, Y., Ouyang, Z., & Tan, W. (2009). How regulatory changes affect IPO underpricing in China? *China Economic Review* 20, 692-702.

Chopra, N., Lakonishok, J., & Ritter, J. R. (1992). Measuring abnormal performance: do stocks overreact, *Journal of Financial Economics* 31, 235-268.

Armstrong, C. S., Core, J. E., Taylor, D. J., & Verrecchia, R. E. (2011). When does information asymmetry affect the cost of capital? *Journal of Accounting Research* 49, 1-40.

Cohn, S. R., & Yinzhi, M. (2018). The Dragon and the Eagle: Reforming China's Securities IPO Laws in the US Model, Pros and Cons. *Wash. U. Global Stud. L. Rev.*17, 327.

Conrad, J., Cornell, B., Landsman, W., & Rountree, B. (2006). How Do Analyst Recommendations Respond to Major News? *Journal of Financial and Quantitative Analysis* 41, 25-49.

Diamond, D. W., & Verrecchia, R. E. (1991). Disclosure, liquidity, and the cost of capital. *The Journal of Finance* 46, 1325-1359.

De Bondt, W. F., & Thaler, R. (1985). Does the stock market overreact? *The Journal of Finance* 40, 793-805.

Derrien, F. & Kecskés, A. (2013). The Real Effects of Financial Shocks: Evidence from Exogenous Changes in Analyst Coverage, *Journal of Finance* 68, 1407-1440.

Eberhart, A.C., Maxwell, W.F., & Siddique, A.R. (2004). An Examination of Long-Term Abnormal Stock Returns and Operating Performance Following R&D Increases, *Journal of Finance* 59, 623-650

Fama, E. F. & French, K. R. (1993) Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3-56.

Fama, E. F. (1998). Market efficiency, long-term returns, and behavioral finance. *Journal of financial economics*, *49*(3), 283-306.

Farrell, D., Lund, S., Rosenfeld, J., Morin, F., Gupta, N. & Greenberg E. (2006). Putting China's Capital to Work: The Value of Financial System Reform. New York, *McKinsey Global Institute Report.*

Fisman, R., Hamao, Y. & Wang, Y. (2014). Nationalism and economic exchange: Evidence from shocks to sino-japanese relations. *The Review of Financial Studies* 27, 2626-2660.

Franklin, A., Shan, C.Y. & Zhu, J.L. (2018). "Stock Market Development" in Amstad, Marlene, Sun Guofeng and Wei Xiong (Ed), *The Handbook of China's Financial System* (forthcoming).

Frankel, R., & Li, X. (2004). Characteristics of a firm's information environment and the information asymmetry between insiders and outsiders. *Journal of Accounting and Economics* 37, 229-259.

Galindo-Rueda, F. & Verger, F. (2016). "OECD Taxonomy of Economic Activities Based on R&D Intensity", *OECD Science, Technology and Industry*, Working Papers.

Gounopoulos, D. & Pham, H. (2018). Specialist CEOs and IPO Survival, *Journal of Corporate Finance* 48, 217-243.

Hackbarth, D., Haselmann, R., & Schoenherr, D. (2015). Financial distress, stock returns, and the 1978 Bankruptcy Reform Act. *The Review of Financial Studies* 28, 1810-1847.

Hafiz, H. & Shaolong, M. (2019). Partial private sector oversight in China's A-share IPO market: An empirical study of the sponsorship system, *Journal of Corporate Finance* 56, 15-37.

Hall, B. H. (2002). The financing of research and development, *Oxford Review of Economic Policy* 18, 35–51.

Healy, P. M., & Palepu, K. G. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of accounting and economics 31*, 405-440.

Himmelberg, C. P., & Petersen, B. C. (1994). R&D and internal finance: A panel study of small firms in high-tech industries. *The Review of Economics and Statistics*, *76*(1), 38-51.

Hirshleifer, D., & Subrahmanyam, A. (1998). Investor psychology and security market under-and overreactions, *The Journal of Finance,* 53, 1839-1885.

Howell, S. T. (2017). Financing Innovation: Evidence from R&D Grants. *American Economic Review* 107, 1136-64.

Hulburt, H. M., Miles, J. A., & Woolridge, J. R. (2002). Value creation from equity carve-outs. *Financial Management*, 83-100.

Hsu, H. C., Reed, A. V., & Rocholl, J. (2010). The new game in town: Competitive effects of IPOs, *The Journal of Finance* 65, 495-528.

Johansson, A. C., Luo, D., Rickne, J. & Zheng, W. (2017). Government intervention in the capital allocation process: Excess employment as an IPO selection rule in China, *China Economic Review* 44, 271-281.

Joseph D. P. & Tianyu, Z. (2014). Politicians and the IPO decision: The impact of impending political promotions on IPO activity in China, *Journal of Financial Economics* 111, 111-136.

Kai, L., Tan, W., Yan-Leung, C., & Ping, J. (2011). Privatization and Risk Sharing: Evidence from the Split Share Structure Reform in China, *The Review of Financial Studies* 24, 2499–2525.

Kim, O., & Verrecchia, R. E. (2001). The relation among disclosure, returns, and trading volume information. *The Accounting Review 76*, 633-654.

Kroszner, R. S., & Strahan, P. E. (2011). Financial regulatory reform: Challenges ahead. *American Economic Review*, *101*(3), 242-46.

Lambert, R. A., Leuz, C., & Verrecchia, R. E. (2011). Information asymmetry, information precision, and the cost of capital. *Review of Finance 16*, 1-29.

Lee, S. H., Bach, S. B., & Baik, Y. S. (2011). The impact of IPOs on the values of directly competing incumbents, *Strategic Entrepreneurship Journal* 5, 158-177.

Levine, R. (1999). Law, finance, and economic growth, *Journal of Financial Intermediation* 8, 8-35.

Levine, R. (2005). Finance and growth: Theory and evidence, in P. Aghion and S. Durlauf, eds, *Handbook of Economic Growth* (North-Holland Elsevier Publishers, Amsterdam).

Li, G. & Zhou, H. (2015). Political connections and access to IPO markets in China, *China Economic Review* 33, 76-93.

Liao, L., Liu, B., & Wang, H. (2014). China's secondary privatization: Perspectives from the Split-Share Structure Reform, *Journal of Financial Economics* 113, 500-518,

Lin, C., Morck, R., Yeung, B., & Zhao, X. (2016). *Anti-corruption reforms and shareholder valuations: Event study evidence from China* (No. w22001). National Bureau of Economic Research.

Lin, O.W., Lee, Y., & Hung, S. (2006). R&D intensity and commercialization orientation effects on financial performance, *Journal of Business Research* 59, 679-685.

Loughran, T., & Ritter, J. R. (1995). The new issues puzzle. *The Journal of Finance 50*, 23-51.

MacKinlay, A. C. (1997). Event studies in economics and finance, *Journal of Economic Literature* 35, 13-39.

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

Rousseau, P. L., & Wachtel, P. (2000). Equity markets and growth: cross-country evidence on timing and outcomes:1980–1995, *Journal of Banking and Finance* 24, 1933-1957.

Sandra P., Walter S., & Hylke V. (2010). Financial constraints in China: Firm-level evidence, *China Economic Review* 21, 411-422.

Schipper, K., & Smith, A. (1986). A comparison of equity carve-outs and seasoned equity offerings: Share price effects and corporate restructuring, *Journal of Financial Economics* 15, 153-186.

Slovin, M. B., Sushka, M. E., & Ferraro, S. R. (1995). A comparison of the information conveyed by equity carve-outs, spin-offs, and asset sell-offs, *Journal of Financial Economics* 37, 89-104.

Song, S., Tan, J., & Yang, Y. (2014). IPO Initial Returns in China: Underpricing or Overvaluation? *China Journal of Accounting Research 7*(1), pp. 31–49.

Song, Z., Storesletten, K., & Zilibotti, F. (2011). Growing like china, *American Economic Review* 101, 196-233.

Subrahmanyam, A., & Titman, S. (1999). The going public decision and the development of financial markets, *Journal of Finance* 54, 1045-1082.

Svirydzenka, K. (2016). Introducing a New Broad-based Index of Financial Development, *IMF Working Papers*, *No 16/5,* International Monetary Fund.

The China Securities Regulatory Commission "CSRC"$_{(1)}$, 2019, "Opinions on the Implementation of Establishing the Sci-Technology Board and Pilot Registration

System in Shanghai Stock Exchange”. Retrieved from http://www.csrc.gov.cn/pub/zjhpublic/zjh/201901/P020190130725847011706.pdf

The China Securities Regulatory Commission “CSRC”(2), 2019, “Administrative measures for registration of initial public offerings of (for Trial)”. Retrieved from http://www.csrc.gov.cn/pub/zjhpublic/zjh/201903/t20190301_351633.htm

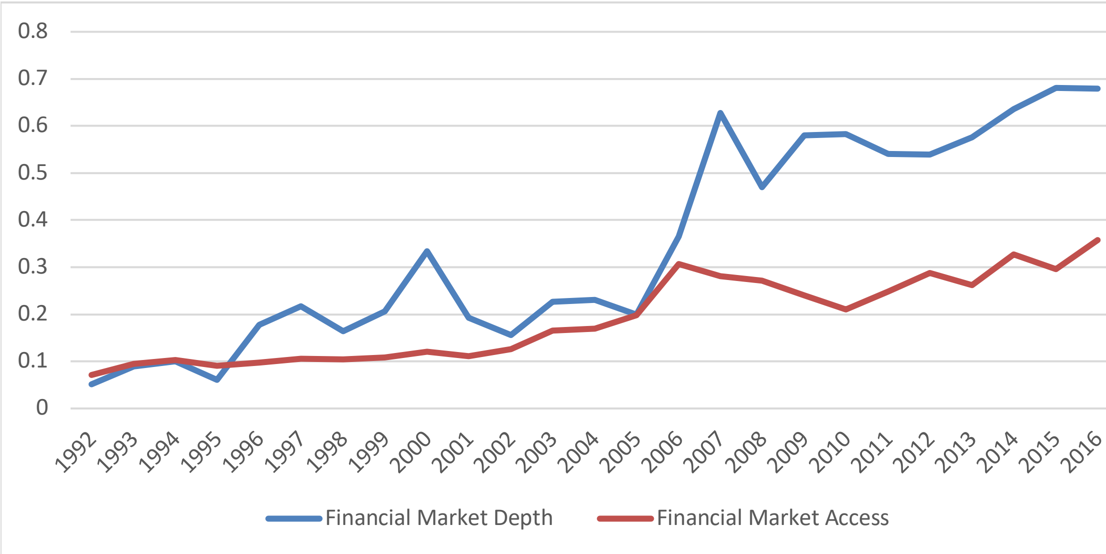
Tian, L. (2011). Regulatory underpricing: determinants of Chinese extreme IPO returns. *Journal of Empirical Finance* 18, 78-90

Wang, F., & Xu, Y. (2004). What determines Chinese stock returns? *Financial Analysts Journal* 60, 65-77.

Wallsten, S.J. (2000). The Effects of Government-Industry R&D Programs on Private R&D: The Case of the Small Business Innovation Research Program. *RAND Journal of Economics* 31, 82-100.

Wright, R.E. (2002). Reforming the US IPO market: lessons from history and theory, *Accounting, Business & Financial History* 12, 419-437.

Figure 1: Indices of financial market depth (FMD) and access (FMA) of China



Source: IMF's Index of Financial Development prepared by Svirydzenka (2016)

Table 1	The significant reforms in Chinese stock market history
1996	the launch of the restrictions of stock price
2002	lessening stock brokerage fees；the introduction of QFII
2004	the start of the small-and-medium sized enterprises board
2005-2006	the split-share reform；QDII
2009	lessening the stamp duty；the growth enterprises market board
2010	the initiation of margin trading and short selling；the introduction of stock index futures, government bond futures, and the ETF50 options
2011	RQFII
2013	the New Third Market
2014	the establishment of the Shanghai-Hong Kong Connect
2016	the establishment of the Shenzhen-Hong Kong Connect

Table 2 Summary Statistic of main variables

SOE is an indicator variable that equal to 1 if the firm is State-owned enterprise, otherwise it is 0. RD intensity is measured as R&D expenditure divided by sales. RD Growth Rate is the average R&D expenditure growth rate. Sales Growth Rate is the average sales growth rate over most recently three years.

	ALL firms						Related High-tech Industry					
	Total		SOE		Non-SOE		Total		SOE		Non-SOE	
Variable	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
RD Intensity	0.01	0.08	0	0.02	0.01	0.1	0.01	0.04	0.01	0.04	0.01	0.04
RD Growth Rate	2.88	37.55	0.67	6.22	4.63	50.01	4.67	50.73	0.36	1.43	7.6	65.64
Sales Growth Rate	26.49	126.27	16.12	108.22	34.18	137.67	24.01	86.38	12.53	25.92	30.08	104.66
ROA	5.15	5.88	3.83	4.86	5.92	6.28	5.98	6.57	4.87	5.89	6.43	6.78
Age	20.75	5.58	22.46	5.01	19.76	5.66	19.97	5.54	22.02	5.14	19.13	5.48
Asset (billion yuan)	19.43	86.4	36.15	134.79	9.7	31.47	8.94	21.62	15.59	34.47	6.21	12.15
Leverage	0.43	0.2	0.49	0.2	0.39	0.19	0.37	0.18	0.43	0.19	0.35	0.17

Table 3 Related High-tech industry distribution

CSRC Industry Code	Industry Name	Number of Firms	Percentage of Firms
I64	Internet and related services	42	4.93
C26	Manufacture of chemical raw materials and chemical products	178	20.89
C39	Manufacture of computers, communication and other electronic equipment	224	26.29
I65	Software and information technology services	74	8.69
C37	Manufacture of railway, ships, aerospace and other transportation equipment	39	4.58
M73	Research and experimental development	4	0.47
C27	Manufacture of medical products	164	19.25
C35	Manufacture of special purpose machinery	127	14.91
Total Number of Firms		852	100

[a] The industry classification follows The Guidelines for the Industrial Classification of Listed Companies (Revised in 2012), issued by China Securities Regulatory Commission (CRSC)
[b] According to the STAR announcement issued by CSRC, the related high-tech industries were selected based on OECD industry classification.

Table 4 Cumulative average abnormal return for related high-tech industry firms
In this table, the cumulative average abnormal return (CAAR) of related high-tech industry firms around policy announcement date (31st January of 2019) are reported. Abnormal return is computed as the difference between the actual daily return and expected daily return over each indicated window. The expected return is estimated using market model by setting [-180, -30] trading days as the estimation window. Both T-statistic and Patell Z statistic and their corresponding P-value are reported.

Days	No. Firms	CAAR	T-Statistic	P-value	Patell Z-Statistic	Patel P-value
[-10,10]	812	0.46%	1.048	0.296	2.931	0.003
[-7,7]	812	0.83%	2.473	0.015	5.705	0.000
[-5,5]	811	0.63%	2.155	0.033	6.507	0.000
[-3,3]	812	0.18%	0.758	0.449	1.485	0.138
[-1,1]	812	0.22%	1.495	0.137	3.931	0.000
[0,1]	812	0.32%	2.586	0.011	5.750	0.000
[0,3]	812	0.60%	3.437	0.001	7.001	0.000
[0,5]	812	0.93%	4.282	0.000	9.223	0.000
[0,7]	812	1.20%	4.727	0.000	10.683	0.000
[0,10]	812	0.78%	2.582	0.011	8.908	0.000

Figure 2 Cumulative average abnormal return for related high-tech industry firm with event window of [-10,10]

The event date 0 is defined as the policy announcement date (31 January of 2019), Abnormal return is computed as the difference between the actual daily return and expected daily return over each indicated window. The expected return is estimated using market model by setting [-180, -30] trading days as the estimation window.

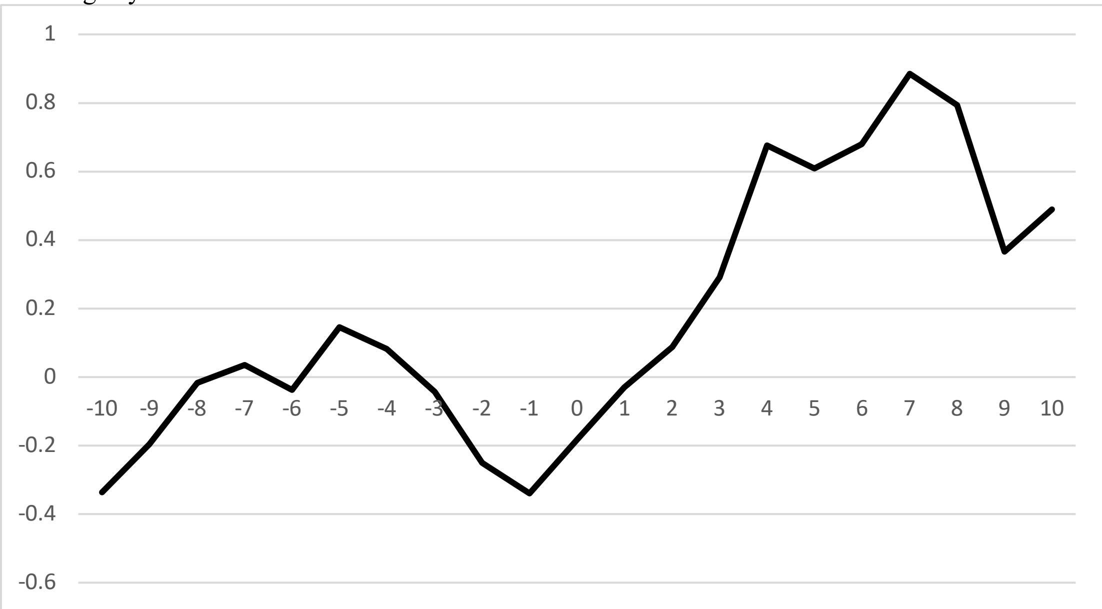


Table 5 Buy and Hold Abnormal Return for related high-tech industry firms over long run

In this table, the buy and hold abnormal return (BHAR) of related high-tech industry firms around policy announcement date (31st January of 2019) for long period are reported. Abnormal return is computed as the difference between the actual daily return and expected daily return over each indicated window. The expected return is estimated using market model by setting [-180, -30] trading days as the estimation window. ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Event window	No. of Firms	BHAR	Significance
[0;5]	805	1.88%	***
[0;10]	805	2.36%	***
[0;20]	805	4.27%	***
[0;30]	805	4.52%	***
[0;40]	805	6.27%	***
[0;50]	805	5.37%	***
[0;60]	805	3.71%	***
[0;70]	805	6.45%	***
[0;80]	805	5.60%	***
[0;90]	805	6.72%	***

Figure 3 Buy and Hold abnormal return for related high-tech industry firm within 90 days

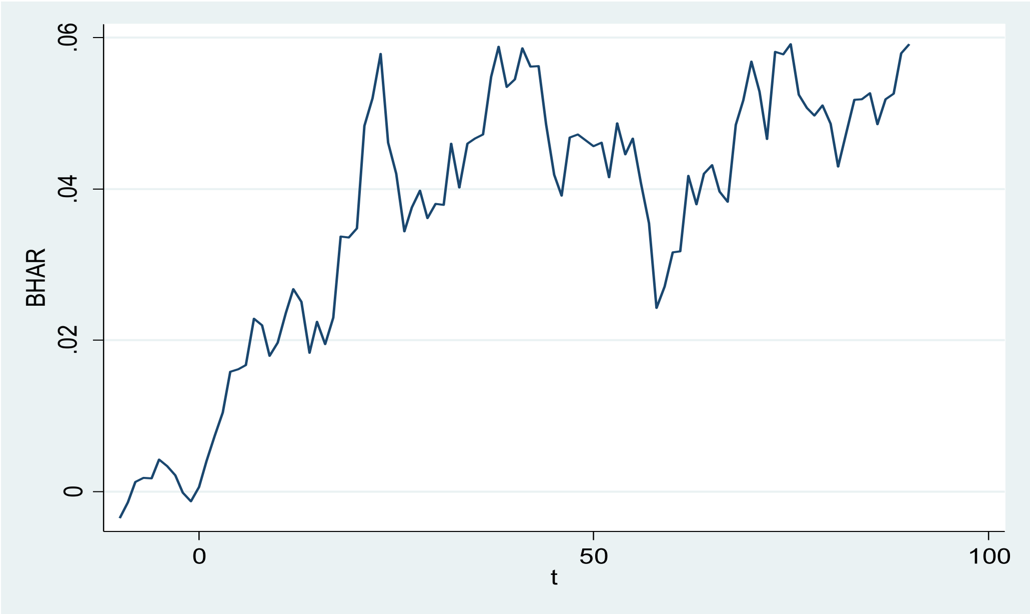


Table 6 The impact of opening STAR on information Asymmetry

This table shows the impact of new policy announcement on information asymmetry for related industry firms. Information asymmetry is measured in following ways: (1) the number of report covering each firm every month (Report Coverage), (2) the number of analyst following each firm every month (Analyst Coverage), (3) the number of broker company following each firm every month, (4) KV, which is 1000000 times the slope coefficient of the regression of log absolute returns on abnormal volume over 5 months. The observations correspond to all listed nonfinancial A share firms. The period for each regression model covers from September of 2018 to June of 2019. Post is defined as 1 for February of 2019 and after, and 0 otherwise. Treat is defined as 1 for related industry firms. Standard errors are clustered at the firm level and appear in parentheses. ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

	Report Coverage		Analyst Coverage		Broker Coverage		KV
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post	-4.082***		-0.809***		-0.530***		-0.101***
	(-18.66)		(-9.93)		(-7.56)		(-21.51)
Post*treat	2.194***	2.058***	0.456***	0.340**	0.394***	0.284**	-0.016*
	(6.82)	(6.40)	(3.12)	(2.38)	(3.02)	(2.22)	(-1.80)
Constant	8.769***	6.981***	4.911***	4.568***	4.527***	4.307***	0.200***
	(117.62)	(162.33)	(164.13)	(239.26)	(172.91)	(251.14)	(101.14)
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month Fixed Effect	No	Yes	No	Yes	No	Yes	NA
Observations	9,785	9,785	9,785	9,785	9,785	9,785	5,132
R-squared	0.526	0.652	0.588	0.689	0.591	0.689	0.806

Table 7 Regression of firm characteristics on cumulative abnormal return around policy announcement date for related high-tech firms
This table presents the regression explains both 1-day [0,1] and 3-day [0,3] cumulative abnormal returns (CAR). Independent variables include the State-owned-enterprise indicator (SOE), R&D expenditure to sales (RD Intensity) and R&D expenditure growth rate (RD Growth Rate). Control variables are Average sales growth rate over most recently three years (Sales Growth Rate), Return on Assets (ROA), firm age (Age), firm size (log(assets)) and debt to assets (Leverage). All models include industry fixed effect and standard errors are clustered at industry level. t-statistics associated with coefficients are reported in parentheses, ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

	CAR[0,1]				CAR[0,3]			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SOE	-0.463**			-0.859	-1.136***			-1.661**
	(-2.42)			(-1.69)	(-5.52)			(-3.01)
RD Intensity		5.191**				4.999**		
		(3.10)				(3.08)		
RD Growth Rate			0.003***	0.003**			0.001	-0.000
			(5.14)	(3.46)			(0.74)	(-0.38)
SOE*RD Growth Rate				0.372*				0.250
				(2.12)				(1.60)
Sales Growth Rate	-0.006**	-0.006**	-0.005***	-0.005***	-0.005*	-0.004	-0.004***	-0.005***
	(-2.59)	(-2.70)	(-5.67)	(-6.60)	(-2.02)	(-1.76)	(-6.81)	(-9.62)
ROA	0.109***	0.115***	0.121***	0.124***	0.083***	0.088***	0.092***	0.094***
	(6.73)	(6.09)	(3.83)	(3.86)	(7.05)	(6.09)	(3.55)	(3.50)
Age	-0.029	-0.036	-0.000	0.012	-0.001	-0.019	0.012	0.036
	(-1.27)	(-1.56)	(-0.00)	(0.81)	(-0.03)	(-0.62)	(0.33)	(1.21)
Size	0.577***	0.533***	0.116	0.156	0.718***	0.625***	0.393	0.474
	(3.82)	(3.52)	(0.91)	(1.11)	(4.92)	(4.43)	(1.43)	(1.56)

Leverage	-0.065	-0.029	0.637	0.725	0.634	0.532	-0.562	-0.394
	(-0.08)	(-0.03)	(0.41)	(0.51)	(0.49)	(0.35)	(-0.39)	(-0.33)
Constant	-12.047***	-11.200**	-2.508	-3.389	-15.292***	-13.278***	-7.853	-9.596
	(-3.58)	(-3.38)	(-0.82)	(-1.01)	(-4.98)	(-4.93)	(-1.16)	(-1.30)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	641	641	234	234	641	641	234	234
R-squared	0.128	0.129	0.126	0.146	0.174	0.164	0.224	0.255

Table 8 Regression of firm characteristics on cumulative abnormal return around policy announcement date for all firms

This table presents the regression explains both 1-day [0,1] and 3-day [0,3] cumulative abnormal returns (CAR). Independent variables include the State-owned enterprise indicator (SOE), R&D expenditure to sales (RD Intensity) and R&D expenditure growth rate (RD Growth Rate). Control variables are Average sales growth rate over most recently three years (Sales Growth Rate), Return on Assets (ROA), firm age (Age), firm size (log(assets)) and debt to assets (Leverage). All models include industry fixed effect and standard errors are clustered at industry level. t-statistics associated with coefficients are reported in parentheses, ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

	CAR[0,1]				CAR[0,3]			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SOE	-0.087			-0.649*	-0.785***			-1.344***
	(-0.49)			(-1.82)	(-4.22)			(-3.45)
RD Intensity		-1.484*				0.418		
		(-1.96)				(0.61)		
RD Growth Rate			0.002*	0.003***			-0.001	-0.001
			(1.85)	(3.59)			(-0.66)	(-0.76)
SOE*RD Growth Rate				-0.054***				-0.108***
				(-3.38)				(-7.59)
Sales Growth Rate	-0.002**	-0.002**	-0.004***	-0.005***	-0.001*	-0.001	-0.004***	-0.005***
	(-2.49)	(-2.47)	(-4.53)	(-5.19)	(-1.73)	(-1.37)	(-3.76)	(-4.93)
ROA	0.062***	0.061***	0.124***	0.121***	0.041**	0.046***	0.093***	0.088***
	(3.85)	(3.75)	(3.71)	(3.63)	(2.65)	(2.99)	(4.27)	(3.94)
Age	-0.010	-0.010	-0.049	-0.038	0.004	-0.009	-0.026	-0.003
	(-0.71)	(-0.73)	(-1.67)	(-1.31)	(0.19)	(-0.49)	(-0.72)	(-0.08)
Size	0.442***	0.438***	0.156	0.211	0.422***	0.374***	0.021	0.133
	(5.56)	(5.67)	(0.86)	(1.26)	(3.90)	(3.60)	(0.07)	(0.46)

Leverage	-1.383***	-1.442***	-0.276	-0.068	-0.049	-0.183	-0.266	0.165
	(-2.75)	(-2.91)	(-0.17)	(-0.05)	(-0.08)	(-0.28)	(-0.20)	(0.14)
Constant	-9.321***	-9.220***	-2.304	-3.563	-9.237***	-8.189***	0.944	-1.626
	(-5.40)	(-5.47)	(-0.60)	(-1.01)	(-3.68)	(-3.44)	(0.13)	(-0.25)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,123	2,123	430	430	2,124	2,124	430	430
R-squared	0.098	0.099	0.192	0.202	0.129	0.122	0.274	0.302

Table 9 The heterogenous effect of opening STAR on information Asymmetry: firm characteristics

This table shows the heterogenous impact of new policy announcement on information asymmetry for related industry firms. Information asymmetry is measured in following ways: (1) the number of report covering each firm every month (Report Coverage), (2) the number of analyst following each firm every month (Analyst Coverage), (3) the number of broker company following each firm every month, (4) KV, which is 1000000 times the slope coefficient of the regression of log absolute returns on abnormal volume over 5 months. The observations correspond to all listed nonfinancial A share firms. The period for each regression model covers from September of 2018 to June of 2019. Post is defined as 1 for February of 2019 and after, and 0 otherwise. Treat is defined as 1 for related industry firms. Standard errors are clustered at the firm level and appear in parentheses. ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

VARIABLES	Analyst coverage	Broker coverage	Report coverage	KV	Analyst coverage	Broker coverage	Report coverage	KV
	(1)	(2)	(3)	(4)	(4)	(5)	(6)	(7)
post×treat	0.604***	0.511***	2.271***	-0.013	-0.089	-0.167	1.589*	-0.004
	(3.55)	(3.30)	(6.00)	(-1.14)	(-0.29)	(-0.61)	(1.95)	(-0.20)
post×SOE	-0.098	-0.097	-0.888**	0.011				
	(-0.60)	(-0.69)	(-1.97)	(1.23)				
post×treat×SOE	-0.904***	-0.773***	-1.011	-0.004				
	(-2.93)	(-2.81)	(-1.45)	(-0.27)				

post×R&D Growth Rate					-0.020***	-0.019***	-0.028**	0.002*
					(-2.86)	(-3.40)	(-2.17)	(1.84)
post×treat×R&D Growth Rate					0.022***	0.020***	0.034***	-0.002*
					(3.15)	(3.67)	(2.62)	(-1.76)
Constant	4.603***	4.339***	7.191***	0.200***	5.030***	4.704***	7.403***	0.105***
	(127.18)	(136.12)	(78.30)	(101.15)	(68.69)	(72.48)	(38.50)	(19.54)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,662	9,662	9,662	5,132	1,905	1,905	1,905	888
R-squared	0.691	0.690	0.655	0.806	0.699	0.697	0.661	0.742

Table 10 Cumulative average abnormal return for ownership related listed firms

In this table, the cumulative average abnormal return (CAAR) of listed firms which are ownership related with STAR applicants announced prospectus releasing date are reported. Abnormal return is computed as the difference between the actual daily return and expected daily return over each indicated window. The expected return is estimated using market model by setting [-180, -60] trading days as the estimation window. Both T-statistic and Patell Z statistic and their corresponding P-value are reported.

Days	No. Firms	CAAR	T-Statistic	P-value	Patell Z-Statistic	Patel P-value
[-5,5]	51	1.84%	1.82	0.072	4.27	0.000
[-3,3]	50	3.90%	4.89	0.000	7.24	0.000
[-1,1]	51	4.72%	8.97	0.000	12.02	0.000
[0,1]	51	4.88%	11.37	0.000	16.10	0.000
[0,3]	51	3.34%	5.49	0.000	11.82	0.000
[0,5]	51	1.40%	1.88	0.063	9.01	0.000
[-5,5]	51	1.84%	1.82	0.072	4.27	0.000
[-5,5]	51	1.84%	1.82	0.072	4.27	0.000
[-5,5]	51	1.84%	1.82	0.072	4.27	0.000
[-5,5]	51	1.84%	1.82	0.072	4.27	0.000

Figure 4 Cumulative average abnormal return for ownership related listed firm with event window of [-5,5]

The event date 0 is defined as the prospectus releasing date, Abnormal return is computed as the difference between the actual daily return and expected daily return over each indicated window. The expected return is estimated using market model by setting [-180, -60] trading days as the estimation window

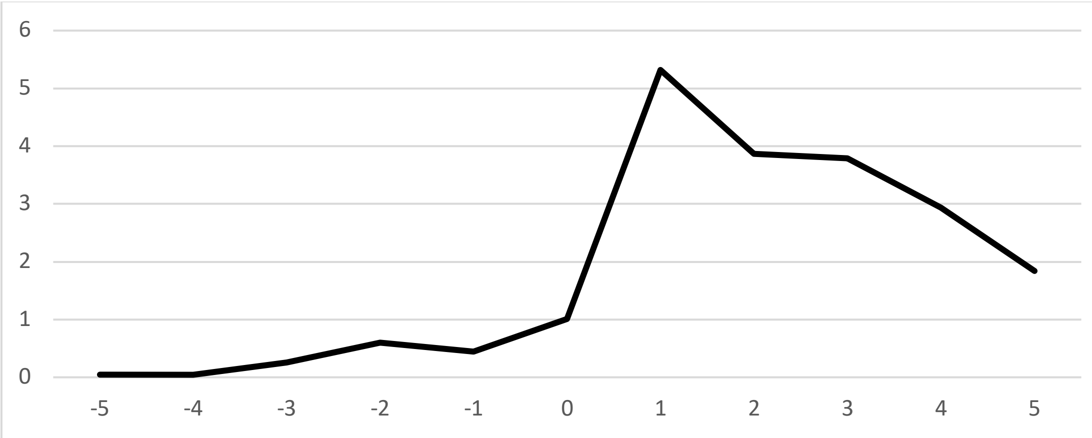


Table 11 Cumulative average abnormal return for competitors

In this table, the cumulative average abnormal return (CAAR) of competitors to STAR applicants around prospectus releasing date are reported. Abnormal return is computed as the difference between the actual daily return and expected daily return over each indicated window. The expected return is estimated using market model by setting [-180, -60] trading days as the estimation window. Both T-statistic and Patell Z statistic and their corresponding P-value are reported.

Days	No. Firms	CAAR	T-Statistic	P-value	Patell Z-Statistic	Patel P-value
[-7,7]	75	-2.92%	-2.60	0.011	-4.91	0.000
[-5,5]	75	-2.47%	-2.60	0.011	-4.82	0.000
[-3,3]	75	-1.71%	-2.26	0.026	-3.94	0.000
[-1,1]	75	-0.76%	-1.54	0.127	-1.73	0.083
[0,1]	75	-0.71%	-1.77	0.079	-2.04	0.041
[0,3]	75	-0.76%	-1.33	0.185	-2.31	0.021
[0,5]	75	-1.00%	-1.44	0.153	-2.66	0.008
[0,7]	75	-1.19%	-1.47	0.143	-2.96	0.003
[-7,7]	75	-2.92%	-2.60	0.011	-4.91	0.000
[-7,7]	75	-2.92%	-2.60	0.011	-4.91	0.000

Figure 5 Cumulative average abnormal return for competitors with event window of [-20,10]

The event date 0 is defined as the prospectus releasing date, Abnormal return is computed as the difference between the actual daily return and expected daily return over each indicated window. The expected return is estimated using market model by setting [-180,-60] trading days as the estimation window

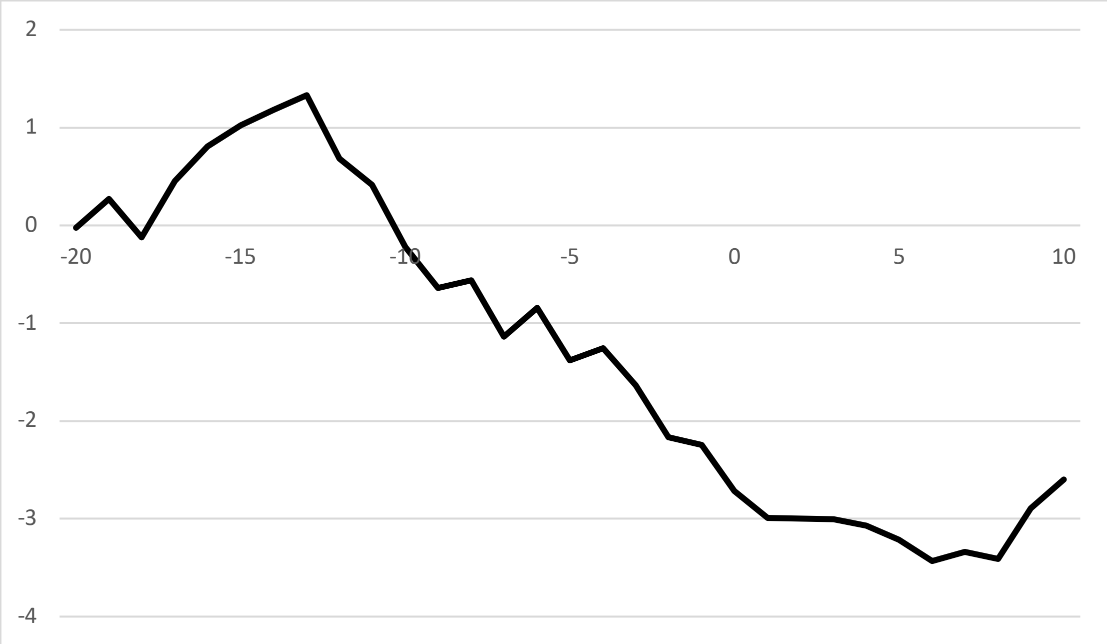


Table 12 Regression of firm characteristics on cumulative abnormal return around prospectus releasing date for ownership related firms

This table presents the regression explains for 3-day [-1,1], 2-day [0,1] and 4-day [0,3] cumulative abnormal returns (CAR). Independent variables include R&D expenditure growth rate (RD growth rate), number of total patents (log (Patent), the percentage of newly issued shares (Issued share percentage). Control variables include firm size (log (Assets)), debt to assets (Leverage) and Average sales growth rate over most recently three years (Sales Growth Rate). All models include industry fixed effect and standard errors are clustered at industry level. t-statistics associated with coefficients are reported in parentheses, ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

	CAR[-1,1]		CAR[0,1]		CAR[0,3]	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
RD growth rate	0.139**		0.130***		0.161*	
	(2.30)		(2.72)		(1.76)	
Log(Patent)		1.809*		1.341		1.696
		(1.83)		(1.67)		(1.13)
Issued share percentage	-0.611***	-0.521***	-0.582***	-0.503***	-0.657**	-0.558**
	(-3.77)	(-3.19)	(-4.55)	(-3.81)	(-2.68)	(-2.26)
Log(asset)	-4.278***	-3.997***	-4.678***	-4.319***	-6.427***	-5.988***

	(-2.93)	(-2.71)	(-4.05)	(-3.62)	(-2.90)	(-2.68)
Leverage	0.239***	0.231***	0.193***	0.188***	0.140	0.133
	(3.85)	(3.64)	(3.95)	(3.66)	(1.49)	(1.38)
Average sales growth rate	0.003	0.038	0.005	0.038*	-0.039	0.001
	(0.10)	(1.36)	(0.22)	(1.69)	(-0.83)	(0.02)
Constant	57.665***	45.975**	63.484***	52.875***	87.050***	73.825**
	(3.00)	(2.41)	(4.18)	(3.42)	(2.98)	(2.55)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	55	55	55	55	55	55
R-squared	0.386	0.363	0.468	0.420	0.216	0.187

Table 13 Regression of firm characteristics on cumulative abnormal return around prospectus releasing date for competitors

This table presents the regression explains for 15-day [-1,1], 11-day [-5,5] and 7-day [-3,3] cumulative abnormal returns (CAR). Independent variables include the percentage of newly issued shares (Issued share percentage), firm size (log (Assets)), debt to assets (Leverage) and Average sales growth rate over most recently three years (Sales Growth Rate). All models include industry fixed effect and standard errors are clustered at industry level. t-statistics associated with coefficients are reported in parentheses, ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

	CAR[-7,7]	CAR[-5,5]	CAR[-3,3]
VARIABLES	(1)	(2)	(3)
Issued share percentage	-0.059**	-0.057**	-0.042**
	(-2.07)	(-2.26)	(-2.08)
Log(Asset)	-1.000	-0.821	0.886
	(-0.72)	(-0.68)	(0.90)
Leverage	0.015	0.018	-0.088*
	(0.23)	(0.30)	(-1.82)
Average sales growth rate	0.031	0.005	0.021
	(1.18)	(0.23)	(1.13)
Constant	8.097	7.476	-9.212
	(0.52)	(0.55)	(-0.85)
Industry Fixed Effects	Yes	Yes	Yes
Observations	77	77	77
R-squared	0.085	0.072	0.107

Appendix I Ownership-related public listed firms

STAR code[a]	STAR company name	Shareholder name	Shareholder stock code
A19004.SH	江西金达莱环保股份有限公司	骆驼股份	601311
A19006.SH	江苏北人机器人系统股份有限公司	联明股份	603006
A19006.SH	江苏北人机器人系统股份有限公司	软控股份	002073
A19006.SH	江苏北人机器人系统股份有限公司	誉衡药业	2437
A19006.SH	江苏北人机器人系统股份有限公司	仙鹤股份	603733
A19006.SH	江苏北人机器人系统股份有限公司	小商品城	600415
A19006.SH	江苏北人机器人系统股份有限公司	软控股份	2073
A19010.SH	哈尔滨新光光电科技股份有限公司	江苏阳光	600220
A19010.SH	哈尔滨新光光电科技股份有限公司	苏常柴 A	000570
A19010.SH	哈尔滨新光光电科技股份有限公司	海南海药	000566
A19012.SH	聚辰半导体股份有限公司	小商品城	600415
A19012.SH	聚辰半导体股份有限公司	天壕环境	300332
A19016.SH	烟台睿创微纳技术股份有限公司	宏达股份	600331
A19016.SH	烟台睿创微纳技术股份有限公司	宏达股份	600331
A19016.SH	烟台睿创微纳技术股份有限公司	四川成渝	601107
A19016.SH	烟台睿创微纳技术股份有限公司	康源药业	600557
A19017.SH	上海泰坦科技股份有限公司	天宸股份	600620
A19018.SH	深圳传音控股股份有限公司	厦门国贸	600755
A19018.SH	深圳传音控股股份有限公司	厦门信达	000701
A19018.SH	深圳传音控股股份有限公司	厦门信达	701
A19019.SH	优刻得科技股份有限公司	通鼎互联	2491
A19019.SH	优刻得科技股份有限公司	中衡设计	603017
A19019.SH	优刻得科技股份有限公司	游族网络	002174
A19020.SH	晶晨半导体（上海）股份有限公司	创维数字	000810
A19020.SH	晶晨半导体（上海）股份有限公司	中原高速	600020
A19020.SH	晶晨半导体（上海）股份有限公司	泰达股份	000652
A19020.SH	晶晨半导体（上海）股份有限公司	TCL 集团	000100
A19020.SH	晶晨半导体（上海）股份有限公司	新湖中宝	600208
A19022.SH	厦门特宝生物工程股份有限公司	通化东宝	600867
A19030.SH	和舰芯片制造（苏州）股份有限公司	江丰电子	300666
A19031.SH	宁波容百新能源科技股份有限公司	银亿股份	000981
A19032.SH	安翰科技（武汉）股份有限公司	棒杰股份	2634
A19032.SH	安翰科技（武汉）股份有限公司	东方创业	600278
A19034.SH	江苏天奈科技股份有限公司	华闻传媒	000793
A19034.SH	江苏天奈科技股份有限公司	大港股份	002077
A19034.SH	江苏天奈科技股份有限公司	新宙邦	300037
A19034.SH	江苏天奈科技股份有限公司	洋河股份	002304
A19035.SH	武汉科前生物股份有限公司	蔚蓝生物	603739
A19036.SH	广东利元亨智能装备股份有限公司	有研新材	600206

A19036.SH	广东利元亨智能装备股份有限公司	TCL 集团	000100
A19036.SH	广东利元亨智能装备股份有限公司	宁德时代	300750
A19038.SH	广东嘉元科技股份有限公司	奇信股份	2781
A19039.SH	西部超导材料科技股份有限公司	西部材料	002149
A19045.SH	科大国盾量子技术股份有限公司	神舟信息	000555
A19045.SH	科大国盾量子技术股份有限公司	浙江东方	600120
A19045.SH	科大国盾量子技术股份有限公司	银轮股份	002126
A19045.SH	科大国盾量子技术股份有限公司	光迅科技	002281
A19046.SH	虹软科技股份有限公司	通鼎互联	2491
A19046.SH	虹软科技股份有限公司	美盛文化	2699
A19046.SH	虹软科技股份有限公司	思美传媒	2712
A19046.SH	虹软科技股份有限公司	华昌化工	002274
A19050.SH	中微半导体设备（上海）股份有限公司	中原高速	600020
A19052.SH	澜起科技股份有限公司	华西股份	000936
A19052.SH	澜起科技股份有限公司	中原高速	600020
A19054.SH	福建福光股份有限公司	厦门国贸	600755
A19065.SH	青岛海尔生物医疗股份有限公司	上海建工	600170
A19065.SH	青岛海尔生物医疗股份有限公司	中联重科	000157
A19065.SH	青岛海尔生物医疗股份有限公司	上海临港	600848
A19065.SH	青岛海尔生物医疗股份有限公司	青岛海尔	600690
A19110.SH	北京致远互联软件股份有限公司	二六三	2467

[a] The STAR code is temporary assigned by Wind database

Source: Wind database

Appendix II Public listed competitor firms

STAR code[a]	STAR name	Competitor name	Competitor stock code
A16088.SH	北京宝兰德软件股份有限公司	北京东方通科技股份有限公司	300379
A16232.SH	苏州工业园区凌志软件股份有限公司	博彦科技股份有限公司	2649
A16232.SH	苏州工业园区凌志软件股份有限公司	江苏润和软件股份有限公司	300339
A17172.SH	深圳市杰普特光电股份有限公司	大族激光科技产业集团股份有限公司	002008
A17172.SH	深圳市杰普特光电股份有限公司	华工科技产业股份有限公司	000988
A17172.SH	深圳市杰普特光电股份有限公司	武汉锐科光纤激光技术股份有限公司	300747
A17172.SH	深圳市杰普特光电股份有限公司	武汉精测电子集团股份有限公司	300567
A17197.SH	深圳市创鑫激光股份有限公司	武汉锐科光纤激光技术股份有限公司	300747
A17241.SH	上海美迪西生物医药股份有限公司	广州博济医药生物技术股份有限公司	300404
A17241.SH	上海美迪西生物医药股份有限公司	北京昭衍新药研究中心股份有限公司	603127
A17241.SH	上海美迪西生物医药股份有限公司	杭州泰格医药科技股份有限公司	300347
A17241.SH	上海美迪西生物医药股份有限公司	康龙化成(北京)新药技术股份有限公司	300759
A17241.SH	上海美迪西生物医药股份有限公司	无锡药明康德新药开发股份有限公司	603259
A17372.SH	江苏联瑞新材料股份有限公司	浙江华飞电子基材有限公司	002409
A19001.SH	武汉科前生物股份有限公司	普莱柯生物工程股份有限公司	603566
A19001.SH	武汉科前生物股份有限公司	天津瑞普生物技术股份有限公司	300119
A19001.SH	武汉科前生物股份有限公司	中牧实业股份有限公司	600195
A19001.SH	武汉科前生物股份有限公司	上海海利生物技术股份有限公司	603718
A19001.SH	武汉科前生物股份有限公司	金宇生物技术股份有限公司	600201
A19004.SH	宁波容百新能源科技股份有限公司	湖南杉杉能源科技股份有限公司	835930
A19004.SH	宁波容百新能源科技股份有限公司	北京当升材料科技股份有限公司	300073
A19004.SH	宁波容百新能源科技股份有限公司	厦门钨业股份有限公司	600549
A19005.SH	广东利元亨智能装备股份有限公司	大族激光科技产业集团 股份有限公司	002008
A19005.SH	广东利元亨智能装备股份有限公司	深圳赢合科技股份有限 公司	300457
A19005.SH	广东利元亨智能装备股份有限公司	上海克来机电自动化工程股份有限公司	603960
A19005.SH	广东利元亨智能装备股份有限公司	福建星云电子股份有限 公司	300648
A19005.SH	广东利元亨智能装备股份有限公司	无锡先导智能装备股份 有限公司	300450
A19005.SH	广东利元亨智能装备股份有限公司	广东拓斯达科技股份有限公司	300637
A19005.SH	广东利元亨智能装备股份有限公司	新松机器人自动化股份有限公司	300024
A19006.SH	江苏北人机器人系统股份有限公司	上海天永智能装备股份有限公司	603895
A19006.SH	江苏北人机器人系统股份有限公司	上海克来机电自动化工程股份有限公司	603960
A19007.SH	江苏天奈科技股份有限公司	青岛昊鑫新能源科技有限公司	300409
A19008.SH	烟台睿创微纳技术股份有限公司	浙江大立科技股份有限公司	002214
A19014.SH	苏州华兴源创科技股份有限公司	武汉精测电子集团股份有限公司	300567
A19014.SH	苏州华兴源创科技股份有限公司	杭州长川科技股份有限公司	300604
A19015.SH	深圳微芯生物科技股份有限公司	江苏恒瑞医药股份有限公司	600276
A19015.SH	深圳微芯生物科技股份有限公司	深圳信立泰药业股份有限公司	002294
A19015.SH	深圳微芯生物科技股份有限公司	贝达药业股份有限公司	300558
A19015.SH	深圳微芯生物科技股份有限公司	北京康辰药业股份有限公司	603590
A19015.SH	深圳微芯生物科技股份有限公司	上海君实生物医药科技股份有限公司	833330
A19015.SH	深圳微芯生物科技股份有限公司	成都康弘药业集团股份有限公司	002773
A19016.SH	厦门特宝生物工程股份有限公司	安徽安科生物工程(集团)股份有限公司	300009
A19017.SH	科大国盾量子技术股份有限公司	格尔软件股份有限公司	603232
A19017.SH	科大国盾量子技术股份有限公司	飞天诚信科技股份有限公司	300386
A19017.SH	科大国盾量子技术股份有限公司	中孚信息股份有限公司	300659

A19017.SH	科大国盾量子技术股份有限公司	浙江九州量子信息技术股份有限公司	837638
A19017.SH	科大国盾量子技术股份有限公司	成都卫士通信息产业股份有限公司	002268
A19019.SH	二十一世纪空间技术应用股份有限公司	珠海欧比特控制工程股份有限公司	300053
A19020.SH	深圳光峰科技股份有限公司	青岛海信电器股份有限公司	600060
A19029.SH	福建福光股份有限公司	中山联合光电科技股份有限公司	300691
A19030.SH	杭州鸿泉物联网技术股份有限公司	江苏新宁现代物流股份有限公司	300013
A19030.SH	杭州鸿泉物联网技术股份有限公司	兴民智通(集团)股份有限公司	002355
A19030.SH	杭州鸿泉物联网技术股份有限公司	慧翰微电子股份有限公司	832245
A19030.SH	杭州鸿泉物联网技术股份有限公司	北京四维图新科技股份有限公司	002405
A19040.SH	深圳市贝斯达医疗股份有限公司	珠海和佳医疗设备股份有限公司	300273
A19040.SH	深圳市贝斯达医疗股份有限公司	深圳开立生物医疗科技股份有限公司	300633
A19040.SH	深圳市贝斯达医疗股份有限公司	北京万东医疗科技股份有限公司	600055
A19040.SH	深圳市贝斯达医疗股份有限公司	深圳迈瑞生物医疗电子股份有限公司	300760
A19040.SH	深圳市贝斯达医疗股份有限公司	鑫高益医疗设备股份有限公司	835758
A19041.SH	北京木瓜移动科技股份有限公司	华扬联众数字技术股份有限公司	603825
A19041.SH	北京木瓜移动科技股份有限公司	北京蓝色光标数据科技股份有限公司	300058
A19041.SH	北京木瓜移动科技股份有限公司	广东佳兆业佳云科技股份有限公司	300242
A19042.SH	中微半导体设备（上海）股份有限公司	北方华创科技集团股份有限公司	002371
A19043.SH	赛诺医疗科学技术股份有限公司	乐普(北京)医疗器械股份有限公司	300003
A19044.SH	安集微电子科技（上海）股份有限公司	上海新阳半导体材料股份有限公司	300236
A19045.SH	哈尔滨新光光电科技股份有限公司	浙江大立科技股份有限公司	002214
A19045.SH	哈尔滨新光光电科技股份有限公司	湖北久之洋红外系统股份有限公司	300516
A19045.SH	哈尔滨新光光电科技股份有限公司	武汉高德红外股份有限公司	002414
A19046.SH	杭州当虹科技股份有限公司	北京数码视讯科技股份有限公司	300079
A19046.SH	杭州当虹科技股份有限公司	深圳市佳创视讯技术股份有限公司	300264
A19046.SH	杭州当虹科技股份有限公司	北京捷成世纪科技股份有限公司	300182
A19046.SH	杭州当虹科技股份有限公司	大恒新纪元科技股份有限公司	600288
A19048.SH	交控科技股份有限公司	浙江众合科技股份有限公司	000925
A19052.SH	博众精工科技股份有限公司	无锡先导智能装备股份有限公司	300450
A19052.SH	博众精工科技股份有限公司	深圳市赢合科技股份有限公司	300457
A19052.SH	博众精工科技股份有限公司	沈阳新松机器人自动化股份有限公司	300024
A19052.SH	博众精工科技股份有限公司	苏州赛腾精密电子股份有限公司	603283
A19056.SH	上海晶丰明源半导体股份有限公司	杭州士兰微电子股份有限公司	600460
A19058.SH	申联生物医药（上海）股份有限公司	内蒙古生物股份有限公司	600201
A19058.SH	申联生物医药（上海）股份有限公司	中牧实业股份有限公司	600195
A19058.SH	申联生物医药（上海）股份有限公司	上海海利生物技术股份有限公司	603718
A19058.SH	申联生物医药（上海）股份有限公司	新疆天康畜牧生物技术股份有限公司	002100
A19059.SH	广东紫晶信息存储技术股份有限公司	北京易华录信息技术股份有限公司	300212
A19059.SH	广东紫晶信息存储技术股份有限公司	北京同有飞骥科技股份有限公司	300302
A19061.SH	恒安嘉新（北京）科技股份公司	北京神州绿盟信息安全科技股份有限公司	300369
A19061.SH	恒安嘉新（北京）科技股份公司	江苏永鼎股份有限公司	600105
A19061.SH	恒安嘉新（北京）科技股份公司	任子行网络技术股份有限公司	300311
A19061.SH	恒安嘉新（北京）科技股份公司	北京天融信科技有限公司	002212
A19064.SH	北京热景生物技术股份有限公司	广州万孚生物技术股份有限公司	300482
A19064.SH	北京热景生物技术股份有限公司	郑州安图生物工程股份有限公司	603658
A19064.SH	北京热景生物技术股份有限公司	武汉明德生物科技股份有限公司	002932
A19064.SH	北京热景生物技术股份有限公司	基蛋生物科技股份有限公司	603387
A19064.SH	北京热景生物技术股份有限公司	深圳迈瑞生物医疗电子股份有限公司	300760

A19064.SH	北京热景生物技术股份有限公司	北京利德曼生化股份有限公司	300289
A19065.SH	苏州瀚川智能科技股份有限公司	上海克来机电自动化工程股份有限公司	603960
A19066.SH	威胜信息技术股份有限公司	南京新联电子股份有限公司	002546
A19066.SH	威胜信息技术股份有限公司	深圳友讯达科技股份有限公司	300514
A19066.SH	威胜信息技术股份有限公司	光一科技股份有限公司	300356
A19067.SH	北京安博通科技股份有限公司	深信服科技股份有限公司	300454
A19068.SH	西安铂力特增材技术股份有限公司	先临三维科技股份有限公司	830978
A19074.SH	视联动力信息技术股份有限公司	苏州科达科技股份有限公司	603660
A19074.SH	视联动力信息技术股份有限公司	二六三网络通信股份有限公司	002467
A19074.SH	视联动力信息技术股份有限公司	华平信息技术股份有限公司	300074
A19074.SH	视联动力信息技术股份有限公司	中兴通讯股份有限公司	000063
A19075.SH	博瑞生物医药（苏州）股份有限公司	江苏恒瑞医药股份有限公司	600276
A19075.SH	博瑞生物医药（苏州）股份有限公司	浙江海正药业股份有限公司	600267
A19075.SH	博瑞生物医药（苏州）股份有限公司	浙江奥翔药业股份有限公司	603229
A19078.SH	杭州安恒信息技术股份有限公司	北京北信源软件股份有限公司	300352
A19078.SH	杭州安恒信息技术股份有限公司	任子行网络技术股份有限公司	300311
A19078.SH	杭州安恒信息技术股份有限公司	启明星辰信息技术集团股份有限公司	002439
A19078.SH	杭州安恒信息技术股份有限公司	蓝盾信息安全技术股份有限公司	300297
A19078.SH	杭州安恒信息技术股份有限公司	深信服科技股份有限公司	300454
A19078.SH	杭州安恒信息技术股份有限公司	北京神州绿盟信息安全科技股份有限公司	300369
A19079.SH	山石网科通信技术股份有限公司	启明星辰信息技术集团股份有限公司	002439
A19079.SH	山石网科通信技术股份有限公司	北京神州绿盟信息安全科技股份有限公司	300369
A19079.SH	山石网科通信技术股份有限公司	北京天融信科技有限公司	002212
A19079.SH	山石网科通信技术股份有限公司	深信服科技股份有限公司	300454
A19079.SH	山石网科通信技术股份有限公司	杭州迪普科技有限公司	300768
A19081.SH	上海柏楚电子科技股份有限公司	上海维宏电子科技股份有限公司	300508
A19082.SH	江苏卓易信息科技股份有限公司	南威软件股份有限公司	603636
A19082.SH	江苏卓易信息科技股份有限公司	万达信息股份有限公司	300168
A19082.SH	江苏卓易信息科技股份有限公司	北京银信长远科技股份有限公司	300231
A19082.SH	江苏卓易信息科技股份有限公司	北京华宇软件股份有限公司	300271
A19083.SH	张家港广大特材股份有限公司	通裕重工股份有限公司	300185
A19083.SH	张家港广大特材股份有限公司	北京钢研高纳科技股份有限公司	300034
A19089.SH	北京沃尔德金刚石工具股份有限公司	长沙岱勒新材料科技股份有限公司	300700
A19089.SH	北京沃尔德金刚石工具股份有限公司	深圳市中天超硬工具股份有限公司	430740
A19089.SH	北京沃尔德金刚石工具股份有限公司	南京三超新材料股份有限公司	300554
A19089.SH	北京沃尔德金刚石工具股份有限公司	富耐克超硬材料股份有限公司	831378
A19090.SH	广东华特气体股份有限公司	江苏南大光电材料股份有限公司	300346
A19091.SH	北京天宜上佳高新材料股份有限公司	博深工具股份有限公司	2282
A19092.SH	北京航天宏图信息技术股份有限公司	合众思壮	2382
A19103.SH	广东嘉元科技股份有限公司	诺德投资股份有限公司	600110
A19103.SH	广东嘉元科技股份有限公司	广东超华科技股份有限公司	2288
A19104.SH	北京佰仁医疗科技股份有限公司	先健科技公司	1302
A19104.SH	北京佰仁医疗科技股份有限公司	烟台正海生物科技股份有限公司	300653
A19104.SH	北京佰仁医疗科技股份有限公司	冠昊生物科技股份有限公司	300238
A19105.SH	江西金达莱环保股份有限公司	北京碧水源科技股份有限公司	300070
A19105.SH	江西金达莱环保股份有限公司	博天环境集团股份有限公司	603603
A19105.SH	江西金达莱环保股份有限公司	北京碧水源科技股份有限公司	300070
A19105.SH	江西金达莱环保股份有限公司	安徽国祯环保节能科技股份有限公司	300388

A19105.SH	江西金达莱环保股份有限公司	福建海峡环保集团股份有限公司	603817
A19106.SH	中国铁路通信信号股份有限公司	浙江众合科技股份有限公司	925
A19107.SH	深圳普门科技股份有限公司	安徽航天生物科技股份有限公司	833607
A19107.SH	深圳普门科技股份有限公司	江苏奥迪康医学科技股份有限公司	835620
A19107.SH	深圳普门科技股份有限公司	上海润达医疗科技股份有限公司	603108
A19107.SH	深圳普门科技股份有限公司	郑州安图生物工程股份有限公司	603658
A19107.SH	深圳普门科技股份有限公司	深圳迈瑞生物医疗电子股份有限公司	300760
A19109.SH	北京映翰通网络技术股份有限公司	北京东土科技股份有限公司	300353
A19109.SH	北京映翰通网络技术股份有限公司	福建星网锐捷通讯股份有限公司	2396
A19109.SH	北京映翰通网络技术股份有限公司	汉威科技集团股份有限公司	300007
A19109.SH	北京映翰通网络技术股份有限公司	瑞斯康达科技发展股份有限公司	603803
A19110.SH	天津久日新材料股份有限公司	湖北固润科技股份有限公司	835595
A19110.SH	天津久日新材料股份有限公司	常州强力电子新材料股份有限公司	300429
A19110.SH	天津久日新材料股份有限公司	浙江扬帆新材料股份有限公司	300637
A19111.SH	南京万德斯环保科技股份有限公司	北京高能时代环境技术股份有限公司	603588
A19111.SH	南京万德斯环保科技股份有限公司	广西博世科环保科技股份有限公司	300422
A19113.SH	宁波长阳科技股份有限公司	江苏裕兴薄膜科技股份有限公司	300305
A19113.SH	宁波长阳科技股份有限公司	江苏双星彩塑新材料股份有限公司	2585
A19113.SH	宁波长阳科技股份有限公司	康得新复合材料集团股份有限公司	2450
A19113.SH	宁波长阳科技股份有限公司	航天彩虹无人机股份有限公司	2389
A19114.SH	江苏浩欧博生物医药股份有限公司	上海科新生物技术股份有限公司	430175
A19115.SH	锦州神工半导体股份有限公司	福建阿石创新材料股份有限公司	300706
A19115.SH	锦州神工半导体股份有限公司	常州强力电子新材料股份有限公司	300429
A19115.SH	锦州神工半导体股份有限公司	宁波江丰电子材料股份有限公司	300666
A19115.SH	锦州神工半导体股份有限公司	湖北菲利华石英玻璃股份有限公司	300395
A19115.SH	锦州神工半导体股份有限公司	江阴江化微电子材料股份有限公司	603078
A19116.SH	北京致远互联软件股份有限公司	上海泛微网络科技股份有限公司	603039
A19117.SH	三达膜环境技术股份有限公司	天津膜天膜科技股份有限公司	300334
A19117.SH	三达膜环境技术股份有限公司	天津创业环保集团股份有限公司	600874
A19117.SH	三达膜环境技术股份有限公司	黑龙江国中水务股份有限公司	600187
A19117.SH	三达膜环境技术股份有限公司	北京碧水源科技股份有限公司	300070
A19120.SH	江苏硕世生物科技股份有限公司	厦门艾德生物医药科技股份有限公司	300685
A19120.SH	江苏硕世生物科技股份有限公司	广东凯普生物科技股份有限公司	300639
A19120.SH	江苏硕世生物科技股份有限公司	中山大学达恩基因股份有限公司	2030
A19120.SH	江苏硕世生物科技股份有限公司	上海之江生物科技股份有限公司	834839
A19121.SH	博拉网络股份有限公司	广东省广告股份有限公司	2400
A19121.SH	博拉网络股份有限公司	科达集团股份有限公司	600986
A19121.SH	博拉网络股份有限公司	宣亚国际品牌管理(北京)股份有限公司	300612
A19121.SH	博拉网络股份有限公司	北京蓝色光标品牌管理顾问股份有限公司	300058
A19121.SH	博拉网络股份有限公司	利欧集团股份有限公司	2123
A19122.SH	贵州白山云科技股份有限公司	网宿科技股份有限公司	300017
A19123.SH	龙岩卓越新能源股份有限公司	荆州大地生物工程股份有限公司	833662

[a] The ST STAR IB code is temporary assigned by Wind database

Source: The prospectus released by STAR firms