Do anti-takeover provisions restrain IPO underpricing? An analysis from the perspective of information asymmetry

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Abstract

Purpose – Based on the textual-analyzed data covering 2148 IPO firms in China's stock market during the 2007–2018 period, the authors' purpose is to examine the influence of anti-takeover provision (ATP) adoption on initial public offerings (IPO) underpricing and identify the reducing effect of the former.

Design/methodology/approach – The authors examine the sample consisting of Chinese A-share listed IPO firms between 2007 and 2018 from China Stock Market Accounting Research and Chinese Research Data Services, with ATP data collected from the IPO firm chapters. Specifically, the authors use text analysis to identify whether there are ATPs in the IPO firm chapters, as well as the number of ATPs. H1: IPO underpricing is less severe for firms adopting ATPs. H2: The effect of ATP adoption on IPO underpricing is more salient for firms in worse information environments.

Findings – The authors examine the influence of ATP adoption on IPO underpricing and identify the reducing effect of the former. This effect can be explained by the fact that adopting ATPs in IPO firm chapters can reduce information asymmetry to a large extent by helping external investors obtain more private information, which alleviates IPO underpricing. The authors also find that the reducing effect is more significant in the worsened information environment. Furthermore, the authors explore the influence of adopting ATPs on other IPO characteristics and find positive effects on IPO over-subscription, funds raised and trading activity and negative effects on listing fees.

Originality/value – This study mainly contributes to the literature from the following two aspects. First, the study enriches the literature about the influencing factors of IPO underpricing. Second, the study also enriches the literature about the economic consequences of ATP adoption. This study also has important policy implications. With the coming of the era of decentralized ownership in China's capital market, ATP adoption has become more important and attracted more attention. Also, investors focus more on pricing efficiency. The findings in this paper provide a more comprehensive understanding of the relationship between ATP adoption and IPO underpricing.

Keywords IPO underpricing, Anti-takeover provisions, Information asymmetry, Capital market efficiency

Paper type Research paper

JEL Classification — G12, M41

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1. Introduction

As an important measure reflecting resource allocation capability and market operation efficiency, IPO pricing has long been an essential research topic. When companies go public, the equity they sell in the initial public offering tends to be underpriced, resulting in a substantial price jump on the first day of trading, implying that firms left considerable amounts of money on the table. The phenomenon of IPO underpricing widely exists in both developed and emerging markets, which is more severe in the latter (Rock, 1986).

The existing literature mainly explains the phenomenon of IPO underpricing from various perspectives including asymmetric information, institutional, control and behavioral (Ljungqvist & Wilhelm, 2003), among which the asymmetric information theory is the best established and has the most extensive influence. The key parties to an IPO transaction consist of the issuing firm, the bank underwriting and marketing the deal and the investors. Asymmetric information assumes that one of these parties knows more than the others. Previous studies have mainly developed four types of theories from the perspective of asymmetric information between different parties: (1) The winner's curse: in order to avoid the "adverse selection" problem caused by asymmetric information between informed investors and uninformed investors, the issuing firm chooses lower issue price to make up for the losses of uninformed investors (Rock, 1986); (2) Book-building theory: in the process of stock issuance, investors may have more information about the demand for new shares than underwriters. In order to obtain the true purchase intention of investors, underwriters provide compensation for investors through IPO underpricing (Benveniste & Spindt, 1989); (3) Signaling theory: the issuing firm sends "high-quality" signals to the market through IPO underpricing, and they are confident to obtain high-price compensation through additional offering and other financing methods in the secondary market (Welch, 1989); (4) Principal-agent theory: in the primary market, compared with issuers, underwriters are closer to the market and have more information advantages. In order to avoid the loss of underwriting fees and reputation damage caused by the failure of issuance, underwriters have the motivation to issue shares at a low price (Loughran & Ritter, 2002).

Previous studies indicate that the IPO underpricing in China's stock market may be attributing to asymmetry information. For example: selecting underwriters with high reputations can alleviate asymmetric information and thus reduce IPO underpricing (Guo & Zhao, 2006), and using high-quality analyst reports can improve information transparency and further alleviate IPO underpricing (Pan, Dai, & Liu, 2011). Besides, based on institutional factors and behavioral finance, Qian, Ritter, and Shao (2022) found that strict pricing regulations and investor sentiment may also be the reasons for the serious phenomenon of IPO underpricing in China's stock market. Admittedly, among many financing methods of enterprises, the initial public offering is much more sensitive to the information environment. In the process, information transmission among investors, issuing companies and underwriters is asymmetric. The higher the level of information asymmetry, the higher the level of IPO underpricing (Ritter & Welch, 2002). However, by strengthening information disclosure and corporate transparency, issuing companies can alleviate information asymmetry between issuing companies and investors, hence reducing the degree of IPO underpricing (Ang & Bra, 2002).

With the completion of the reform of non-tradable shares, China has entered the era of full circulation of shares, and gradually formed an external control market. In the IPO process, to fight against hostile provisions, many companies may amend their articles of association to add ATPs to prevent "barbarian invasion". Asymmetric information is a strategy of acquisition defense (Edlin & Stiglitz, 1995; Shleifer & Vishny, 1989). Before the rise of ATPs in China, when facing takeover threats, enterprises tended to disclose only favorable news, which further increased the asymmetry of information between companies and investors (Richardson, 2000; HeHealy & Palepu, 2001). However, the establishment of ATPs reduced the acquisition threat faced by management. Along with the easing of acquisition pressure,

the level of information disclosure increases and the asymmetry of information between issuing firms and external investors decreases (Ferreira & Laux, 2007). The establishment of ATPs reduces the possibility of a loss of control in the IPO process. At the same time, to ensure the successful issuance of IPOs, issuing firms are motivated to improve the level of information disclosure to convey positive signals to the market, which reduces the asymmetry of information in the process (Cohen & Dean, 2005), and thus improves the issuance efficiency. Therefore, from the perspective of information asymmetry in China's stock market, it is of both theoretical and empirical significance to explore the relationship between ATPs and IPO underpricing.

The "long-term value" of anti-takeover provision (ATP) proposed by Chemmanur and Jiao (2012) confirms the positive effect of ATPs. The establishment of ATPs will reduce the short-sighted behaviors of the management and focus on the long-term value of the enterprise. At the same time, Chemmanur, Paeglis, & Simonyan (2011) found that high-quality management stimulates the "long-term value creation role effect" of ATP and plays a positive role in the evaluation of enterprise value. So, will the adoption of ATPs have an impact on the IPO pricing process? Will it improve the efficiency of IPO pricing and reduce the phenomenon of high IPO underpricing? So far, these questions remain unanswered. Therefore, it is meaningful to explore the relationship between ATPs and IPO underpricing from the perspective of information asymmetry.

We focus the study on China for the following reasons. First, China provides a featured institutional background. Although China has unified regulations, i.e. Guidelines for the Articles of Listed Company, the implementation of the amendment of Company Law in 2005 and the new Securities Law and Guidelines for the Articles of Listed Company in 2006 have reinforced the autonomy of the IPO firm chapter to various extents, indicating large variations in the firm chapters across different firms that can be used for further analysis. Second, China's stock market has experienced rapid development and regulatory reforms. A quota system was used for the IPO process in China before 1999, which has led to increased rent-seeking activities and inefficient resource allocations. A cumulative price inquiry was introduced in late 1999 to stop IPOs from overheating with high P/E ratios, which has malfunctioned the market mechanism and unbalanced the market supply. In 2005, a new inquiry system came into play, along with a series of problems, including the high first-return of IPO firms and unfair distribution of wealth. Since 2009, the China Securities Regulatory Commission (CSRC) has implemented the reformed inquiry system to fix the high first-return problem, which in turn results in the "three high" problems (high issue price, high P/E ratio and high fund-raising ratio). With frequent reforms taking place, ATPs play a prominent role in formalizing the IPO process. Besides, China's stock market is still at an early age with some basic problems. In particular, listed firms have low information transparency and are faced with bad information environments (Piotroski & Wong, 2012). Asymmetric information is even more severe between the managerial board and external investors. Therefore, China's stock market provides a suitable sample for studying the effect of ATP adoption from the perspective of asymmetric information.

We select 2007 as the starting point of our analysis as China's listed companies rarely adopt ATPs until the launch of the Guidelines for the Articles of Listed Company in 2006, which entitles listed companies to greater autonomy. Based on the sample consisting of 2148 IPO firms in China's stock market between 2007 and 2018, we identify and analyze the reducing effect of ATP adoption on IPO underpricing. We also find that the reducing effect is more significant in a worsened information environment. Furthermore, we explore the influence of ATP adoption on other IPO characteristics and find positive effects on IPO over-subscription, funds raised, trading activity and negative effects on listing fees. In short, this paper extends the literature on ATP adoption and IPO underpricing. To address the potential issue of endogeneity, we conducted a series of analyses including instrumental

variable regression, propensity score matching (PSM), entropy balancing matching and Heckman analysis, which further confirmed the findings from the main empirical analysis.

Our study mainly contributes to the literature from the following two aspects. First, the study enriches the literature about the influencing factors of IPO underpricing. Although IPO underpricing is a global phenomenon (Loughran, Ritter, & Rydqvist, 1994), previous studies have not reached a consensus on the reasons behind it. In this paper, we reexamine the role played by ATP adoption in IPO underpricing from the perspective of information asymmetry, which can provide a better understanding of the underlying driving force of IPO pricing. Previous studies have investigated the relationship between ATPs and capital market efficiency from the information perspective based on established firms. Different from their studies, our paper provides a new sight to explain the effect of ATPs on capital market efficiency based on IPO firms.

Second, the study enriches the literature about the economic consequences of ATP adoption. Previous studies mainly focus on the influence of ATP adoption on firm innovation (Chakraborty, 2014), firm control (DeAngelo & Rice, 1983) and firm value (Faleye, 2007), and pay little attention to its influence on IPO pricing. Our study finds empirical evidence that ATP adoption can reduce asymmetric information and hence alleviate IPO underpricing, which contributes to the current literature on ATP adoption.

Our study also has important policy implications. With the coming of the era of decentralized ownership in China's capital market, ATP adoption has become more important and attracted more attention. In addition, investors focus more on pricing efficiency. The findings in this paper provide a more comprehensive understanding of the relationship between ATP adoption and IPO underpricing, which can be beneficial for the regulatory sector to improve the IPO issue system.

The remainder of the paper proceeds as follows. Section 2 develops the hypothesis. Section 3 describes the methodology and data. Section 4 reports the main results, along with the endogenous analysis and robustness check. Section 5 presents the cross-section analysis. Section 6 provides further analysis and Section 7 concludes the paper.

2. Hypothesis development

The phenomenon of IPO underpricing has been more prominent in the capital market (Ritter & Welch, 2002). The prevailing explanation of IPO underpricing is the view of asymmetric information, which mainly attributes the deviance of the issuing price from the true value to the uncertainty caused by asymmetric information between the issuing agency and external investors (Allen & Faulhaber, 1989). The greater the extent of asymmetric information, the more severe the IPO underpricing (Beatty & Ritter, 1986; Baron, 1982). Due to the agency problem, there is always asymmetric information between the issuing agency and external investors. The issuing agency can alleviate IPO underpricing by improving information disclosure and firm transparency, hence reducing asymmetric information (Ang & Bra, 2002; Schrand & Verrecchia, 2005). Previous studies have verified the influence of asymmetric information on IPO underpricing (Beatty & Ritter, 1986; Ljungqvist, Nanda, & Singh, 2006; Bajo, 2017).

There is a growing body of literature indicating the important role played by ATP adoption in firm operation and development. Previous studies conclude that ATP adoption can reduce the risk of hostile takeovers, raise stock valuation and firm innovation, reduce short-sighted behaviors and improve internal management (Chemmanur & Tian, 2018; Chemmanur & Jiao, 2012; Grossman & Hart, 1988). Other studies find that ATP adoption can affect private information (Ferreira & Laux, 2007), improve surplus quality (Dechow & Skinner, 2000; Zhao & Chen, 2009) and reduce asymmetric information (Armstrong, Balakrishnan, & Cohen, 2012). When facing pressure from firm holdings, firms will disclose information that is beneficial to them, magnifying the asymmetry of information (Richardson,

2000; HeHealy & Palepu, 2001). ATP adoption can reduce the chance of takeovers and hence relieve the pressure faced by the managerial members, improving information disclosure (Ferreira & Laux, 2007). Asymmetric information conventionally exists between IPO firms and external investors, with greater magnitudes of asymmetry leading to more severe IPO underpricing (Megginson & Weiss, 1991; Rock, 1986). The reduction in asymmetric information can alleviate IPO underpricing (Schrand & Robert, 2005; Boulton, Smart, & Zutter, 2011; Park & Patel, 2015; Li, Wang, & Wang, 2019). ATP adoption can improve the quality of information disclosure and reduce asymmetric information faced by external investors, and hence alleviating IPO underpricing. Based on the analysis above, we propose the following hypothesis:

H1. IPO underpricing is less severe for firms adopting ATPs.

Takeover protection is not conducive to corporate governance (Unsal & Rayfield, 2020). ATP adoption can reduce the incentive to manipulate earnings management (Bhojraj, Sengupta, & Zhang, 2017). The effect of ATPs embedded in the firm chapter should produce a greater impact on dividend payout for firms under bad corporate governance (Francis, 2011). The board of directors, size of the audit committee and extent of voluntary disclosure can reduce asymmetric information, indicating that the monitoring role of company governance has an important influence on asymmetric information (Cormier, Ledoux, Magnan, & Aerts, 2010). The relationship between irresponsible directors, a measure of corporate governance and asymmetric information is negative, which proves that corporate governance indeed affects the extent of asymmetric information (Salehi, Rezaie, & Ansari, 2014). Previous studies indicate that the information environment plays a significant role in economic activities. For example, Zhu, Zhang, Li, and Chen (2015) find the reducing effect of market-wide sentiment on the initial returns of IPOs in good information environments. Based on various measures of information environments, Li *et al.* (2019) show that the relationship between trust and IPO underpricing is more significant for firms with more severe asymmetric information. Therefore, we consider the information environment as an important condition for the alleviating effect of ATP adoption on IPO underpricing, which leads to the following hypothesis:

H2. The effect of ATP adoption on IPO underpricing is more salient for firms in worse information environments.

3. Methodology and data

3.1 Measuring IPO underpricing

In the spirit of previous studies (e.g. Rock, 1986; Chan, Wang, & Wei, 2004), we define IPO underpricing, $Underpricing_{it}$, as follows

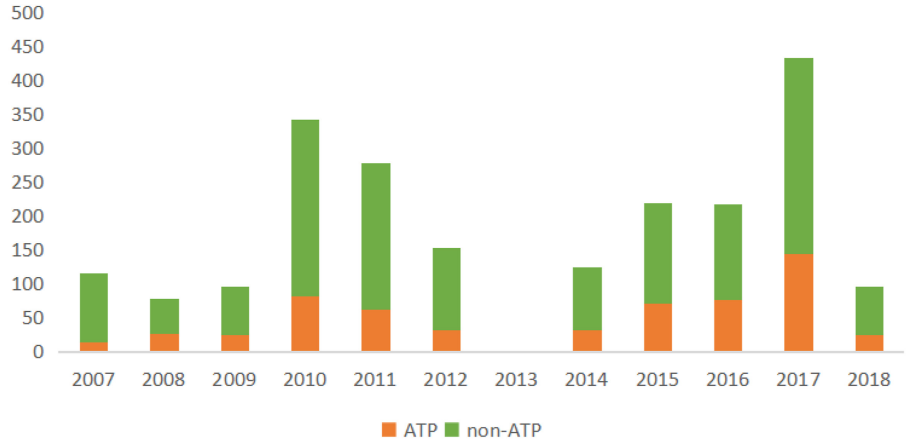
$$Underpricing_{it} = \frac{P_{it} - P_{i0}}{P_{i0}} - \frac{P_{i,m1} - P_{i,m0}}{P_{i,m0}} \tag{1}$$

where P_{i0} is the initial offer price, P_{it} is the first-day market closing price, and P_{m0} and P_{m1} are the closing prices of the corresponding Shanghai or Shenzhen A-share market index on the offering and first trade day of the newly issued i respectively.

3.2 Measuring ATP adoption

Following the literature (e.g. Gompers, 2003; Tetlock, 2011; Dougal, Engelberg, Garcia, & Parsons, 2012; Garcia, 2013), we conduct textual analysis to obtain information about ATP adoption and construct a dummy variable, denoted as ATP_{it}, which equals one if there is at least one ATP in the IPO firm chapter, and zero otherwise. More specifically, to identify the

appearance of ATPs, we search for a list of words that are likely to be associated with ATPs within the IPO firm chapter. Figure 1 shows the empirical distribution of the number of ATPs (ATPN) identified in the IPO firm chapter during the 2007–2018 period. Furthermore, Table 1 reports the frequency distribution of ATPs and non-ATPs by industry from 2007 to 2018.



Note(s): The stacked bar chart reports the development of ATP adoption of listed firms in China. It is clear from the chart that the proportion of Chinese firms choosing to adopt ATPs in their IPO firm chapter is not high. The missing bar in 2013 is due to the IPO suspension in 2013 to reconstruct the confidence of the stock market
Source(s): Authors own creation

Figure 1.
The development of ATP adoption of listed firms in China

Code	Industry	ATPs	Non-ATPs	Total	Percentage
A	Agriculture, forestry, livestock farming and fishery	6	14	20	0.93%
B	Mining	4	26	30	1.40%
C	Manufacturing	429	1097	1526	71.04%
D	Production, electricity, coal and water	8	21	29	1.35%
E	Construction	21	42	63	2.93%
F	Wholesale and retail	18	33	51	2.37%
G	Transport and storage	14	27	41	1.91%
H	Accommodation and Food	0	3	3	0.14%
I	Information technology	35	183	218	10.15%
K	Real estate	7	5	12	0.55%
L	Leasing trade	10	25	35	1.63%
M	Science	6	29	35	1.63%
N	Water conservancy	10	26	36	1.68%
O	Social service	0	1	1	0.05%
P	Education	1	4	5	0.23%
Q	Healthcare	1	6	7	0.33%
R	Reaction and cultural industry	13	23	36	1.68%
Total		583	1565	2148	100%

Note(s): This table shows the IPO samples categorized by primary industries according to the 2012 China Securities Regulatory Commission
Source(s): Authors own creation

Table 1.
IPO samples sorted by industry

3.3 Control variables

We set control variables following previous studies (e.g. Rock, 1986; Carter, Dark, & Singh, 1998). Firm size (*SIZE*) is defined as the logarithm of total assets in the year before an IPO. The leverage (*LEV)* is defined as the book value of pre-IPO debt divided by the book value of total assets. Return on equity (*ROE*) is calculated as the ratio between the net income divided by the total assets in the year before IPO. The age of the firm (*AGE*) is calculated as the logarithm of one plus the AGE at the IPO date. We also introduce the following dummy variables: underwriter reputation (*UDW*) takes a value of one if the underwriter is ranked in the top ten measured by the total funds raised in the current year; stated-owned equity (*SOE*) takes a value of one if the firm is state-owned; the type of audit (*AUD*) equals one if auditing firm is among the big four in China. Besides, we also include the first-day turnover (*FDT*) and lot rate (*LOT*).Regulatory pricing restrictions (REP) equals one if the IPO is issued in a restricted period and zero otherwise. We provide detailed definitions of variables in Table A1.

3.4 Model

To examine the influence of ATP adoption on IPO underpricing, we fit the panel regression model with the year and industry-fixed effects as follows:

$$Underpricing_{it} = \beta_0 + \beta_1 ATP_{it} + \beta_2 Controls_{it} + \varphi_i + \tau_t + \varepsilon_{it} \quad (2)$$

where i and t are the firm and year indices, respectively. Our main variable of interest is ATP, which is an indicator that equals one if IPO firms adopt ATPs in their IPO firm chapters. $Controls_{it}$ represents the vector of control variables. Furthermore, we control the industry fixed effect (φ_i) and year fixed effect (τ_t).

3.5 Data and descriptive statistics

We examine the sample consisting of Chinese A-share listed IPO firms between 2007 and 2018 from China Stock Market Accounting Research (CSMAR) and Chinese Research Data Services (CNRDS), with ATP data collected from the IPO firm chapters. Specifically, we use text analysis to identify whether there are ATPs in the IPO firm chapters, as well as the ATPN. Financial service firms and firms with actual IPO time outside the sample period are excluded, leading to a final sample of 2148 IPOs. All continuous variables are winsorized at the 1% level from both tails.

Table 2 reports the descriptive statistics for the main variables. The sample mean, standard deviation, minimum and maximum of *underpricing* is 0.503, 0.494, −0.083 and 2.956, respectively, which are similar to those reported by Peng (2021). Notably, the magnitude of IPO underpricing in China is much higher than those reported in U.S. IPO studies (Ritter & Welch, 2002). The sample mean of *ATPs* is 0.271, indicating that about 27.1% of the sampled firms adopted ATPs in the IPO firm chapter. The last three columns of Table 2 report the univariate comparisons between the groups adopting and non-adopting ATPs. As can be seen, there is a significant decrease in the mean of IPO underpricing when ATPs are adopted. The results of the correlation test indicate that there is no significant multi-collinearity between the variables.

4. Empirical analysis

4.1 Baseline regression analysis

Table 3 reports the baseline regression results. In column (1), ATP adoption is taken as the only independent variable. In column (2), control variables are included in the model. In column (3), the year and industry-fixed effects are further added to the model. As can be seen, ATP adoption has a significant reducing effect on IPO underpricing under all conditions.

Table 2.
Descriptive statistics

	All samples(N = 2148)							ATP(N = 583)	Non-ATP(N = 1565)	Difference in means
variable	*mean*	*std*	*min*	*p25*	*median*	*p75*	*max*	*mean*	*mean*	*t-test*
Under-pricing	0.503	0.494	−0.083	0.328	0.426	0.472	2.956	0.442	0.525	−0.083***
ATP	0.271	0.445	0.000	0.000	0.000	1.000	1.000	1.000	0.000	1.000
SIZE	20.522	1.097	18.651	19.789	20.345	21.043	24.783	20.719	20.449	0.270***
LEV	0.422	0.176	0.075	0.291	0.416	0.553	0.817	0.427	0.420	0.007
AGE	2.420	0.558	0.693	2.197	2.485	2.833	3.401	2.453	2.407	0.046*
ROE	0.210	0.096	0.050	0.139	0.196	0.263	0.528	0.199	0.214	−0.016***
SOE	0.234	0.424	0.000	0.000	0.000	0.000	1.000	0.223	0.238	−0.015
FDT	0.350	0.375	0.000	0.000	0.107	0.753	0.921	0.288	0.373	−0.085***
LOT	0.007	0.016	0.000	0.000	0.003	0.008	0.120	0.006	0.008	−0.002**
UDW	0.442	0.497	0.000	0.000	0.000	1.000	1.000	0.441	0.442	−0.001
AUD	0.037	0.189	0.000	0.000	0.000	0.000	1.000	0.019	0.044	−0.025***
REP	0.573	0.495	0.000	0.000	1.000	1.000	1.000	0.64	0.548	0.092***

Note(s): This table reports the descriptive statistics for the sample and the difference in the mean of the variables between firms adopting ATPs and firms non-adopting ATPs
Source(s): Authors own creation

Variable	(1) Underpricing	(2) Underpricing	(3) Underpricing
ATP	−0.083***	−0.055***	−0.035***
	(−4.492)	(−3.795)	(−2.654)
SIZE		−0.052***	−0.040***
		(−4.706)	(−3.952)
LEV		0.122**	0.046
		(2.266)	(0.890)
AGE		−0.034	0.029
		(−1.580)	(1.470)
ROE		−0.283***	−0.271***
		(−3.023)	(−3.093)
SOE		0.091***	0.027
		(4.151)	(1.372)
FDT		1.134***	1.012***
		(19.084)	(15.877)
LOT		1.498	1.261
		(1.490)	(1.372)
UDW		−0.011	−0.002
		(−0.657)	(−0.132)
AUD		0.084	0.064
		(1.547)	(1.121)
REP		0.926***	0.159***
		(18.810)	(4.308)
Constant	0.525***	0.709***	1.131***
	(37.889)	(3.111)	(4.567)
Year FE	NO	NO	YES
Industry FE	NO	NO	YES
N	2148	2148	2148
Adj-R^2	0.005	0.469	0.619

Note(s): This table reports the regression results of ATP adoption and IPO underpricing. All variables are defined in the Appendix. The year and industry fixed effects are included in column (3). The t-statistics reported in parentheses are based on the standard errors clustered by industry. ***, ** and * indicate significance at the 0.01, 0.05 and 0.10 levels, respectively

Source(s): Authors own creation

Table 3. Baseline regression results

The regression coefficient on ATP is a significant and negative, suggesting that the average underpricing in firms adopting ATPs is lower than that firms that do not adopt ATPs by 3.5%, which equals 6.96% of the sample average (0.035/0.503). Consistent with previous studies (e.g. Carter *et al.*, 1998), we also find that IPO firms with relatively larger sizes are likely to experience less underpricing, and higher profitability and FDT can decrease IPO underpricing. We show that strict regulations result in higher IPO underpricing, causing a high cost of going public.

4.2 Endogeneity analysis

4.2.1 Instrumental variable regression. The adoption of ATPs and IPO underpricing may be endogenous. That is, IPO firms with lower IPO underpricing may be more likely to adopt ATPs. To alleviate the potential problem of endogeneity, we conducted instrumental variable regression to reexamine the effect of ATP adoption on IPO underpricing.

Previous studies suggest that lawyers have incentives to encourage their IPO clients to adopt ATPs (Bebchuk, 2003). Firms advised by larger law firms with more ATP experience tend to adopt ATPs (Coates, 2001). When IPO firms are confronted with hostile takeovers,

lawyers are subject to substantial reputation loss if they fail in protecting their clients with ATP adoption. Therefore, we construct an instrumental variable based on the law firms of the IPO firms (referred to as *law firm acquisition experience* hereinafter): the dummy variable equals one if the law firm at the IPO date belongs to Asia Pacific mergers and acquisitions, which is union formed by 28 law firms.

Table 4 shows the results of the instrumental variable regression. As can be seen in column (1), the effect of law firm acquisition experience is significant, validating the instrumental variable. column (2) reports the results of the second-stage regression, which reconfirms that adopting ATPs at the IPO stage can reduce the magnitude of underpricing.

4.2.2 Propensity score matching. Alternatively, we use PSM to address the potential issue of endogeneity. More specifically, we employ the one-to-one nearest neighbor matching to form the control group (firms non-adopting ATPs) and treatment group (firms adopting

Variable	(1) ATP	(2) Underpricing
Law firm acquisition experience	0.071***	
	(3.548)	
ATP		−0.659***
		(−2.591)
SIZE	0.060***	0.001
	(4.301)	(0.004)
LEV	−0.052	0.013
	(−0.719)	(0.203)
AGE	−0.024	0.016
	(−1.089)	(0.735)
ROE	−0.106	−0.334***
	(−0.952)	(−3.131)
SOE	−0.008	0.023
	(−0.315)	(1.011)
FDT	−0.055	0.983***
	(−0.773)	(14.112)
LOT	−2.114***	−0.137
	(−2.926)	(−0.148)
UDW	−0.025	−0.015
	(−1.237)	(−0.792)
AUD	−0.220***	−0.071
	(−4.516)	(−0.946)
REP	−0.053	0.124
	(−0.671)	(1.615)
Constant	−1.420***	0.955**
	(−4.109)	(1.988)
Year FE	YES	YES
Industry FE	YES	YES
F-value	13.17	
Sargan statistic (p-value)	0.000	
N	2148	2148
Adj-R^2	0.059	0.320

Note(s): This table shows the results of the two-stage instrumental variables regression. The instrumental variable, *Law firm acquisition experience,* is a dummy variable taking a value of one if the law firm belongs to Asia Pacific mergers and acquisitions. The year and industry fixed effects are included in the models. The *t*-statistics reported in parentheses are based on standard errors clustered by industry. ***, ** and * denote the significance of the parameter estimates at the 0.01, 0.05 and 0.10 levels, respectively

Source(s): Authors own creation

Table 4.
Instrumental variable regression results

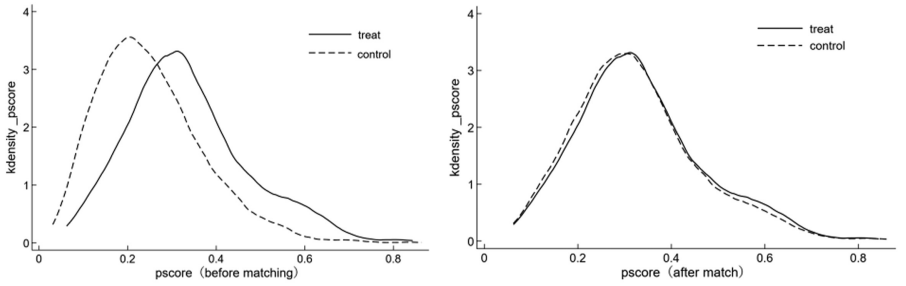
ATPs) based on all control variables. Figure 2 shows the propensity density map of the matched groups, indicating a decent matching. It was found that there was no significant difference between the variables after PSM, which implies good comparability between groups. Column (1) of Table 5 presents the regression results based on the matched sample, which confirms that the magnitude of IPO underpricing is significantly less for firms adopting ATPs.

4.2.3 Entropy balancing matching. As another matching method, entropy balancing has several advantages over PSM (Hainmueller, 2012). First, entropy balancing adjusts the covariate distribution of the control group and hence increases the similarity of the covariate distribution between the control and treatment groups. Second, in the process of entropy balancing, the only parameter needed to be specified is the tolerance level of the iterative algorithm, which greatly alleviates the subjectiveness of conventional preprocessing methods. Third, as the weights of entropy balancing vary smoothly among units, more information can be obtained from the preprocessing data. For comparison, we choose the same covariates used for PSM. It is found that there is no significant difference between the variables after entropy balance, which indicates the biases that affect the covariate distributions have been removed after weighing (Chahine, Colak, Hasan, & Mazboudi, 2020). Column (2) of Table 5 shows the regression results based on entropy balancing. Again, the reducing effect of ATP adoption is supported, with the coefficient of IPO underpricing being more negative than that based on PSM.

4.2.4 Heckman analysis. As adopting ATPs in the IPO firm chapter is voluntary, some firms may choose not to disclose ATPs in their firm chapter. Therefore, firms with less IPO underpricing may be more likely to adopt ATPs. To alleviate the influence of the sample selection bias, we use the Heckman two-stage model to check the empirical results. In the first stage, a probit model is fitted to *ATPs*, and the inverse mills ratio (*IMR*) is calculated. In the second stage, the IMR is included as an independent variable in the panel regression. Table 6 reports the regression results of the Heckman two-stage model, and the significant coefficient of IMR indicates the potential issue of selection bias. As can be seen, the results in Table 6 are consistent with the main empirical results obtained in previous sections.

4.3 Robustness checks

4.3.1 An alternative measure of IPO underpricing. To check that the results are not driven by the chosen measure of IPO pricing, we consider an alternative measure. More specifically,



Note(s): This figure shows the results of propensity score matching. The horizontal axis is the propensity score, and the vertical axis represents the density. The solid line denotes the treatment group (i.e., firms adopting ATPs), and the dotted line denotes the control group (i.e., firms non-adopting ATPs)
Source(s): Authors own creation

Figure 2.
Results of propensity score matching

Variable	(1) PSM Underpricing	(2) Entropy balancing Underpricing
ATP	−0.065***	−0.031***
	(−3.571)	(−2.794)
SIZE	−0.022*	−0.029***
	(−1.728)	(−3.365)
LEV	0.092	0.063
	(1.489)	(1.426)
AGE	0.074***	0.037**
	(2.843)	(2.053)
ROE	−0.316***	−0.268***
	(−2.745)	(−3.273)
SOE	−0.010	0.016
	(−0.412)	(0.950)
FDT	0.868***	0.925***
	(10.430)	(15.188)
LOT	1.166	0.964
	(0.822)	(0.840)
UDW	−0.007	0.002
	(−0.386)	(0.142)
AUD	0.077	0.098*
	(1.083)	(1.740)
REP	0.117***	0.136***
	(2.638)	(4.029)
Constant	0.719***	0.745***
	(2.609)	(3.874)
Year FE	YES	YES
Industry FE	YES	YES
N	985	2148
Adj-R^2	0.583	0.599

Note(s): This table reports the regression results based on propensity score matching and entropy balancing. The year and industry fixed effects are included in the models. The *t*-statistics reported in parentheses are based on standard errors clustered by firms. ***, **, and * denote the significance of the parameter estimates at the 0.01, 0.05, and 0.10 levels, respectively
Source(s): Authors own creation

Table 5.
Regression results based on PSM and entropy balancing

following Marcato (2018), we define the alternative measure of IPO underpricing, *Underpricng1*, as the difference between the first-day market closing price and the initial offer pricing scaled by the initial offer pricing. The regression results are shown in Column (1) of Table 7, which are consistent with the main empirical results.

4.3.2 An alternative measure of ATP adoption. In the main regression analysis, we construct a dummy variable (*ATP*) to quantify ATP adoption. Following Field and Karpoff (2002), we consider the *ATPN* as an alternative measure. Column (2) of Table 7 shows the regression results, indicating that ATP adoption is negatively related to IPO underpricing. We also consider the natural logarithm of *ATPN*, and the results remain consistent, as shown in Column (3) of Table 7. Overall, the reducing effect of ATP adoption on IPO underpricing is reconfirmed under alternative measures of the main variables.

5. Cross-sectional tests

In the spirit of Peng, Jia, Chan, and Wang (2021), we consider two direct measures of the firm information environment: analyst attention and earnings management. Following Frankel,

Variable	(1) ATP	(2) Underpricing
ATP		−0.038***
		(−3.137)
SIZE	0.206***	−0.171***
	(4.712)	(−3.563)
LEV	−0.164	0.153**
	(−0.723)	(2.379)
AGE	−0.082	0.077***
	(−1.140)	(3.008)
ROE	−0.393	−0.012
	(−1.069)	(−0.090)
SOE	−0.004	0.026
	(−0.044)	(1.558)
FDT	−0.193	1.100***
	(−0.781)	(16.034)
LOT	−7.411***	5.745***
	(−2.726)	(3.707)
UDW	−0.067	0.044**
	(−1.042)	(2.321)
AUD	−0.780***	0.521***
	(−3.777)	(3.298)
REP	−0.205	0.283***
	(−0.773)	(5.502)
IMR		−3.660***
		(−3.162)
Constant	−3.982***	4.951***
	(−3.676)	(3.442)
Year FE	YES	YES
Industry FE	YES	YES
N	2148	2148
Adj-R^2	0.073	0.620

Note(s): This table reports the result of the Heckman two-step regression. Column (1) shows the first-step regression results, and the inverse mills ratio (i.e. IMR) is taken as a control variable in the second-step regression shown in Column (2). The year and industry fixed effects are included in the models. The *t*-statistics reported in parentheses are based on standard errors clustered by firms. ***, ** and * denote the significance of the parameter estimates at the 0.01, 0.05 and 0.10 levels, respectively
Source(s): Authors own creation

Table 6.
Heckman analysis

Kothari, and Weber (2006), we measure analyst attention by an indicator variable, which equals one if analyst attention is above the sample median in a given year and zero otherwise. Following Dechow, Sloan, and Sweeney (1995), we measure earnings management by an indicator variable that equals one if the absolute value of accrual earnings management is above the sample median in a given year and zero otherwise. Asymmetric information is an important reflection of corporate governance, and previous studies have confirmed that the difference in corporate governance will lead to the difference in information transparency. Hence, we also consider corporate governance as an alternative measure of the information environment. The board of directors plays an essential role in corporate governance. Previous studies have found that the independence of the board of directors and separation of the chief executive officer (CEO) and Chair roles have significant positive influences on firm performance (Bruno & Claessens, 2010; Rechner & Dalton, 1991). Therefore, we consider CEO-chair duality (CCD) and the independence of directors (ID) as measures of corporate governance. More specifically, the dummy variable for *CCD* takes a value of one if the CEO is also the chairman of the board and zero otherwise. The indicator variable for the ID equals

Variable	Alternative independent variable (1) Underpricing1	Alternative dependent variable (2) Underpricing	(3) Underpricing
ATP	−0.037***		
	(−2.812)		
ATPN		−0.019***	
		(−2.683)	
LN(ATPN)			−0.037***
			(−2.670)
SIZE	−0.040***	−0.041***	−0.040***
	(−3.983)	(−4.033)	(−3.993)
LEV	0.031	0.046	0.046
	(0.608)	(0.900)	(0.899)
AGE	0.026	0.029	0.029
	(1.306)	(1.470)	(1.469)
ROE	−0.302***	−0.269***	−0.269***
	(−3.416)	(−3.066)	(−3.076)
SOE	0.023	0.027	0.027
	(1.178)	(1.362)	(1.363)
FDT	1.076***	1.012***	1.012***
	(16.716)	(15.839)	(15.852)
LOT	1.597*	1.287	1.275
	(1.785)	(1.398)	(1.386)
UDW	−0.003	−0.002	−0.002
	(−0.178)	(−0.148)	(−0.144)
AUD	0.058	0.066	0.065
	(1.009)	(1.152)	(1.135)
REP	0.173***	0.158***	0.158***
	(4.661)	(4.280)	(4.287)
Constant	1.170***	1.153***	1.142***
	(4.706)	(4.657)	(4.613)
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
N	2148	2148	2148
Adj-R^2	0.626	0.618	0.618

Note(s): This table reports the regression results under alternative measures of IPO underpricing and ATP adoption. In Column (1), IPO underpricing is calculated as $(P_{i1} - P_{i0})/P_{i0}$ following Marcato (2018). Columns (2) and (3) take the numbers of ATPs and their natural logarithm as alternative measures of ATP adoption. The year and industry fixed effects are included in the models. The *t*-statistics reported in parentheses are based on standard errors clustered by firms. ***, ** and * denote the significance of the parameter estimates at the 0.01, 0.05 and 0.10 levels, respectively

Source(s): Authors own creation

Table 7.
Robustness checks

one if the ratio of independent directors is above the sample median in a given year and zero otherwise. R&D expense is one of the causes of information asymmetry. R&D expense is one of the causes of asymmetry information and an important means for enterprises to gain a competitive advantage. However, it is difficult to estimate the value of companies with high R&D expenses, which aggravates the asymmetry of information between enterprises and external investors (Aboody & Lev, 2000). Therefore, we defined R&D expenses as the R&D investment divided by the operating revenue, grouping them according to the industry-year median. High R&D expenses refer to the firms whose R&D expenses are above the industry-year median. Table 8 shows the regression results that account for the information environment. We can see that the reducing effect of ATP adoption on IPO underpricing is more salient for IPO firms in worse information environments.

Table 8. Cross-sectional tests: information environment

	Analyst attention		Earnings management		Corporate governance: CEO-chair duality		Corporate governance: Board independence		R&D expense	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variable	High	Low	High	Low	CCD = 1	CCD = 0	ID = 1	ID = 0	High	Low
ATP	−0.007	−0.056***	−0.062***	−0.013	−0.055***	−0.004	−0.010	−0.065***	−0.054***	−0.013
	(−0.446)	(−2.853)	(−2.747)	(−0.808)	(−2.691)	(−0.252)	(−0.632)	(−3.173)	(−2.766)	(−0.701)
SIZE	−0.009	−0.053***	−0.057***	−0.023*	−0.025*	−0.033***	−0.026**	−0.038**	−0.037**	−0.046***
	(−0.773)	(−3.544)	(−3.601)	(−1.907)	(−1.790)	(−2.616)	(−2.290)	(−2.464)	(−2.482)	(−3.346)
LEV	−0.025	0.075	0.032	0.062	−0.033	0.058	−0.063	0.124	0.088	−0.032
	(−0.424)	(0.967)	(0.382)	(1.036)	(−0.491)	(0.938)	(−1.117)	(1.503)	(1.214)	(−0.412)
AGE	0.038*	0.008	0.029	0.040*	0.005	0.042**	0.061**	−0.014	0.044*	−0.000
	(1.920)	(0.289)	(0.962)	(1.725)	(0.169)	(1.962)	(2.408)	(−0.490)	(1.674)	(−0.000)
ROE	−0.186**	−0.183	−0.371**	−0.161*	−0.368***	−0.327***	−0.280***	−0.281**	−0.248**	−0.354***
	(−2.349)	(−1.248)	(−2.495)	(−1.661)	(−2.589)	(−3.343)	(−2.785)	(−2.065)	(−2.133)	(−2.596)
SOE	0.007	0.029	0.058*	0.009	0.049	0.023	0.022	0.031	0.029	0.032
	(0.355)	(0.928)	(1.892)	(0.383)	(1.462)	(1.096)	(0.763)	(1.210)	(1.072)	(1.154)
FDT	0.719***	1.263***	1.007***	0.950***	0.990***	0.932***	0.917***	1.045***	0.924***	1.067***
	(13.650)	(11.051)	(11.058)	(11.644)	(10.271)	(12.613)	(10.938)	(11.103)	(11.678)	(11.854)
LOT	−0.316	1.972	2.705*	−0.068	−0.759	1.265	0.936	0.919	1.421	1.305
	(−0.560)	(1.231)	(1.833)	(−0.061)	(−0.673)	(1.276)	(0.779)	(0.735)	(1.008)	(1.530)
UDW	0.013	0.006	0.005	−0.011	−0.014	−0.015	−0.017	0.005	−0.021	0.016
	(0.863)	(0.286)	(0.218)	(−0.702)	(−0.689)	(−0.860)	(−0.995)	(0.223)	(−1.160)	(0.748)
AUD	−0.007	0.229*	0.050	0.091	0.070	0.086*	0.142**	0.075	0.066	0.077
	(−0.202)	(1.786)	(0.482)	(1.559)	(0.410)	(1.695)	(1.964)	(0.837)	(0.904)	(0.855)
REP	0.071**	0.306**	0.218***	0.111***	0.118**	0.150***	0.112**	0.163***	0.137***	0.182**
	(2.325)	(2.540)	(3.313)	(2.718)	(2.338)	(4.004)	(2.455)	(2.713)	(2.623)	(2.541)
Constant	0.848***	0.382	1.189***	0.990***	0.852**	0.862***	1.246***	0.272	0.694**	1.198***
	(2.816)	(0.870)	(3.714)	(3.669)	(2.039)	(3.038)	(4.401)	(0.673)	(1.995)	(3.873)
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	924	1224	1099	1049	984	1164	973	1175	1107	1041
Adj-R^2	0.634	0.655	0.648	0.581	0.699	0.599	0.553	0.664	0.685	0.569

Note(s): This table presents the results of ATP adoption on IPO underpricing under different information environments. All control variables and the year and industry fixed effects are included in the models The *t*-statistics reported in parentheses are based on standard errors clustered by firms. ***, ** and * denote the significance at the 0.01, 0.05 and 0.10 levels

Source(s): Authors own creation

6. Further analysis of other IPO characters

Having identified the reducing effect of ATP adoption on IPO underpricing, it is of interest to see if ATP adoption may also affect other IPO characteristics. In the spirit of previous studies (Duong, Goyal, Kallinterakis, & Veeraraghavan, 2021; Chen, Goyal, Veeraraghavan, & Zolotoy, 2020; Hong, Hung, & Lobo, 2014; Dunbar *et al.*, 2000), we consider five IPO characteristics including IPO over-subscription, proceeds, trading volume, gross spread and investment fee, which are quantified as follows: IPO over-subscription is the total volume of orders in the underwriting book divided by the number of shares offered; Proceeds is calculated as the total IPO funds raised divided by the total assets of the IPO firm at the IPO date; Trading volume is calculated as the natural logarithm of the total shares issued by the IPO firm at the IPO date; Gross spread is calculated as the total administrative fee of issuing the IPO divided by the total funds raised at the IPO date; and Investment bank fee is calculated as the fee charged by the investment bank underwriting the IPO, divided by the total funds raised at the IPO date.

The regression results are shown in Table 9. As can be seen, adopting ATPs has significant positive influences on IPO over-subscription, proceeds and trading volume,

Variable	(1) Over-subscription	(2) Proceed	(3) Trading volume	(4) Gross spread	(5) Investmentbank fee
ATP	114.955**	0.028**	0.061***	−0.003**	−0.003**
	(2.243)	(2.000)	(2.863)	(−2.040)	(−2.293)
SIZE	−224.242***	−0.087***	0.562***	−0.024***	−0.015***
	(−6.105)	(−7.238)	(22.358)	(−23.981)	(−20.253)
LEV	197.838	−0.329***	−0.495***	0.050***	0.027***
	(1.066)	(−6.787)	(−6.649)	(9.414)	(6.844)
AGE	62.144	−0.022	−0.076***	−0.001	−0.001
	(1.420)	(−0.741)	(−2.690)	(−0.673)	(−1.076)
ROE	−883.180***	0.252*	−0.419***	−0.093***	−0.047***
	(−3.581)	(1.859)	(−3.343)	(−12.069)	(−8.223)
SOE	−18.019	−0.004	0.058**	0.003*	0.003**
	(−0.278)	(−0.401)	(2.361)	(1.925)	(2.281)
FDT	202.497**	−0.185***	−0.002	0.012***	0.005*
	(2.486)	(−2.775)	(−0.021)	(2.745)	(1.709)
LOT	4187.545**	3.278	3.376***	0.029	−0.040
	(2.526)	(1.394)	(2.597)	(0.400)	(−0.832)
UDW	2.043	0.022	0.043**	0.001	0.003***
	(0.041)	(1.258)	(2.310)	(0.755)	(2.620)
AUD	−112.994	0.005	0.111	0.012***	0.006**
	(−0.900)	(0.241)	(1.055)	(2.661)	(2.218)
REP	353.313***	−0.107***	0.221***	0.040***	0.021***
	(5.248)	(−2.697)	(3.897)	(6.307)	(4.107)
Constant	5899.149***	2.592***	5.604***	0.552***	0.340***
	(6.805)	(6.785)	(9.726)	(22.204)	(18.653)
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
N	2148	2148	2148	2148	2148
Adj-R^2	0.735	0.308	0.693	0.548	0.461

Note(s): This table presents the regression results of the influence of ATP adoption on other IPO characteristics. Variable definitions are provided in the Appendix. All control variables and the year and industry fixed effects are included in the model. The *t*-statistics reported in parentheses are based on standard errors clustered by firms. ***, ** and * denote the significance of the parameter estimates at the 0.01, 0.05 and 0.10 levels

Source(s): Authors own creation

Table 9.
ATP adoption and other IPO characteristics

indicating that IPO firms adopting ATPs are more likely to be oversubscribed, with more money raised and trading activities enhanced. Meanwhile, it is also found that adopting ATPs has significant negative influences on Gross spread and Investment bank fee.

7. Conclusions

Based on the textual-analyzed data covering 2148 IPO firms in China's stock market during the 2007–2018 period, we examine the influence of ATP adoption on IPO underpricing and identify the reducing effect of the former. This effect can be explained by the fact that adopting ATPs in IPO firm chapters can reduce asymmetric information to a large extent by helping external investors obtain more private information, which alleviates IPO underpricing. We also find that the reducing effect is more significant in a worse information environment. Furthermore, we explore the influence of adopting ATPs on other IPO characteristics and find positive effects on IPO over-subscription, funds raised and trading activity, but negative effects on listing fees. In brief, this paper extends the literature on ATP adoption and IPO underpricing and presents a new insights regarding IPO pricing.

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Appendix

Variable	Definition
Under-pricing	The difference in relative price changes as specified in Equation (1)
IPO Over-subscription	The total volume of orders in the underwriting book divided by the number of shares offered
Proceeds	The total IPO funds raised divided by the total assets of the IPO firm at the IPO date
Trading Volume	The logarithm of total shares issued by the IPO firm at the IPO date
Gross Spread	The total administrative fee of issuing the IPO divided by the total funds raised at the IPO date
Investmentbank Fee	The fee charged by the investment bank underwriting the IPO is divided by the total funds raised at the IPO date
ATP	A dummy variable that equals one if the firm sets anti-takeover provisions in their IPO's firm chapter and zero otherwise
SIZE	The logarithm of the total assets in the year before the IPO
LEV	The book value of Pre-IPO debt divided by the book value of the total assets
AGE	The logarithm of one plus the age of the firm at the IPO date
ROE	The net income divided by the total assets in the year before the IPO
SOE	A dummy variable that takes a value of one if the firm has state-owned equity and zero otherwise
FDT	IPO first-day turnover
LOT	The lot winning rate of the newly issued share
UDW	A dummy variable that equals one if the underwriter is ranked in the top 10 measured by the total funds raised in the current year and zero otherwise
AUD	A dummy variable that equals one if the auditing firm is among the big four auditing firms in China and zero otherwise
REP	A dummy variable that equals one if the IPO is issued in a restricted period, and zero otherwise
CCD	A dummy variable takes a value of one if the CEO is also the chairman of the board and zero otherwise
ID	An indicator variable that equals one if the ratio of independent directors is above the sample median in a given year and zero otherwise
Year FE	The year-fixed effect
Industry FE	The industry fixed effect

Source(s): Authors own creation

Table A1.
Variable Definition

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