



The Sci-Tech Innovation Board of IPO Discount and Information Disclosure

Daheng Hu*

Business School, Macquarie University, Sydney, 2109, Australia

*Corresponding author's e-mail: 425798057@qq.com

Abstract. The pilot registration system and listing system implemented by the Sci-Tech Innovation Board (STIB) will help high-tech companies improve the quality of investment. It is significant to study the quality of disclosure of IPOs on the STIB. This paper analyzes whether the increase in risk disclosure under the registration system of the Sci-Tech Innovation Board reduces the IPO discount by examining the IPO discount, and then analyzes the disclosure of the STIB and market effectiveness. The results show a U-shaped relationship between business risk disclosure indicators and IPO discounts. When the amount of operating risk information disclosure increases, the IPO discount first decreases and then increases. The conclusions of this paper remain robust after removing outliers and replacing the way indicator is calculated.

Keywords: Information disclosure, IPO Discount, Business risk, Financial risk

1 Introduction

Foreign studies explain the IPO discount phenomenon with hypotheses such as information asymmetry theory, market timing theory, and corporate financial characteristics. July 22, 2019, the official opening of the Sci-Tech Innovation Board (STIB). The pilot registration system and listing system implemented by the STIB will help high-tech companies to improve the quality of their investments and promote the deeper integration of the capital market and innovation, and the study of the pricing efficiency of IPOs on the STB is of great significance to the advancement of this development strategy. Disclosure of information is the core of the Sci-Tech Innovation Board (STIB), and the quality of risk disclosure and the review and inquiry based on the disclosure of information is the key to the transformation of STIB companies to the registration system. How information is disseminated, scrutinized and controlled has also become an important issue in the area of dissemination of information on the STIB. Previous studies in the literature on information disclosure and IPO discounts have reached mixed conclusions, exempli gratia Beatty and Welch (1996)'s [1] conclusions are contrary to those of Hanley and Hoberg (2010) [2].

The contributions of this paper are as follows: First, this paper analyzes whether the disclosure of information on the Science and Technology Innovation Board

(STIB) reduces the cost of capital through IPO discounting. On this basis, this paper analyzes the nonlinear law of information disclosure and finds a U-shaped law for the disclosure of operational risk information and financial risk information. While previous literature analyzes risk disclosure in general, this paper refines the study to examine the impact of different risk categories on IPO pricing. The research in this paper provides evidence on the effects of market-based pricing reforms on the STIB.

The rest of the paper is organized as follows: The second part is the literature review. The third part is the empirical research method. The fourth chapter is the empirical results. The fifth part is the robustness test. Finally, the sixth part summarizes the full text.

2 Literature Review

2.1 Information Asymmetry and IPO Pricing Influences

Stoll (1970) [3] and Welch (1989) [4] proposed the IPO foundation theory, Rock (1986) [5] proposed the information asymmetry hypothesis, the market timing hypothesis (Chemmanur, 1993) [6], and the certification hypothesis of investment banks (Carter and Manaster, 1990) [7]. As described by Ritter and Welch (2002) [8], the main cause of IPO discounts is information asymmetry. Loughran and Ritter (2002) [9] argue that firms' shareholders or entrepreneurs become complacent before going public and thus are willing to leave more money behind when the firm's value increases significantly. In addition, issuer-underwriter agency conflicts, underwriter power, and regulation may play an important role in explaining IPO discounts (e.g. Loughran and Ritter, 2002 [9]; Jenkinson et al., 2018 [10]). From the perspective of information asymmetry, indicators such as Firm Age, R&D Spending, Hi-Tech Dummy, and VC Dummy have been used in the literature to measure the degree of information asymmetry, and then to analyze its relationship with IPO discount.

2.2 Risk Disclosure and IPO Discount

Beatty and Ritter (1986) [11] argue that when listed firms supply less information content to investors, the discount on IPOs is correspondingly higher. Clarkson et al. (1996) [12] argue that enhanced disclosure reduces appraisal risk and thus reduces the cost of financing. Healy et al. (1999) [13] noted that the average stock price of data-limited companies increased by seven percent as a result of improved voluntary disclosure of data company stock. The stability of the company's stock will further improve over the next three years as institutional clients increase their average holdings of Data's stock and gain more analyst favor. Ang and Brau (2002) [14] and Schrand and Verrecchia (2002) [15] show that firms in financial markets consider disclosure before developing IPOs, thereby increasing business clarity. Beatty and Welch (1996) [1], Hanley and Hoberg (2010) [2] analyze the correlation between risk factor disclosure and IPO discounts, but with opposite results. Loughran and McDonald (2013) launched an analysis of the Listing application materials provided by U.S. public companies and found a positive correlation between this uncertainty and IPO

discounts. Xiqiong He et al. (2023) [16] find that the longer the length of risk disclosure, the lower the probability of bankruptcy. Currently, there is a scarcity of articles that have conducted in-depth research on important financial risk disclosure information in China. Only Xiangchao Hao and Zhixiang Su (2014) [17] subdivided the important financial risk recognition information into standard financial risk recognition information and special financial risk recognition information through text analysis method and concluded that the special financial risk recognition information will help to reduce the IPO discount, and similar studies in the STIB are not available. Studies such as Xuegang Cui (2004) [18], Zhong Ma, Xiangyu Wu (2007) [19], and Wang et al. (2008) [20] show that the extent of voluntary information disclosure by Chinese firms is still low in general.

2.3 Research on IPO of Science and Technology Innovation Board

Concerning the special registration system on China's STIB and its effect on the IPO discount rate, Yibiao Chen (2020) [21] points out that the winning rate of offline corporate investors will be significantly larger than that of online private investors, which results in a herd utility abatement, and the IPO price will be more accurate. Hu Xiong (2020) [22] Company according to the analysis of the Cochrane IPO discount effect factor shows that the turnover rate, the cost of the additional issue and the investor sentiment index all play a more significant role in the IPO discount. Both Dongsheng Su and Siming Li (2020) [23] argue that the high return rate on the first day of listing, the winning rate, and the pre-listing earnings per share will play a role in the IPO discount for China's TechCorp firms. Zongxin Zhang and Junliang Teng (2020) [24] argue from the perspective of the registration system reform of China's Science and Technology Innovation Board (STIB) that the new registration system Request For Quotations (RFQ) model increases the difficulty of the content of the RFQ, which in turn avoids overly fair competition among RFQ firms and improves the quality of IPO pricing.

Based on the literature and related principles, the thesis proposes the following hypothesis: The more adequate the disclosure of risk information in a listed company's Prospectus, the lower the degree of information asymmetry and the lower the IPO price depression. In the following section, a model is designed based on the hypotheses, data is found, and the hypotheses are tested through empirical analysis.

3 Research Methods

3.1 Calculation of Indicators

IPO discount indicator ReU:

$$UP_i = 100 * \left(\frac{P_{i,IPO}}{P_{i,offer}} - 1 \right) \quad (1)$$

where $P_{i,IPO}$ is the first day closing price of IPO firm i and $P_{i,offer}$ is the offering price.

In this paper, we use a crawler technique to first download the IPO prospectus of a Sci-Tech Innovation Board Company, and then count the word frequencies of various risks: operational risk (RJY), financial risk (RCW), technology risk (RJS), legal risk (RFL), internal control risk (RNK), and industry and market risk (RSC).

3.2 Regression Models

$$Y_{i,t} = \alpha_0 + \beta_1 X_{i,t} + \beta_2 C_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $Y_{i,t}$ is the IPO first day discount (ReU) for IPO firm i in year t . $X_{i,t}$ is the information disclosure metrics in the prospectus of firm i at the time of its listing application in year t , including business risk (RJY), financial risk (RCW), technology risk (RJS), legal risk (RFL), internal control risk (RNK), and industry and market risk (RSC), as well as their quadratic terms. $C_{i,t}$ is control variables for firm i before and on the day of listing in year t , including investment profitability (ROE), governance structure, company established time (AGE), issue size (OSIZE), first largest shareholder ownership ratio (FIRST) and nature of the firm (SOE), market share (MARKET), time variable (YEAR), and industry variable (Ind). $\varepsilon_{i,t}$ is the interference term.

3.3 Data Description

IPO First Day Performance Data from Cathay Pacific Database (CSMAR), includes a table of basic prospectus and listing information of the IPO of individual stocks on the Science and Technology Innovation Board, a table of pre-prospectus financial indicators, a table of the top 10 shareholders at the time of listing, a table of market performance on the first day of listing, and a table of shareholders and governance structure. Selected data for 2019-2023 for the entire STIB, i.e., data for first-time issuance of STIB stocks (see Table 1).

Table 1. Description of variables.

variable	sign	implication
Explained variables (market reaction variable)	ReU	IPO discount: (Closing price of the stock on the first day/issue price of the stock-1) * 100%
Explanatory variables (risk disclosure indicators)	RJY	business risk
	RCW	financial risk
	RJS	technology risk
	RFL	legal risk
	RNK	internal control risk
	RSC	market risk

FIRST	Shareholding of the first largest shareholder (%)
AGE	Age of the company, logarithm of the time the company was founded
ROE	Pre-prospectus weighted return on net assets (%)
Market	(Composite index on the first day of listing/prospectus date-1)*100%
OSIZE	Total actual funds raised, issue price×issue number, This paper takes logarithmic
IPOPRC	issue price
SOE	State-owned or not
Ind	Industry, SEC 2012 Standards
Year	Time effect, year of listing

4 Empirical Findings

4.1 Descriptive Statistics

In this paper, 449 IPO data of the science and technology innovation board are obtained after merging, and the descriptive statistics are shown in Table 2. The average IPO discount rate in the overall sample is 1.3454 %, the standard deviation is 1.4864 %, the minimum value is -0.3466 %, and the maximum value is 12.7398 %. Specifically, there were 57 IPOs in 2019. The average discount on the first day was 1.02 %, the standard deviation was 0.7171 %, the minimum value was -0.0215 %, and the maximum value was 3.6652 %. There are 124 IPOs in 2020, the average discount on the first day is 1.8535 %, the standard deviation is 1.4212 %, the minimum value is -0.1184 %, and the maximum value is 9.2391 %. There are 149 IPOs in 2021, with an average first-day discount of 1.8958 %, a standard deviation of 1.778 %, a minimum of -0.2727 %, and a maximum of 12.7398 %. The proportion of IPOs with negative first-day discounts is 8.8 %. In 2022, there are 102 IPOs with a first-day discount mean of 0.2138%, a standard deviation of 0.4234%, a minimum of -0.3466%, and a maximum of 2.1238%. In 2023 there are 17 IPOs with a first-day discount mean of 0.6914%, a standard deviation of 0.5903%, a minimum of -0.0626%, and a maximum of 1.7677%.

The descriptive statistics of the risk disclosure indicators are shown in Table 3. The overall average value of the operational risk disclosure indicator (RJY) is 0%, i.e., the frequency of the word "operational" in the filing is 0%. The mean value of financial risk disclosure index (RCW) is 0 %, the mean value of technical risk disclosure index (RJS) is 0 %, the mean value of legal risk disclosure index (RFL) is 0 %, the mean value of internal control risk disclosure index (RNK) is 0 %, and the mean value of market risk disclosure index (RSC) is 0 %.

Table 2. Descriptive statistics of IPO on Science and Technology Innovation Board.

Annum	Number	Mean value	Standard deviation	Minimum value	Maximum value
2019	57	1.02	0.7171	-0.0215	3.6652
2020	124	1.8535	1.4212	-0.1184	9.2391
2021	149	1.8958	1.778	-0.2727	12.7398
2022	102	0.2138	0.4234	-0.3466	2.1238
2023	17	0.6914	0.5903	0.0626	1.7677
Whole	449	1.3454	1.4864	-0.3466	12.7398

Table 3. Descriptive statistics of risk information disclosure indicators.

Index	Mean value	Standard deviation	Minimum value	Maximum value
RJY	0	0.0003	-0.0012	0.0015
RCW	0	0.0001	-0.0002	0.0006
RJS	0	0.0018	-0.0034	0.0073
RFL	0	0.0001	-0.0002	0.0009
RNK	0	0	-0.0001	0.0001
RSC	0	0.0005	-0.0012	0.0032

Table 4. Descriptive statistics of other indicators.

Index	Mean value	Standard deviation	Minimum value	Maximum value
AGE	14.7697	5.6402	4.3333	39.8333
FIRST	30.8802	13.9776	1.79	81.88
IPOPRC	38.7168	43.8623	1.22	557.8
Market	-0.0004	0.0299	-0.1113	0.1581
OSIZE	20.7905	1.0065	18.7669	25.5568
ROE	8.7709	30.2563	-434	104.98
SOE	0.0935	0.2915	0	1

In terms of control indicators, as shown in Table 4, the mean value of the logarithm of the establishment time (AGE) of listed companies on the science and technology board is 14.7697, and the standard deviation is 5.6402; The average shareholding ratio (FIRST) of the largest shareholder of the science and technology innovation board listed company is 30.8802%, the standard deviation is 13.9776%, the minimum value is 1.79%, and the maximum value is 81.88%. The mean value of the logarithm of the size of the science and technology board listed companies (OSIZE) is 20.7905, the standard deviation is 1.0064, the minimum value is 18.7669, and the maximum value is 25.5568. Other variables are similar.

4.2 Regression Result

The dependent variable in this part of the regression is the first-day discount rate of listed companies, ReU. As shown in the first column of Table 5, the regression coefficient of the operational risk disclosure indicator (RJY) is -0.0320, which is significant at the 1% level, and the regression coefficient of the quadratic term of the operational risk disclosure indicator is 0.001024, which is remarkable at the 1% level. This suggests that the business risk disclosure indicator has a U-shaped relationship with IPO discount. As shown in the second column of Table 5, the regression coefficient of the financial risk disclosure indicator (RCW) is -0.0131, which is significant at the 10% level, and the regression coefficient of the quadratic term of the financial risk disclosure indicator is 0.00017161, which is remarkable at the 5% level. This indicates that the financial risk disclosure indicator has a U-shaped relationship with IPO discount. As shown in the sixth column of Table 5, the regression coefficient of the quadratic term of the market risk disclosure indicator is 0.0214, which is remarkable at the 10% level, which indicates that the U-shaped relationship of the market risk disclosure indicator is not significant. The regression coefficients for the other risk disclosure indicators are not considered remarkable.

As shown in the third row of Table 5, the return on the market composite index is positively correlated with the IPO discount, with regression coefficients from the first to the sixth columns of 12.52, 11.73, 10.26, 11.86, 10.85, and 11.34, respectively, which are significant at the 10% level. As shown in the ninth row of Table 5, the IPO Issue Size Indicator (OSIZE) is negatively correlated with IPO discounts, with regression coefficients from the first to the sixth columns of -0.436, -0.387, -0.281, -0.372, -0.358, and -0.331, respectively, which are significant at the 1% level.

Table 5. Regression Analysis of IPO Discount and Information Disclosure Indicators (up23).

Variable	Management	Finance	Technique	Law	Internally piloting	Market
RJY	-0.0320** (0.0145)					
RiskJY ²	0.001024** (0.00021025)					
Market	12.52* (6.636)	11.73* (6.626)	10.26* (6.122)	11.86* (6.811)	10.85 (6.657)	11.34* (6.795)
AGE	-0.0123 (0.0159)	-0.0129 (0.0156)	-0.0201 (0.0150)	-0.0135 (0.0152)	-0.0134 (0.0155)	-0.0139 (0.0152)
ROE	-0.00435 (0.00509)	-0.00590 (0.00488)	-0.00456 (0.00407)	-0.00642 (0.00503)	-0.00671 (0.00508)	-0.00787 (0.00498)
SOE	0.203 (0.259)	0.242 (0.257)	0.137 (0.288)	0.242 (0.258)	0.245 (0.256)	0.275 (0.249)
FIRST	-0.00415	-0.00519	-0.00594	-0.00551	-0.00543	-0.00498

	(0.00746)	(0.00767)	(0.00790)	(0.00770)	(0.00766)	(0.00769)
OSIZE	-0.436***	-0.387***	-0.281**	-0.372***	-0.358***	-0.331**
	(0.133)	(0.140)	(0.139)	(0.137)	(0.132)	(0.143)
RCW		-0.0131				
		(0.0229)				
RCW ²		0.00017161				
		(0.00052441)				
RJS			0.00852*			
			(0.00504)			
RJS ²			0.00007259			
			*			
			(0.0000254)			
RFL				0.00571		
				(0.0335)		
RFL ²				0.0000326		
				041		
				(0.001122		
				25)		
RNK					0.218	
					(0.219)	
RNK ²					0.047524	
					(0.047961)	
RSC						0.0214*
						(0.0113)
RSC ²						0.00045796*
						(0.00012769)
Ind	control	control	control	control	control	control
Year	control	control	control	control	control	control
Obs	154	154	154	154	154	154
R ²	0.406	0.389	0.417	0.388	0.391	0.407

Note: The robust standard deviation is within brackets, and *, **, *** correspond to 10 %, 5 % and 1 % significant levels, respectively. For simplicity, the regression coefficient of the intercept term is not shown.

5 Conclusion

This paper constructs risk disclosure indicators in the prospectus of the Science and Technology Board based on textual analysis and analyzes their relationship with IPO discounts. On this basis, this paper analyzes the relationship between disclosure and the first-day price of IPOs. The results show that the business risk disclosure indicator

has a U-shaped relationship with the IPO discount, and the IPO discount decreases and then increases when the amount of business risk disclosure increases. The regression coefficients of other risk disclosure indicators are not significant.

An effective information disclosure system is the way for a disorderly market economy to move toward the development of a regulated market. The characteristics of Sci-Tech Board companies include a high volume of research investment, risk factors, unstable business development, the possibility of delisting, etc., and a potentially large information asymmetry relationship with investors. Comprehensive and accurate news revelation is the strongest safeguard for the interests of investors and is an essential basis for the value assessment of investors. The research in this paper contributes to the public monitoring and evaluation mechanism of the KSC and provides evidence of the effectiveness of market-based pricing reforms in China.

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