BOARD FINANCIAL EXPERTISE AND IPO PERFORMANCE: AN ANALYSIS OF U.S. PUBLIC OFFERINGS AND WITHDRAWALS

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Abstract

Potential investors examine governance characteristics prior to an initial public offering (IPO) to assess the quality and prospects of the issuing firm. One important governance characteristic is board financial expertise, as it provides directors with the relevant knowledge for an IPO process and is valuable for the board's monitoring duties. Therefore, the purpose of this paper is to examine whether and how board financial expertise affects IPO outcomes. To do so, I employ a sample of 414 completed and 85 withdrawn IPOs that were filed from 2014–2017 at NYSE or NASDAQ. I document that the ratio of directors with financial expertise on the board is negatively associated with the level of underpricing and the probability of IPO withdrawal. The results suggest that particularly outside directors with financial expertise have a positive signaling effect and help to reduce information asymmetry around initial public offerings. Above that, using quantile regression, I find that director financial expertise is most valuable for issuances with high levels of investor uncertainty. Therefore, this study makes important contributions to the corporate governance and IPO literature by providing a comprehensive analysis of the effects of board financial expertise on IPO outcomes.

Keywords: Initial Public Offerings, Underpricing, Board Composition, Board of Directors, Financial Expertise

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1. INTRODUCTION

Since the 1970s, the underpricing of IPOs has been a well-observed phenomenon (Camp, Comer, & How, 2006). Many issuers see their stock price rising sharply on the first day of trading, which means that the IPO firm could have realized higher proceeds from the offering ("money left on the table"). As a result, venture capitalists and Silicon Valley companies recently expressed their dissatisfaction with traditional IPOs, blaming underwriters to intentionally underprice shares in new emissions (Levy & Wapner, 2019). However, in recent years, the global IPO activity has generally kept a high momentum and also quickly recovered from the initial impact of the COVID pandemic (EY, 2020). As traditional IPOs are still the most common way for firms to go public, there is a need for further research on how firms can effectively reduce the level of underpricing.

One important factor during an IPO is the quality of the issuer's corporate governance (Bertoni, Meoli, & Vismara, 2014). Research finds that governance characteristics, such as board

independence and size, are relevant determinants of the level of underpricing and the probability of IPO withdrawal (Certo, Daily, & Dalton, 2001; Helbing, Lucey, & Vigne, 2019). During an IPO process, IPO firms shift from private to public status and transform their organization to conform with the scrutiny of the regulator and the investor community (Filatotchev & Bishop, 2002). While inside directors, who are part of the management team, are mainly responsible for leading the firm through the process of going public (Latham & Braun, 2010), outside directors are a valuable resource of knowledge and provide advising to the issuer as internal resources of the issuer are limited (Clarysse, Knockaert, & Lockett, 2007; Kim, Mauldin, & Patro, 2014; Ward, 1989). Hence, both inside and outside directors are actively involved in the IPO process and can affect the IPO's outcome. Furthermore, just prior to an IPO, information asymmetries exist between the issuer, potential investors, and the underwriters. In this sense, board characteristics can serve as a signal that conveys the issuer's value to underwriters and potential investors and reduces information asymmetries (Certo et al., 2001).

An important aspect of board composition that has gained increasing attention over the past years is financial expertise, especially because directors with financial expertise are generally expected to improve corporate governance (DeFond, Hann, & Hu, 2005). An IPO is typically a complex transaction with a high relevance of financial information (Willenborg, Wu, & Yang, 2015). Thus, directors with financial expertise might also prove to be beneficial in the context of an IPO. Therefore, this paper seeks to examine whether and how directors with financial expertise affect the IPO process and its outcomes. On the one hand, financial expertise provides directors with the relevant knowledge for an IPO process and enables them to strengthens the issuer's position, e.g., towards the underwriters when evaluating financial information and discussing valuation assumptions (Ettredge, Li, Wang, & Xu, 2020; Judge et al., 2015). On the other hand, financial expertise is valuable for the board's monitoring duty, for instance in terms of financial reporting (DeFond et al., 2005; Kim et al., 2014). Accordingly, financial expertise might also signal future monitoring performance to potential investors. As a result, the purpose of this paper is to provide a comprehensive empirical analysis of the effect of board financial expertise on IPO outcomes.

To do so, this study uses the ratio of financial experts on the board at the time of the IPO and analyzes the effect on the level of underpricing and the probability of IPO withdrawal. My sample consists of 414 completed and 85 withdrawn IPOs that were filed from 2014–2017 at NYSE or NASDAQ. I find that the ratio of financial experts on the board is negatively associated with IPO underpricing. However, I also document that the results are driven by financial experts among outside directors. Thus, the results underline the importance of knowledge provided by outside directors and their positive signaling effect for issuing firms. Exploratory results of quantile regressions show that the effect of financial expertise is strongest for issues with higher levels of ex-ante-uncertainty[1]. The analysis of IPO withdrawals reveals that outside director financial expertise is also associated with a reduced probability of IPO withdrawal.

This paper makes important contributions to the IPO and corporate governance literature as it underlines that outside director financial expertise is exceptionally important for a successful IPO, suggesting that director financial expertise has a positive signaling effect to potential investors and equips outside directors with the relevant knowledge to advise the issuer during the IPO process. Thus, I expand the results of Judge et al. (2015) and Ettredge et al. (2020) on the relevance of financial expert directors for the IPO process. Applying quantile regression, I further elaborate on these findings and demonstrate that directors with financial expertise are most valuable for issuances that are related to higher levels of investor uncertainty. Consequently, this study also contributes to the IPO literature from a methodological perspective as it is among the first studies to employ quantile regressions in the IPO context. As underpricing follows a non-Gaussian distribution, quantile regression produces more consistent results compared to OLS while offering more insights into the association between dependent and independent variables. Finally, by also analyzing the effect of board financial expertise on the probability of IPO withdrawal, this paper presents a comprehensive analysis of the role of board financial expertise during the IPO process. In summary, from a practical perspective, firms preparing for an IPO should therefore implicitly consider financial expertise when (re)appointing directors to the board.

The remainder of the paper proceeds as follows. Section 2 presents related research within the IPO and corporate governance context and develops testable hypotheses. Section 3 covers information about the sample and the variable descriptions, while Section 4 presents the empirical results. Section 5 concludes.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Firms conducting an IPO are exposed to enormous challenges during the IPO process as they are confronted with preparing the offering, negotiating with underwriters, and shifting from private to public status. While inside directors are mainly responsible for transforming the issuing firm to become a public company and lead the firm through the IPO process (Latham & Braun, 2010), outside directors have equally important responsibilities. They review and authorize key decisions and the registration documentation and advise the issuer on important aspects of the IPO process (Bertoni et al., 2014; Westenberg, 2013). Therefore, IPO firms often select outside directors that provide business advice to the IPO firm and compensate for a lack of experience and network of their executives (Kroll, Walters, & Le, 2007; Shivdasani & Yermack, 1999; Westphal, 1998).

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[1] Ex-ante uncertainty describes the uncertainty of investors about the value of a company before it starts trading. A higher level of uncertainty means that investors demand higher first-day trading returns (Beatty & Ritter, 1986).

One challenge associated with an IPO is the level of underpricing. The level of underpricing is the difference between the offer price and the price at the end of the first trading day and presents a direct wealth transfer from the issuing firm and its initial shareholders to new investors (Filatotchev & Bishop, 2002). Information asymmetry serves as a dominant explanation for the underpricing phenomenon (Carter & Manaster, 1990; Connelly, Certo, Ireland, & Reutzel, 2011; Ritter & Welch, 2002), as potential investors have only limited information about the issuer and judge IPOs based on a subjective probability of future success (Beatty & Ritter, 1986; Rock, 1986). In this sense, a higher ex-ante uncertainty of investors about the value of the issuer results in a higher level of underpricing (Beatty & Ritter, 1986). However, also the relationship between the issuer and the underwriters creates agency costs through information asymmetries, as underwriters have informational advantages about the structure of the capital market and the demand for the issuer's shares (Baron, 1982; Liu & Ritter, 2010). IPO firms can employ mechanisms to overcome these information asymmetries and convey their (expected) value to underwriters and potential investors by sending signals that are costly to imitate (Michaely & Shaw, 1994).

In this context, specific governance characteristics can serve as a signal, as potential investors examine the composition of the board before the IPO to assess the quality and prospects of the issuing firm (Baker & Gompers, 2003; Da Silva Rosa, Izan, Lin, & Lin, 2008). For example, Filatotchev and Bishop (2002) find a proportion of non-executive directors above the threshold of 33% to be negatively associated with underpricing, while Certo et al. (2001) document that board size is a favorable signal resulting in less underpricing.

One important aspect of the board composition is financial expertise. From a governance perspective, financial expertise equips directors, particularly outside directors, with relevant knowledge to fulfill their monitoring duty, e.g., in the context of the financial reporting process (DeFond et al., 2005; Kim et al., 2014). Research finds that board monitoring activity is positively associated with firm value (Brick & Chidambaran, 2010), while weak governance structures increase the likelihood of failure and involuntary delisting of newly publicly-listed firms (Djerbi & Anis, 2015). Thus, directors with financial expertise might have a positive signaling effect as they assure future governance performance, which reduces investor uncertainty about the value of the issuer and hence leads to less underpricing.

Above that, also in the direct interaction between the issuer, underwriters, and investors, director financial expertise might reduce information asymmetries. Financial expertise enables directors to challenge assumptions and evaluate financial information presented by external advisors or underwriters, which strengthens the issuer's position towards the underwriter, for example when it comes to discussions about the appropriate valuation of the issuer (Judge et al., 2015). Furthermore, director financial expertise might also positively affect the issuer's financial reporting and thus convey the value of the issuer to

potential investors more credibly (Ettredge et al., 2020). This could enhance the way the issuer is presented to potential investors, e.g., during road-shows. Consequently, director financial expertise should also reduce information asymmetries through the direct interaction with investors and the underwriters, also leading to less uncertainty about the value of the issuer. Therefore, I expect a negative association of director financial expertise and IPO underpricing.

H1: The board's financial expertise is negatively associated with IPO underpricing.

A substantial amount of companies filing for an IPO withdraw their registration at some point during the process. While withdrawing from an IPO is not necessarily a negative event if the issuing firm has a superior option (Busaba, 2006)[2], research shows that most firms that withdraw do not return for a second try (Dunbar & Foerster, 2008; Lian & Wang, 2012). Additionally, an IPO process is costly, as expenses related to the filing, roadshows, and organizational transformation occur (Helbing et al., 2019). Withdrawing an IPO means that these expenses are not offset by any proceeds. Also, withdrawing from an IPO can be associated with bad publicity and a potential weakening of a firm's growth prospects (Latham & Braun, 2010). It is the board's decision to continue or withdraw an IPO. Financial expertise provides directors with the relevant knowledge about an IPO process and qualifies them to determine an appropriate valuation for the IPO firm. Therefore, directors with financial expertise are potentially better suited to decide whether completing or withdrawing the offering is best for the issuing firm.

Most firms that withdraw their IPO blame unfavorable market conditions, and indeed, research finds that the market environment is a valid determinant of IPO withdrawal (Helbing et al., 2019; Lowry, 2003; Mayur, 2018). Thus, it is possible that directors with financial expertise are better suited to observe capital market movements and make superior decisions about the timing of the offering. However, Helbing et al. (2019) also unveil that corporate governance characteristics, such as board independence and CEO-duality, are significantly associated with the probability of IPO withdrawal. They conclude that investors perceive these governance characteristics as positive because better governance limits future agency issues. Additionally, weak corporate governance structures increase the likelihood of failure and involuntary delisting of newly publicly listed firms (Djerbi & Anis, 2015). As financial expertise is generally a positive governance characteristic, it should favorably affect investors' assessments of the issuer and reduce the probability that investor demand does not meet the issuer's expectations. In summary, a higher ratio of financial experts on the board should therefore also be associated with a lower probability of IPO withdrawal.

H2: The board's financial expertise is negatively associated with the probability of IPO withdrawal.

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[2] Some companies conduct a "dual track" approach and simultaneously consider a trade sale or private placement during an IPO process (Helbing et al., 2019). I analyze the robustness of my findings to excluding (including) these "dual track" IPOs in my empirical analysis.

3. DATA AND METHODOLOGY

3.1. Data collection

I collect a sample of 617 IPOs that were issued at the NYSE or NASDAQ between January 2014 and December 2017 from the Thomson Reuters SDC database. In line with the empirical IPO literature (Bajo & Raimondo, 2017; Ferdous, Withanalage, & Zaman, 2021; Loughran & Ritter, 2002), I exclude real estate investment trusts (REITs), Unit Offerings, American Depositary Shares (ADS), offerings with an offer price below 5$, and financial firms (with SIC codes between 6000 and 6999) from the sample and end up with a final sample size of 414 IPOs. I manually collect the characteristics of the board of directors from the S-1 filings and complement the data with information from Bloomberg and LinkedIn. Industry returns are obtained from Kenneth

French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html) and firm age data is taken from Jay Ritter's website (https://site.warrington.ufl.edu/ritter/ipo-data/). Company and issue-related data is obtained from Thomson Reuters and verified with the data from the S-1 filings, which are retrieved from EDGAR. I conduct the same procedure for withdrawn IPOs in the period 2014–2017 and collect data on 85 withdrawn IPOs.

Table 1 shows the sample distribution over key industries of the SIC classification code. Withdrawn and completed IPOs are distributed similarly. Within the manufacturing industry, firms producing pharmaceutical products account for 63% of the industry group. Many of these companies did not generate any revenue at the time of the IPO. Ninety (90) of 134 firms located in the service industry are related to software products.

Table 1. Industry distribution of sample firms

SIC Codes	Industry name	Withdrawn	%	Successful	%	Total	%	Avg. UP
10–14	Mining	7	8.2	19	4.6	26	5.2	2.65%
15–17	Construction	1	1.2	5	1.2	6	1.2	5.76%
20–39	Manufacturing	45	52.9	215	51.9	260	52.1	12.95%
40–49	Transp., comm., utilities	8	9.4	20	4.8	28	5.61	7.80%
50–51	Wholesale trade	1	1.2	9	2.2	10	2.0	6.44%
52–59	Retail trade	3	4.7	31	7.5	35	7.0	24.30%
70–89	Services	19	22.4	115	27.8	134	26.9	18.31%
Final sample size		84	100	414	100	499	100	

Note: All continuous variables are winsorized at the 1st and 99th percentiles.

3.2. Variable definition

Following prior literature on IPOs, underpricing is computed as the percentage difference between the closing price of the first trading day and the offer price (Bajo & Raimondo, 2017; Butler, O'Connor Keefe, & Kieschnick, 2014). To capture the board's financial expertise, I apply the SEC rules for financial experts and use the percentage of directors with financial expertise on the board as an independent variable which is in line with prior research (Badolato, Donelson, & Ege, 2014; DeFond et al., 2005).

Butler et al. (2014) analyze the determinants of IPO underpricing and find 15 robust and meaningful variables that explain the level of underpricing. I follow Butler et al. (2014) and control for the list of variables they identify[3]. Additionally, I account for firm age, the lockup period, Big 4 auditors, venture capital financing, classification as a spinoff, and other board characteristics. For the analysis of IPO withdrawals, I also include a dummy variable that indicates that debt payment is the intended primary use of proceeds (Busaba, Benveniste, & Guo, 2001)[4]. All variables with their respective descriptions are displayed in Table 2.

3.3. Descriptive statistics

The descriptive statistics in Table 3 shows an average underpricing of 16.04% (16.68% without winsorizing), which is just slightly below the level of underpricing of 16.7% between 2001 and 2020 reported by Jay Ritter on his website. Thus, the sample is representative of the average IPO market of the past two decades. Approximately a third of the directors in this sample are financial experts. However, the ratio of financial experts for completed IPOs is significantly higher than the ratio for withdrawn IPOs (0.319 vs. 0.274, p = 0.034), which is largely due to outside directors with financial expertise (0.369 vs. 0.304, p = 0.009). There are 11 companies, which have no financial expert on their board. To comply with the SEC rules regarding the mandatory financial expert on the audit committee, these companies have a financial expert among their director nominees. Approximately 75% of directors are outside directors and 8.2% are female. Two hundred and forty-eight (248) firms in this sample are backed by a venture capitalist at the time of their IPO, with 220 representing successful IPOs and 28 withdrawn IPOs (0.531 vs. 0.333, p = 0.001). In contrast, 107 of the completed and 30 of the withdrawn IPOs are classified as spinoffs (0.258 vs. 0.357, p = 0.067)[5].

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[3] Butler et al. (2014) identify Ln of firm sales, offer price revision, Ln of news stories, total liabilities to assets ratio, investment bank market share, average underpricing in previous 30 days, average offer price revision in previous 30 days, prior 30 day CRSP EW index, Ln of one plus the ratio of secondary shares retained to shares offered, offer revision from original filing date when negative, Ln of industry market value to sales ratio, Ln of the offer price to sales ratio, prior 30 day industry return, prior 30 day standard deviation of industry return, and the prior 30 day NASDAQ return. I drop the natural logarithm of sales from my regressions, as the variance inflation factor significantly exceeds the critical value of 10 (O'brien, 2007) due to the high correlation with the offer price to sales ratio.
[4] For the analysis of IPO withdrawals, the following variables are not included in the probit regressions as they are not available for IPO withdrawals: offer price revision, secondary shares, offer price revision when negative, offer price to sales.

[5] The SDC database classifies spinoffs as the initial public offering of shares by a company representing ownership in a division or subsidiary, which will trade separately from its parent. IPOs are classified as spinoffs when the parent owns at least 50% of the issuer before the issue. Spinoff classification was reviewed by manually checking the ownership structure in the S-1 filings.

Table 2. Variable descriptions

Variables	Description
Underpricing	Difference between the first-day closing price and the offer price divided by the offer price
Ratio of financial experts	Percentage of financial experts (SEC definition) on the board at the time of the IPO
Ratio of financial experts (inside directors)	Percentage of financial experts (SEC definition) among inside directors on the board at the time of the IPO
Ratio of financial experts (outside directors)	Percentage of financial experts (SEC definition) among outside directors on the board at the time of the IPO
Average tenure	Average years of service of all directors on the board at the time of the IPO
Other directorships	Average number of other board directorships at for-profit companies in the same industry held by the directors at the time of the IPO
Ratio of outside directors	Percentage of outside directors
CEO-Chairman duality	Dummy variable equal to 1 if the CEO is also Chairman of the board
Board size	Total number of directors
Ratio of women	Percentage of female directors
Avg. age of directors	Average age of all directors on the board
Big 4	Dummy variable equal to 1 if the issuer is audited by Big 4 auditor
Lockup period	Number of days insiders are prevented from selling shares
Firm age	Number of years between founding and initial public offering of the firm
Offer price revision	Deviation of the offer price from the middle of the original filing range in %
News stories	Natural logarithm of 1+ number of news stories in the 6 months prior to the IPO; the number of news is retrieved from LexisNexis US News and Wire Database
Liabilities to assets	The ratio of total liabilities to total assets from the last full-year income statement
Investment bank ranking	Investment bank ranking is the updated Carter and Manaster's (1990) investment bank ranking
Avg. underpricing prior 30 days	Average IPO first trading day return in the 30 days prior to the IPO
Avg. offer price revision prior 30 days	Average offer price revision of IPOs in the 30 days prior to the IPO
CRSP performance	CRSP equal-weighted index return in the 30 days prior to the issue date
Secondary shares	Natural logarithm of 1+ secondary shares offered divided by shares outstanding
Offer price revision neg.	Equals offer price revision if offer price revision < 0; otherwise = 0
MV/Sales S&P 1000	Natural logarithm of the average market value to sales ratio of S&P 1000 firms in the same FF-industries in the 12 months prior to the IPO
Offer price to sales	Natural logarithm of offering price multiplied with shares outstanding over sales
FF industry return	Prior 30 days Fama-French industry return
FF industry return STD	Standard deviation of prior 30 days Fama-French industry return
NASDAQ performance	Prior 30 days NASDAQ return
VC-Financing	Dummy variable equal to 1 if the issuer is backed by a VC
Spinoff	Dummy variable equal to 1 if IPO is a spinoff or buyout.
Debt payment	Dummy variable equal to 1 if debt payment is the primary use of proceeds

Table 3. Descriptive statistics

Variables	Completed IPOs		Withdrawn IPOs		p-value of compl. vs. withdr. IPO
	Mean	Std. Dev.	Mean	Std. Dev.	
Underpricing	15.855	28.976			
Ratio of financial experts	0.319	0.177	0.273	0.169	0.034
Ratio of financial experts (inside directors)[1]	0.126	0.296	0.170	0.355	0.245
Ratio of financial experts (outside directors)[2]	0.369	0.204	0.304	0.181	0.009
Avg. board tenure (years)	4.014	2.381	4.118	2.547	0.738
Other directorships	0.768	0.757	0.567	0.732	0.029
Ratio of outside directors	0.764	0.195	0.718	0.245	0.200
CEO chairman duality	0.319	0.467	0.262	0.442	0.298
Board size	6.771	2.088	6.381	2.512	0.129
Ratio of women	0.081	0.112	0.074	0.103	0.603
Avg. age of directors	53.930	5.475	54.778	6.251	0.195
Big 4	0.785	0.411	0.690	0.465	0.063
Lockup period (days)	179.64	12.434	181.131	22.553	0.395
Firm age (years)	15.635	18.489	14.920	15.833	0.729
Offer price revision	-0.039	0.138			
News stories	2.016	0.979	2.029	1.037	0.929
Liabilities to assets	1.172	2.456	2.229	4.731	0.003
Investment bank ranking[3]	7.892	2.024	7.203	2.621	0.025
Average underpricing	20.400	13.066	18.252	13.265	0.167
Average offer price revision	-0.025	0.062	-0.027	0.075	0.768
CRSP performance	0.895	2.553	0.525	2.648	0.227
Secondary shares	1.334	0.485			
Offer price revision negative	-0.070	0.098			
MV/Sales S&P 1000	0.991	0.485	0.938	0.460	0.363
Offer price to sales	10.951	4.579			
FF industry return	0.916	5.773	-0.947	6.060	0.008
FF industry return STD	1.148	0.447	1.22	0.472	0.184
NASDAQ performance	1.245	3.066	0.246	3.508	0.008
Debt payment	0.235	0.021	0.333	0.474	0.058
VC-Financing	0.531	0.500	0.333	0.474	0.001
Spinoff	0.258	0.438	0.357	0.482	0.067

Note: [1]Based on 404 completed and 83 withdrawn IPOs due to missing data.
[2]Based on 396 completed and 78 withdrawn IPOs due to missing data.
[3]P-value based on Chi-square test as the investment bank ranking is a categorical variable.

4. RESULTS

4.1. Multivariate regression analysis

Table 4 presents the results of the OLS regressions. In contrast to Model 1, Model 2 introduces industry and year dummies, while Model 3 shows the effect of financial expertise for inside and outside directors separately.

The results show a significant negative association between the ratio of financial experts and the underpricing of initial public offerings (-15.402, p = 0.024 for Model 1; -17.619, p = 0.009 for Model 2). The average board size for completed IPOs in his sample is 6.77. Thus, one additional director with financial expertise on the board can reduce underpricing by approximately 2.27% to 2.6%[6]. As the average underpricing is 16.04%[7], the results are also economically significant. Therefore, the results suggest that financial expertise equips directors with the necessary knowledge to strengthen the issuer's position during the IPO process and serves as a positive signal to potential investors, leading to less underpricing.

Inside and outside directors generally have different roles on the board, also during an IPO process. While inside directors are part of the management team and are mainly responsible for the operational activities during an IPO (Latham & Braun, 2010), outside directors advise the issuer on important aspects of the IPO process (Bertoni et al., 2014; Westenberg, 2013). Thus, I also analyze whether the effect of financial expertise is different for inside and outside directors. Model 3 of Table 4 shows that the ratio of financial experts among outside directors is driving the results (-15.218, p = 0.010), as the ratio of financial experts among inside directors, although negatively associated with underpricing, is not statistically significant (-3.732, p = 0.209). Thus, the results suggest that outside directors with financial expertise provide important advising to the issuer and serve as a valid signal to potential investors, presumably because of the high relevance of financial expertise for the board's monitoring activities. Overall, I find support for *H1*.

Concerning the control variables, I find a positive and statistically significant association of offer price revision, lockup period, investment bank ranking, and Fama-French industry return with the level of underpricing. Additionally, offer price revision when negative has a negative and statistically significant association with underpricing. These results are in line with Butler et al. (2014).

4.2. Quantile regressions analysis

Whereas OLS only estimates the average relationship between the dependent and independent variables (i.e., conditional mean), quantile regression results in estimates for specific quantiles of the dependent variable (Conyon & He, 2017; Koenker & Bassett, 1978, 1982). Above that, quantile regression is more robust to outliers and requires fewer assumptions about the conditional distribution of the dependent variable. As the distribution of the level of underpricing is positively skewed and multimodal, quantile regression is superior to basic OLS. Also, quantile regressions can be applied in corporate governance research to demonstrate that governance characteristics have different effects on the dependent variable across the distribution of the dependent variable. For example, Ramdani and van Witteloostuijn (2010) show that CEO-duality and board independence have different effects across the performance distribution of firms. They document a positive effect of board independence and CEO duality on firm performance for the average-performing firms, but not for low- or high-performing firms[8]. Conyon and He (2017) demonstrate that the beneficial effect of female directors on the board increases in high-performing firms compared to low-performing firms. Hence, quantile regression can also be used for a comprehensive analysis of the relationship between the board's financial expertise and the level of underpricing.

I employ the regression design of Model 2 from Table 4 for the quantile regressions. Figure 1 displays the effect of board financial expertise for the 20th, 40th, 60th, and 80th percentiles of the underpricing distribution. The dashed line presents the estimated coefficient from OLS. Table 5 provides the coefficients and p-values for the 20th, 40th, 60th, and 80th percentiles.

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[6] These percentages are calculated as follows: on average, the board size is 6.77 directors. Thus, one board director with financial expertise equals 14.77%. The beta coefficient of financial expertise is -15.402 for Model 1 and -17.619 for Model 2. Thus, one additional director with financial expertise results in a reduction of the level of underpricing of 14.77% * -15.402 (-17.619) = -2.27 (-2.6).

[7] The level of underpricing ranges from -27.4% to 147.06% (from -41.08% to 217% without winsorizing).

[8] Because quantile regression offers a multidimensional view of the relationship between the dependent and independent variables, it has been widely applied in the economic literature. Further illustrative examples are Chen and Huang (2011) and Gallego-Álvarez and Ortas (2017). Ramdani and van Witteloostuijn (2010) provide figures that illustratively explain the differences between OLS and quantile regression on page 616.

Table 4. The association of the ratio of financial experts on the board and underpricing

Variables	Model 1	Model 2	Model 3
Ratio of financial experts	-15.402**	-17.619***	
	(0.024)	(0.009)	
Ratio of financial experts (inside directors)			-3.732
			(0.209)
Ratio of financial experts (outside directors)			-15.218**
			(0.010)
Avg. board tenure (years)	0.256	0.342	0.606
	(0.645)	(0.537)	(0.305)
Other directorships	-2.206	-1.844	-2.188
	(0.377)	(0.470)	(0.416)
Ratio of outside directors	10.720	9.807	9.548
	(0.102)	(0.146)	(0.499)
CEO chairman duality	3.556	4.158	4.287
	(0.226)	(0.164)	(0.176)
Board size	-0.416	-0.435	-0.556
	(0.520)	(0.515)	(0.524)
Ratio of female directors	-6.724	-2.893	-0.418
	(0.526)	(0.794)	(0.971)
Avg. age of directors (years)	0.373	0.403	0.432
	(0.119)	(0.107)	(0.130)
Big 4	-3.941	-3.354	-4.469
	(0.197)	(0.249)	(0.142)
Lockup period	0.297*	0.287*	0.284*
	(0.061)	(0.060)	(0.050)
Firm age	0.012	0.009	0.011
	(0.788)	(0.865)	(0.837)
Offer price revision	215.819***	214.231***	218.937***
	(< 0.001)	(< 0.001)	(< 0.001)
News stories	-0.275	-0.005	-0.422
	(0.826)	(0.997)	(0.768)
Liabilities to assets	-0.117	-0.108	0.006
	(0.796)	(0.822)	(0.992)
Investment bank ranking	1.513**	1.557**	1.733***
	(0.010)	(0.012)	(0.008)
Avg. underpricing prior 30 days	0.096	0.047	0.050
	(0.437)	(0.704)	(0.704)
Avg. offer price revision prior 30 days	-29.833	-1.416	3.848
	(0.312)	(0.963)	(0.906)
CRSP performance	0.504	0.213	0.329
	(0.608)	(0.831)	(0.749)
Secondary shares	2.733	1.939	1.631
	(0.300)	(0.485)	(0.600)
Offer price revision neg.	-201.025***	-201.956***	-203.885***
	(< 0.001)	(< 0.001)	(< 0.001)
MV/Sales S&P 1000	1.610	5.928	6.569*
	(0.571)	(0.119)	(0.099)
Offer price to sales	0.259	0.588	0.763
	(0.539)	(0.253)	(0.147)
FF industry return	0.886***	0.928***	0.980***
	(0.007)	(0.005)	(0.005)
FF industry return STD	-5.539*	-2.525	-0.344
	(0.069)	(0.451)	(0.925)
NASDAQ performance	-1.063	-0.640	-0.729
	(0.186)	(0.436)	(0.397)
VC-Financing	7.326**	7.360*	6.593*
	(0.042)	(0.052)	(0.097)
Spinoff	2.768	3.577	3.324
	(0.425)	(0.302)	(0.381)
Constant	-97.073*	-89.801**	-93.860***
	(0.050)	(0.005)	(0.005)
Year dummies	No	Yes	Yes
Industry dummies	No	Yes	Yes
N	414	414	388
R²	35.12	37.12	37.71

*Note: *p < 0.10; **p < 0.05; ***p < 0.01.*

Figure 1. Quantile regression analysis
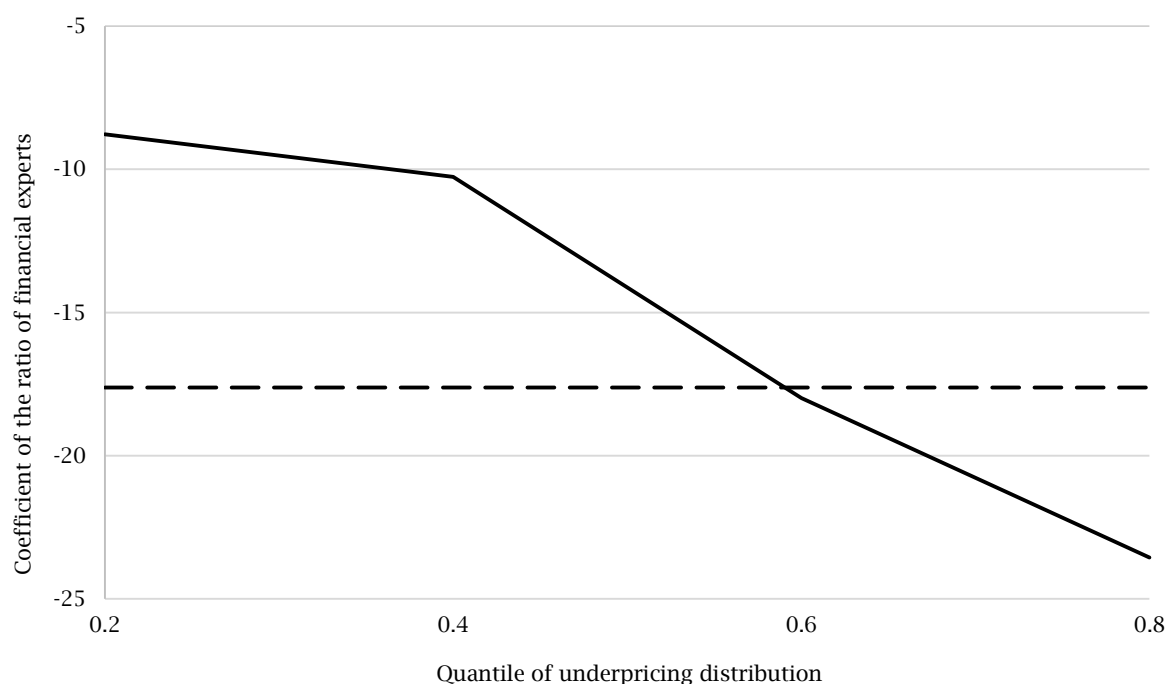
Table 5. Quantile regression results (Part 1)

Variables	20th	40th	60th	80th
Ratio of financial experts	-8.782**	-10.272***	-17.988***	-23.557**
	(0.026)	(0.008)	(0.004)	(0.032)
Avg. board tenure (years)	1.029***	0.826***	0.195	-0.099
	(0.010)	(0.003)	(0.686)	(0.910)
Other directorships	-1.943	-1.051	-0.908	0.361
	(0.170)	(0.486)	(0.600)	(0.926)
Ratio of outside directors	4.810	6.594	7.177	3.993
	(0.435)	(0.132)	(0.340)	(0.730)
CEO chairman duality	-2.600	1.416	5.432**	7.013**
	(0.127)	(0.382)	(0.031)	(0.048)
Board size	-0.107	0.165	-0.873	-0.710
	(0.846)	(0.669)	(0.104)	(0.433)
Ratio of female directors	-13.619**	-8.246	10.833	35.647**
	(0.019)	(0.408)	(0.352)	(0.044)
Avg. age of directors (years)	0.079	0.156	0.170	0.643
	(0.592)	(0.308)	(0.387)	(0.119)
Big 4	-2.677	-2.636	-0.922	-6.760
	(0.208)	(0.125)	(0.666)	(0.232)
Lockup period	-0.001	0.098	0.050	0.195
	(0.999)	(0.758)	(0.446)	(0.333)
Firm age	0.079	0.025	0.030	-0.028
	(0.592)	(0.403)	(0.432)	(0.698)
Offer price revision	146.300***	185.179***	196.123***	293.406***
	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
News stories	0.678	-0.350	-0.545	-0.362
	(0.394)	(0.615)	(0.591)	(0.861)
Liabilities to assets	0.016	-0.139	-0.227	0.008
	(0.970)	(0.346)	(0.829)	(0.994)
Investment bank ranking	1.283***	1.294***	1.637***	2.005
	(0.001)	(0.009)	(0.001)	(0.226)
Avg. underpricing prior 30 days	0.182**	0.170	0.168	0.251
	(0.037)	(0.070)	(0.121)	(0.207)
Avg. offer price revision prior 30 days	-50.804**	-26.826	-28.520	-16.946
	(0.020)	(0.182)	(0.262)	(0.725)
CRSP performance	1.057*	0.286	0.841	1.365
	(0.089)	(0.634)	(0.282)	(0.402)
Secondary shares	1.473	1.534	1.974	-1.409
	(0.300)	(0.313)	(0.370)	(0.751)

Table 5. Quantile regressions results (Part 2)

Variables	20th	40th	60th	80th
Offer price revision neg.	-149.303***	-180.783***	-185.488***	-283.129***
	(< 0.001)	(< 0.001)	(< 0.001)	(< 0.001)
MV/Sales S&P 1000	0.196	4.608**	7.384**	8.975
	(0.940)	(0.032)	(0.018)	(0.131)
Offer price to sales	0.368	0.196	0.293	0.496
	(0.147)	(0.440)	(0.343)	(0.517)
FF industry return	0.715***	0.487***	0.684***	0.999**
	(< 0.001)	(0.002)	(< 0.001)	(0.020)
FF industry return STD	-3.645*	-2.164	-4.566*	-4.658
	(0.126)	(0.309)	(0.059)	(0.393)
NASDAQ performance	-1.310**	-0.538	-1.051	-1.406
	(0.025)	(0.293)	(0.127)	(0.260)
VC-Financing	-0.470	2.872	6.284*	7.288
	(0.816)	(0.163)	(0.043)	(0.162)
Spinoff	-2.488	-0.032	1.357	9.086**
	(0.219)	(0.984)	(0.576)	(0.045)
Constant	-24.924	-49.325	-28.960	-72.392
	(0.824)	(0.402)	(0.107)	(0.128)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
N	414	414	414	414
Pseudo R²	16.52	18.98	23.45	28.85

The coefficient of financial expertise rises in magnitude with the level of underpricing and is statistically significant for the four percentiles. Initially, it might sound counterintuitive that the coefficient is higher in magnitude for higher levels of underpricing, as there is generally a negative effect of financial expertise on underpricing. However, higher percentiles capture highly underpriced IPOs (e.g., 80th percentile = 30.27% underpricing). The level of underpricing is related to investor's ex-ante uncertainty about the value of the issuer (Beatty & Ritter, 1986; Clarkson, 1994). Thus, IPOs with a higher level of underpricing presumably have a higher level of investor uncertainty about the value of the issuer. Consequently, for these IPOs that face higher levels of investor uncertainty, the signaling effect of directors with financial expertise is more important and should have a stronger impact on investor's assessment, resulting in higher coefficients for the upper percentiles. In contrast, for IPOs with low levels of underpricing, the coefficient of financial expertise is smaller in magnitude. Accordingly, for IPOs with low levels of investor uncertainty, the signaling effect of director financial expertise is less important and has a smaller effect on the level of underpricing. This seems plausible because if there is only little uncertainty about the value of the issuer, then there is less margin for the influence and the signaling effect of director financial expertise. Vice versa, if there is high uncertainty about the value of the issuer, director financial expertise has a potentially stronger impact on investor's decision as there might be fewer signals that convey the issuer's quality.

4.3. Probit regression analysis of IPO withdrawals

In the sample, 17%[9] percent of all registered IPOs were withdrawn at some point in the process. Table 6 shows the results from probit regressions that estimate the effect of the independent variables on the probability of IPO withdrawal, accompanied by marginal effects[10]. Director financial expertise has a negative and statistically significant association with the probability of IPO withdrawal (-1.318, p = 0.009). *Ceteris paribus*, a 10% increase in financial experts on the board reduces the probability of withdrawal by about 2.67%. Again, this result is driven by outside directors with financial expertise, as inside directors with financial expertise are not significantly associated with the probability of IPO withdrawal (-1.466, p = 0.001 for outside directors; -0.105, p = 0.697 for inside directors). Consequently, these results also suggest that outside directors with financial expertise are useful advisers to the issuer during the IPO process and serve as a valid signal that conveys the issuer's value to potential investors. Overall, I find support for *H2*[11].

Additionally, the liabilities to assets ratio and the performance of the CRSP index are positively and significantly associated with the probability of IPO withdrawal, while the average underpricing in the prior 30 days before the IPO and the NASDAQ performance is negatively and significantly associated with the probability of IPO withdrawal. The statistically significant coefficients of the CRSP performance and the NASDAQ performance confirm the importance of the timing of an IPO (Helbing et al., 2019; Mayur, 2018).

[9] This compares to 11.89% of Helbing et al. (2019) and 14.3% of Busaba et al. (2001).
[10] Marginal effects represent the effect of a one-unit change of the respective variable on the probability that the dependent variable takes the value of 1 (IPO withdrawal) given that all other independent variables are constant (Aldrich & Nelson, 1984; Helbing et al., 2019).
[11] My results continue to hold when I delete 17 observations of firms that were sold in an M&A transaction (indicating a dual-track approach) within 1 year after withdrawing their IPO.

Table 6. Probit-analysis of IPO withdrawal

Variables	Model 1		Model 2	
	Coefficient	Marg. Effect	Coefficient	Marg. Effect
Ratio of financial experts	-1.318***	-26.67%		
	(0.009)			
Ratio of financial experts (inside directors)			-0.105	-2.06%
			(0.697)	
Ratio of financial experts (outside directors)			-1.466***	-28.66%
			(0.001)	
Avg. board tenure (years)	0.008	0.16%	-0.009	-0.19%
	(0.805)		(0.789)	
Other directorships	-0.008	-0.15%	0.015	-0.29%
	(0.961)		(0.927)	
Ratio of outside directors	-0.213	-4.31%	0.474	9.26%
	(0.670)		(0.590)	
CEO chairman duality	-0.183	-3.71%	-0.155	-3.04%
	(0.303)		(0.401)	
Board size	0.019	0.37%	-0.014	-0.27%
	(0.695)		(0.806)	
Ratio of female directors	0.222	4.49%	0.276	5.39%
	(0.759)		(0.711)	
Avg. age of directors (years)	0.006	0.12%	0.013	0.25%
	(0.713)		(0.484)	
Big 4	-0.026	-0.53%	0.079	1.54%
	(0.901)		(0.733)	
Lockup period	0.002	0.04%	0.002	0.03%
	(0.713)		(0.744)	
Firm age	-0.004	-0.09%	-0.004	-0.07%
	(0.389)		(0.476)	
News stories	0.093	1.88%	0.128	2.51%
	(0.257)		(0.143)	
Liabilities to assets	0.056**	1.13%	0.075***	1.47%
	(0.022)		(0.004)	
Investment bank ranking	-0.052	-1.05%	-0.070	-1.37%
	(0.216)		(0.129)	
Avg. underpricing prior 30 days	-0.019**	-0.39%	-0.021**	-0.41%
	(0.022)		(0.017)	
Avg. offer price revision prior 30 days	2.338	47.30%	2.881	56.33%
	(0.236)		(0.186)	
CRSP performance	0.218***	4.42%	0.217***	4.24%
	(0.001)		(0.003)	
MV/Sales S&P 1000	0.148	-2.99%	0.128	2.50%
	(0.563)		(0.621)	
FF industry return	0.001	0.01%	0.010	0.19%
	(0.977)		(0.560)	
FF industry return STD	0.199	4.03%	0.279	5.47%
	(0.391)		(0.260)	
NASDAQ performance	-0.215***	-4.36%	-0.213***	-4.17%
	(< 0.001)		(0.001)	
Debt payment	0.334	6.76%	0.391*	7.65%
	(0.116)		(0.086)	
VC-Financing	-0.431*	-8.72%	-0.467	-9.13%
	(0.067)		(0.057)	
Spinoff	0.009	0.18%	0.015	0.29%
	(0.965)		(0.943)	
Constant	-0.024		0.573	
	(0.986)		(0.697)	
Year dummies	No		Yes	
Industry dummies	No		Yes	
N	497		464	
Pseudo R²	19.35		21.02	

*Note: *p < 0.10; **p < 0.05; ***p < 0.01.*

4.4. Additional analyses

I provide several analyses to examine the robustness of the results. First, this study uses a comprehensive set of control variables derived from Butler et al. (2014), who identify fifteen relevant determinants of IPO underpricing within their analysis of the IPO underpricing literature. The results are not sensitive to changes in the control variables. Second, many IPO-related studies exclude spinoffs and leveraged-buyouts (LBOs) (Bajo & Raimondo, 2017; Bradley, Gonas, Highfield, & Roskelley, 2009; Demers & Lewellen, 2003) due to their specific characteristics. The results remain largely unchanged when IPOs classified as spinoffs (includes LBOs in the sample) are excluded. Third, I use winsorized data for the regressions. This shows that the results are not driven by outliers. However, the results continue to hold if I use the data without winsorizing. Fourth, I examine the impact of an omitted variables bias by calculating the impact threshold for a confounding variable (ITCV) in accordance with Frank (2000). The ITCV calculates the minimum correlation required to invalidate the inference between dependent and independent variables.

For the coefficient of the ratio of financial experts in Model 2 from Table 4, the required threshold is 0.0365. Thus, an omitted variable would have to be at least correlated at ± 0.191 ($\sqrt{0.0365}$) with the ratio of financial experts and the level of underpricing to make the coefficient of the ratio of financial experts insignificant[12]. For the vast majority of the control variables, the product of the partial correlations with the ratio of financial experts and the level of underpricing does not reach the above-mentioned threshold. Hence, it is very unlikely that the results are seriously biased by an omitted variable.

A pertinent concern in empirical finance and corporate governance research is endogeneity. In this case, one can argue that high quality firms, that generally would experience less underpricing, attract (financial) expert directors so that the results are driven by a selection bias and cannot be attributed to the expertise of the directors. Other empirical finances and corporate governance papers use instrumental variables (IV) to address the issue of endogeneity (Bajo & Raimondo, 2017). However, Larcker and Rusticus (2010) and Jiang (2017) show that IV approaches often produce misleading results as the magnitude of the IV estimate strongly exceeds the uninstrumented estimate regardless of the expected direction of the bias — positive or negative. Above that, identifying appropriate instruments is also fairly difficult. Still, some studies use an instrumental variable approach to address the endogeneity issue for financial expert directors. Ettredge et al. (2020) use the industry average director financial expertise as an instrument, while Badolato et al. (2014) employ a dummy variable that is equal to one if a firm's headquarter is in one of the ten largest metropolitan areas in the United States. However, in my sample, both the industry average director financial expertise and the metro area dummy variable are not significantly associated with the ratio of financial experts and thus do not qualify as an appropriate instrumental variable. Thus, I am not able to employ an instrumental variable approach to address endogeneity concerns.

5. CONCLUSION

The board of directors is mainly responsible for leading an issuer through the IPO process and potential investors examine the composition of the board prior to the IPO to assess the quality and prospects of the issuing firm (Baker & Gompers, 2003; Bertoni et al., 2014). Thus, the quality of the issuer's corporate governance is an important factor during an IPO. In this sense, financial expertise potentially equips directors with relevant knowledge to engage in the IPO process more effectively and can also serve as a positive signal certifying the issuer's quality to investors.

Therefore, I examine the effect of director financial expertise on the level of IPO underpricing and the probability of IPO withdrawal. The sample consists of 414 completed and 85 withdrawn IPOs filed at NYSE or NASDAQ from 2014–2017. I find that the ratio of financial experts on the board is negatively associated with IPO underpricing. The results are driven by financial experts among outside directors, suggesting that outside board members with financial expertise provide useful advising to the issuer during the IPO process and serve as a positive signal to potential investors. Exploratory results of quantile regressions show that the effect of financial expertise is strongest for issues with higher levels of ex-ante-uncertainty. The analysis of IPO withdrawals reveals that the financial expertise of the board is also associated with a reduced probability of IPO withdrawal, which underlines the value of financial experts on the board for the whole IPO process.

This study contributes to the IPO and corporate governance literature. Primarily, the results emphasize that directors with financial expertise are essential for firms that conduct an IPO. As this study considers both completed and withdrawn IPOs, it provides a comprehensive analysis of the association between director financial expertise and IPO outcomes. Thus, this study extends existing results on the effect of director financial expertise on IPO underpricing (Ettredge et al., 2020; Judge et al., 2015) and also documents that director financial expertise is negatively associated with the probability of IPO withdrawal. Above that, this study contributes to the IPO literature from a methodological perspective as it is among the first to employ quantile regressions in the IPO context. I demonstrate that directors with financial expertise are most valuable for issuances that have higher levels of uncertainty surrounding the offering. From a practical point of view, firms preparing for an IPO should implicitly consider financial expertise when (re)appointing directors to the board.

While this study offers important contributions, it also has its limitations. The number of IPOs and the level of underpricing are subject to specific market conditions which change over time (Loughran & Ritter, 2004; Pástor & Veronesi, 2005). Although the years 2014–2017 can be considered as moderate IPO years that capture the average IPO market of the last two decades, the sample covers only four years and shows neither typical characteristics of cold nor hot market conditions. Also, the natural focus of this paper is on companies that go public, which are smaller and more dynamic than the average listed company. Furthermore, a large portion of the sample belongs to either the biotech or software industry. Thus, one should be careful in generalizing these findings for other firms or IPO market conditions. Although quantitative research can prove the beneficial effect of director financial expertise in the IPO context, it does not directly unveil through which channels directors affect IPO outcomes. As the IPO process is complex and highly dynamic, future research could take a more in-depth view of the role of the board of directors during an IPO on a qualitative level.

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[12] For the probit regression (Model 1 from Table 6), the threshold is 0.0274. An omitted variable would have to be at least correlated at ± 0.165 ($\sqrt{0.0274}$) with the ratio of financial experts and the level of underpricing to make the coefficient of the ratio of financial experts insignificant. Only one control variable reaches this threshold. Hence, also for the probit regressions, it is very unlikely that the results are seriously biased by an omitted variable.

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APPENDIX

Table A.1. Completed IPO summary statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Underpricing	414	15.855	28.976	-27.4	147.06
Board characteristics					
Ratio of financial experts	414	0.319	0.177	0	0.833
Ratio of financial experts (inside directors)	405	0.126	0.296	0	1
Ratio of financial experts (outside directors)	397	0.369	0.204	0	1
Avg. board tenure (years)	414	4.014	2.381	0.3	12.5
Other directorships	414	0.768	0.757	0	3
Ratio of outside directors	414	0.764	0.195	0	1
CEO chairman duality	414	0.319	0.467	0	1
Board size	414	6.771	2.088	1	12
Ratio of women	414	0.081	0.112	0	0.429
Avg. age of directors	414	53.930	5.475	35.75	68
Control variables					
Big 4	414	0.785	0.411	0	1
Lockup period (days)	414	179.640	12.434	60	360
Firm age (years)	414	15.635	18.489	1	116
Offer price revision	414	-0.039	0.138	-0.385	0.214
News stories	414	2.016	0.979	0	4.875
Liabilities to assets	414	1.172	2.456	0.034	22.896
Investment bank ranking	414	7.892	2.024	0	9.001
Average underpricing	414	20.400	13.066	-3.650	54.231
Average offer price revision	414	-0.025	0.062	-0.200	0.083
CRSP performance	414	0.895	2.553	-5.613	8.985
Secondary shares	414	1.334	0.485	0.000	2.658
Offer price revision negative	414	-0.070	0.098	-0.286	0
MV/Sales S&P 1000	414	0.991	0.485	-0.350	1.643
Offer price to sales	414	10.951	4.579	4.623	20.307
FF industry return	414	0.916	5.773	-15.331	16.079
FF industry return STD	414	1.148	0.447	0.556	2.765
NASDAQ performance	414	1.245	3.066	-6.456	10.597
VC-Financing	414	0.531	0.500	0	1
Spinoff	414	0.258	0.438	0	1

Note: This table reports the summary statistics for the sample of 414 completed IPOs in the period 2014–2017. All continuous variables are winsorized at the 1st and 99th percentiles.

Table A.2. IPO withdrawals summary statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
Board characteristics					
Ratio of financial experts	84	0.273	0.169	0	0.833
Ratio of financial experts (inside directors)	83	0.170	0.355	0	1
Ratio of financial experts (outside directors)	78	0.304	0.181	0	0.727
Average board tenure (years)	84	4.118	2.547	0.300	12.500
Other directorships	84	0.567	0.732	0	3
Ratio of outside directors	84	0.718	0.245	0	1
CEO chairman duality	84	0.262	0.442	0	1
Board size	84	6.381	2.512	1	12
Ratio of female directors	84	0.074	0.103	0	0.429
Avg. age of directors	84	54.778	6.251	35.75	68
Control variables					
Big 4	84	0.690	0.465	0	1
Lockup period (days)	84	181.131	22.553	90	365
Firm age (years)	84	14.92	15.833	1	88
News stories	84	2.029	1.037	0	4.875
Liabilities to assets	84	2.229	4.731	0.034	22.896
Investment bank ranking	84	7.203	2.621	0	9.001
Average underpricing	84	18.252	13.265	-3.65	54.231
Average offer price revision	84	-0.027	0.075	-0.200	0.083
CRSP performance	84	0.525	2.648	-5.613	8.985
MV/Sales S&P 1000	84	0.938	0.460	-0.350	1.512
FF industry return	84	-0.947	6.060	-15.331	16.079
FF industry return STD	84	1.220	0.472	0.573	2.765
NASDAQ performance	84	0.246	3.508	-6.456	10.597
Debt payment	84	0.333	0.474	0	1
VC-Financing	84	0.333	0.474	0	1
Spinoff	84	0.357	0.482	0	1

Note: This table reports the summary statistics for the sample of 85 withdrawn U.S. IPOs in the period 2014–2017.

Table A.3. Correlation matrix completed IPOs (Part 1)

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
1. Underpricing	1														
2. Ratio of financial experts	-0.097**	1													
3. Average tenure	0.060	-0.044	1												
4. Other directorships	0.010	-0.219***	-0.114**	1											
5. Ratio of outside directors	0.091*	0.030	0.071	0.222***	1										
6. CEO Chairman duality	0.064	0.061	0.0437	-0.110**	-0.154**	1									
7. Board size	0.063	-0.030	0.135**	0.138**	0.616***	-0.094*	1								
8. Ratio of women	-0.016	-0.085	0.030	0.127**	0.203***	-0.016	0.179***	1							
9. Avg. age of directors (years)	0.004	-0.190***	0.264***	0.050	0.020	-0.081	0.040	0.017	1						
10. Big 4	0.073	-0.057	0.030	0.068	0.175***	-0.021	0.185***	0.096*	-0.121**	1					
11. Lockup period	0.158	-0.025	0.114*	-0.005	0.008	-0.068	-0.003	-0.007	0.059	0.041	1				
12. Firm age	-0.058	0.130***	0.076	-0.305***	-0.024	-0.109*	0.042	-0.136***	0.064	0.063	0.017	1			
13. Offer price revision	0.409***	0.004	-0.076	-0.014	0.014	0.042	0.019	0.006	-0.116**	-0.004	0.039	-0.092*	1		
14. News stories	0.033	0.037	0.043	0.030	0.057	0.100**	0.117*	0.039	-0.140***	0.156***	0.047	0.116**	0.028	1	
15. Liabilities to assets	-0.068	-0.095	0.094*	-0.031	-0.123**	-0.025	-0.079	0.031	0.126*	-0.236***	-0.036	-0.054	-0.064	-0.084*	1
16. IB market share	0.152***	0.077	0.010	0.029	0.166***	-0.038	0.231***	-0.029	-0.181***	0.462***	0.010	0.155***	0.101**	0.185***	-0.332***
17. Avg. UP prior 30 days	0.125**	0.001	0.011	-0.066	-0.092*	-0.040	-0.005	-0.098**	0.026	0.085*	0.009	0.001	0.179***	-0.098**	-0.004
18. Avg. OP revision prior 30 days	0.074	-0.015	-0.003	-0.010	-0.071	-0.027	-0.019	-0.116**	0.050	-0.005	-0.011	-0.011	0.171***	-0.062	0.012
19. CRSP performance	0.034	0.099**	0.060	-0.084*	0.006	0.101*	-0.025	0.034	0.036	-0.065	0.117**	0.017	0.033	-0.018	-0.003
20. Secondary shares	0.154***	0.064	-0.005	-0.069	0.057	0.129**	0.060	0.080	-0.035	0.112*	0.070	0.028	0.218***	-0.009	-0.100**
21. Offer price revison neg	0.267***	-0.0003	-0.070	0.015	-0.006	0.028	0.014	0.022	-0.082*	-0.056	0.041	-0.085	0.925***	0.025	-0.039
22. MV/Sales S&P 500	0.108**	-0.233***	0.046	0.492***	0.141**	0.012	0.086*	0.072	0.087*	0.045	-0.022	-0.382***	0.069	0.047	0.034
23. Offer price to sales	0.0358	-0.266***	-0.275***	0.494***	0.098*	-0.035	0.037	0.084	0.064	-0.031	0.003	-0.411***	0.062	-0.077	0.126**
24. FF industry return	0.208***	0.059	0.055	-0.060	-0.045	0.00002	-0.028	-0.050	0.004	-0.003	0.062	-0.062	0.204***	-0.047	0.067
25. FF industry return STD	-0.152***	-0.168***	-0.116**	0.323***	0.092	-0.102*	0.048	0.022	0.083*	-0.002	-0.055	-0.160***	-0.230***	-0.005	0.105**
26. NASDAQ performance	0.043	0.087	0.023	-0.083*	-0.037	0.074	-0.087	-0.051	0.035	-0.087*	0.124**	0.007	0.075	-0.037	0.016
27. VC dummy	0.179***	-0.307***	0.129**	0.508***	0.278***	0.009	0.238***	0.152**	-0.052	0.157**	0.055	-0.362***	0.063	0.089*	-0.081
28. Spinoff dummy	-0.085	0.195***	-0.165***	-0.229***	-0.004	-0.084	-0.102*	-0.117*	-0.075	-0.013	-0.036	0.262***	0.133***	-0.009	0.020
29. Ratio of financial experts (inside directors)	-0.104**	0.427***	-0.027	-0.187***	-0.151***	0.044	-0.095*	-0.167***	-0.043	-0.140***	0.013	0.005	-0.021	-0.049	0.038
30. Ratio of financial experts (outside directors)	-0.049	0.844***	-0.013	-0.238***	-0.169***	0.063	-0.130**	-0.081	-0.143***	-0.047	-0.039	0.157***	0.034	0.011	-0.060

Table A.3. Correlation matrix completed IPOs (Part 2)

Variables	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*
1. Underpricing															
2. Ratio of financial experts															
3. Average tenure															
4. Other directorships															
5. Ratio of outside directors															
6. CEO Chairman duality															
7. Board size															
8. Ratio of women															
9. Avg. age of directors (years)															
10. Big 4															
11. Lockup period															
12. Firm age															
13. Offer price revision															
14. News stories															
15. Liabilities to assets															
16. IB market share	1														
17. Avg. UP prior 30 days	0.003	1													
18. Avg. OP revision prior 30 days	0.044	0.586***	1												
19. CRSP performance	-0.037	-0.158***	-0.134***	1											
20. Secondary shares	0.048	-0.010	-0.079	0.042	1										
21. Offer price revison neg	0.038	0.133***	0.156***	0.060	0.177***	1									
22. MV/Sales S&P 500	-0.101**	0.019	0.030	0.001	-0.015	0.053	1								
23. Offer price to sales	-0.220***	-0.016	0.060	-0.064	-0.091*	0.085	0.487***	1							
24. FF industry return	-0.051	0.102**	0.173***	0.426***	0.002	0.210***	0.054	0.080	1						
25. FF industry return STD	-0.084	-0.038	-0.152***	-0.144***	-0.112**	-0.219***	0.256***	0.374***	-0.194***	1					
26. NASDAQ performance	-0.055	-0.170***	-0.088	0.893***	0.030	0.091*	0.041	-0.039	0.485***	-0.186***	1				
27. VC dummy	0.086*	0.070	0.031	-0.079	-0.040	0.043	0.474***	0.366***	0.030	0.181***	-0.100**	1			
28. Spinoff dummy	0.127***	-0.077	-0.090*	0.020	0.002	-0.132***	0.236***	-0.262***	-0.104**	-0.104**	0.010	-0.474***	1		
29. Ratio of financial experts (inside directors)	-0.091*	-0.114**	-0.134***	0.075	-0.041	0.030	-0.129	-0.106**	-0.0005	-0.088*	0.087*	-0.235***	0.145***	1	
30. Ratio of financial experts (outside directors)	0.010**	0.055	0.033	0.080	0.097*	-0.003	0.190***	-0.246***	0.006	-0.154***	0.081	-0.301***	0.159***	0.044	1

*Note: This table presents Pearson correlations for the variables that are included in the IPO underpricing regressions. N = 414. *p < 0.10; **p < 0.05 ***p < 0.01.*

Table A.4. Correlation matrix IPO withdrawals (Part 1)

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
1. IPO withdrawal	1													
2. Ratio of financial experts	-0.095**	1												
3. Average tenure	0.015	-0.024	1											
4. Other directorships	-0.098**	-0.191***	-0.104**	1										
5. Ratio of outside directors	-0.084*	0.04	0.032	0.223***	1									
6. CEO Chairman duality	-0.047	0.052	0.039	-0.091**	-0.161***	1								
7. Board size	-0.068	-0.011	0.102**	0.122***	0.636***	-0.097**	1							
8. Ratio of women	-0.023	-0.064	-0.008	0.132***	0.188***	-0.039	0.159***	1						
9. Avg. age of directors (years)	0.058	-0.211***	0.277***	0.019	0.007	-0.013	0.037	-0.028	1					
10. Big 4	-0.084*	-0.05	0.041	0.088*	0.231***	-0.066	0.212***	0.109**	-0.140***	1				
11. Lockup period	0.038	-0.01	0.048	-0.007	0.011	-0.058	-0.001	0.018	0.081*	-0.026	1			
12. Firm age	-0.016	0.138***	0.0883**	-0.289***	0.007	-0.098**	0.063	-0.129***	0.061	0.086*	-0.01	1		
13. News stories	0.004	0.013	0.072	0.055	0.105**	0.079*	0.154***	0.031	-0.07	0.179***	0.004	0.145***	1	
14. Liabilities to assets	0.133***	-0.039	0.072	-0.064	-0.102**	-0.035	-0.092**	0.084	0.083*	-0.215***	-0.03	-0.069	-0.100**	1
15. IB market share	-0.120***	0.073	0.029	0.059	0.182***	-0.048	0.239***	-0.006	-0.205***	0.467***	-0.058	0.123***	0.165***	-0.365***
16. Avg. UP prior 30 days	-0.062	-0.028	-0.014	-0.062	-0.061	-0.025	0.024	-0.101**	0.012	0.072	0.05	0.033	-0.065	-0.066
17. Avg. OP revision prior 30 days	-0.013	-0.044	-0.012	-0.033	-0.047	-0.003	-0.001	-0.096**	0.04	0.013	0.012	0.011	-0.04	-0.065
18. CRSP performance	-0.504	0.08*	0.044	-0.064	0.021	0.072	-0.014	-0.031	0.027	-0.008	0.068	-0.027	0.0004	-0.044
19. MV/Sales S&P 500	-0.041	-0.208***	0.03	0.480***	0.116***	0.001	0.080*	0.060	0.087*	0.05	-0.02	-0.361***	0.049	0.068
20. FF industry return	-0.119***	0.082*	0.043	-0.046	0.014	0.007	0.014	-0.049	-0.014	0.034	0.042	-0.059	-0.052	0.007
21. FF industry return STD	0.06	-0.159***	-0.118***	0.286***	0.029	-0.073	-0.02	-0.008	0.083	-0.028	-0.070	-0.152***	0.007	0.075*
22. NASDAQ performance	-0.119***	0.087*	0.033	-0.058	-0.007	0.051	-0.062	-0.048	0.019	-0.011	0.043	-0.024	-0.14	-0.021
23. Debt dummy	0.085*	0.275***	-0.047	-0.283***	-0.027	-0.108**	-0.016	-0.115***	-0.125***	-0.001	-0.02	0.376***	-0.01	-0.092**
24. VC dummy	-0.149***	-0.281***	0.101**	0.505***	0.289***	-0.007	0.261***	0.163***	-0.046	0.175***	0.024	-0.341***	0.089**	-0.093**
25. Spinoff dummy	0.082*	0.153***	-0.136***	-0.215**	-0.003	-0.102**	-0.087*	-0.104**	-0.077*	0.029	-0.06	0.260***	0.018	0.003
26. Ratio of financial experts (inside directors)	0.044	0.401***	-0.005	-0.171***	-0.105**	-0.004	-0.07	-0.155***	-0.046	-0.090*	0.048	0.059	-0.04	0.005
27. Ratio of financial experts (outside directors)	-0.113**	0.848***	-0.012	-0.213***	-0.095**	0.08*	-0.083*	-0.055	-0.160***	-0.048	-0.03	0.142***	-0.006	0.024

Table A.4. Correlation matrix IPO withdrawals (Part 2)

Variables	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*
1. IPO withdrawal													
2. Ratio of financial experts													
3. Average tenure													
4. Other directorships													
5. Ratio of outside directors													
6. CEO Chairman duality													
7. Board size													
8. Ratio of women													
9. Avg. age of directors (years)													
10. Big 4													
11. Lockup period													
12. Firm age													
13. News stories													
14. Liabilities to assets													
15. IB market share	1												
16. Avg. UP prior 30 days	0.006	1											
17. Avg. OP revision prior 30 days	0.037	0.604***	1										
18. CRSP performance	0.009	-0.189***	-0.148***	1									
19. MV/Sales S&P 500	-0.091**	-0.016	0.001	0.001	1								
20. FF industry return	-0.009	0.069	0.136***	0.447***	0.035	1							
21. FF industry return STD	-0.07	-0.035	-0.133***	-0.148***	0.256***	-0.222***	1						
22. NASDAQ performance	0.002	-0.198***	-0.091**	0.893***	-0.035	0.511***	-0.190***	1					
23. Debt dummy	0.148***	-0.026	0.002	0.011	-0.388***	-0.05	-0.184***	0.009	1				
24. VC dummy	0.126***	0.069	0.021	-0.035	0.446***	0.033	0.140***	-0.055	-0.514***	1			
25. Spinoff dummy	0.145***	-0.073	-0.069	0.035	-0.219***	-0.048	-0.051	0.027	0.472***	-0.463***	1		
26. Ratio of financial experts (inside directors)	-0.09*	-0.047	-0.088*	0.024	-0.123**	0.012	-0.76	0.031	0.159***	-0.227***	0.147***	1	
27. Ratio of financial experts (outside directors)	0.08*	0.016	0.016	0.077	-0.161***	0.009	-0.151**	0.089*	0.251***	-0.278***	0.122***	0.02	1

*Note: This table presents Pearson correlations for the variables that are included in the IPO withdrawal regressions. N=497. *p < 0.10; **p < 0.05 ***p < 0.01.*