

Insiders and IPOs

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Abstract—This paper examines insider buying in IPOs and the association with IPO underpricing and price revisions. We find that insider participation is unassociated with IPO underpricing, but when disentangling venture capitalists and corporate partners, the latter is associated with lower IPO underpricing. On the contrary, venture capitalist participation is negatively associated with price revisions and remains robust when examining changes in venture capitalist participation in the bookbuilding period. This paper sheds light on the role of venture capitalists and corporate partners in the initial public offering process and contrasts past research considering IPOs as exit events.

Keywords—Initial public offering (IPO); Insider buying; Venture capital; Corporate partners; Certification; Underpricing; Price revision

I. Introduction

Several studies provide evidence that the opportunity cost of going public is directly related to the level of information asymmetry either between informed and uninformed investors [1] or between corporate insiders and public investors [2, 3]. Past empirical research has found evidence that firms can send signals to investors to indicate firm quality and reduce the degree of underpricing through third-party certification, such as hire a higher-quality underwriter [2, 4, 5, 6], or a reputable auditor [7, 8] can mitigate the information asymmetry through certification, thereby reducing the opportunity cost. Similar to underwriters and auditors, corporate partners can also be viewed as performing a similar validating function [9]. In contrast to certification by third-parties, the credibility of venture capitalists in certifying an IPO is conveyed both through their investment in reputational and monetary capital at stake [3, 10, 11]. Lin (1996) finds evidence for the certification role of large block shareholders in IPOs and documents a negative association between lead venture capitalist pre-IPO shareholding and IPO underpricing [12]. While reputation is an important factor for venture capitalists who intend to be active long-term players in the financial market [11], we argue that a more direct proxy for certification is the commitment by preexisting investors to participate in the IPO. Subscription precommitments by preexisting investors to purchase additional shares in the IPO may convey a significant signaling effect to outside investors. Eckbo and Masulis (1992) argue that subscription precommitments by large blockholders, which companies typically disclose in connection with seasoned equity offerings, such as rights offerings, are likely to influence the subscription decisions of small, relatively uninformed shareholders [13]. Cronqvist and Nilsson (2005) suggest that subscription precommitments

can act as a substitute for certification by an underwriter or a private placement investor when raising follow-on offerings [14]. This paper examines whether subscription precommitments by preexisting investors, such as venture capitalists and corporate partners, can help certify the IPO price and the association with underpricing and price revision.

II. Theory and research hypotheses

A. *Initial public offerings and insider selling*

Past empirical research has focused on venture capitalists' timing of going public [15, 16, 17] and selling decisions by venture capitalists during the IPOs of their portfolio companies [18, 19]. However, venture capitalists (VCs) infrequently sell their shares at the time of the IPO [20, 21]. Selling is more likely for issues of companies with established performance records, whereas the venture-backed IPO universe is intensive in firms with negative trailing earnings and few assets-in-place [22].

B. *Initial public offerings, subscription precommitments and insider participation*

In seasoned equity offerings, such as rights offerings, it is common to see subscription precommitments by large shareholders. Eckbo and Masulis (1992) and Singh (1997) report that companies typically obtain substantial levels of subscription precommitments from large shareholders before choosing the uninsured rights offering method compared to standby underwritten rights [13, 23]. Cronqvist and Nilsson (2005) and Balachandran et al. (2008) find that subscription precommitments is likely to impact the expected take-up levels in rights offerings and play a role in the firms' decision to choose between different equity-selling mechanisms [14, 24]. Subscription precommitments may also have a signaling effect to outside investors. Eckbo and Masulis (1992) argue that subscription precommitments by large blockholders are likely to influence the subscription decisions of small, relatively uninformed shareholders [13].

The decision by preexisting investors to make precommitments to participate in the initial public offering is consistent with the certification hypothesis by Barry et al. (1990) and Megginson and Weiss (1991) [3, 20]. Barry et al. (1990) suggest that retention of ownership provides both a signal of value and an ongoing commitment to monitor [20]. Megginson and Weiss (1991) argue that venture capital investors certify the IPO issue price by maintaining ownership in the company [3].

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We propose that the participation of preexisting investors in the IPO act as a bonding mechanism for credible certification and provides a direct proxy for ex ante uncertainty about an IPO’s valuation and a certification of the IPO issue price (i.e. a highly observable signal). Our framework yields several testable empirical predictions:

1. The degree of underpricing of IPOs is on average lower in IPOs where preexisting investors buy shares.
2. Offer price revisions are on average lower where preexisting investors buy shares.

C. *Data and sample*

To test our predictions, we analyze a sample of private venture capital-backed biotechnology companies that went public during the period 2003 to 2014. The sample of

biotechnology firms was selected from the Securities Data Company’s (SDC) New Issues Database. As per prior research [25] equity carve-outs, unit offers, American Depository Receipts (ADRs), and issues with an offer price below \$5.00 per share were excluded. The final sample consists of 197 venture-backed U.S. biotechnology IPOs during the 2003-2014 time period .

The Thomson Reuters Datastream database is the source for IPO dates, stock prices and returns after the IPO. All other IPO information including the proceeds, the number of shares, the offer price, underwriting discounts and commissions, underwriter information, and founding dates (which are cross-checked with the list on Professor Jay Ritter’s website) were hand-collected from SEC filings made available through the EDGAR (Electronic Data-Gathering, Analysis, and Retrieval) database.

TABLE I.

Distribution of IPOs and insider buying/selling by preexisting investors in IPOs				
<i>Year</i>	<i>Total number of venture-backed biotechnology IPOs</i>	<i>Number of IPOs where the preexisting investors buy shares</i>	<i>Number of IPOs where the preexisting investors sell shares</i>	<i>Percent of IPOs where the preexisting investors buy shares</i>
2003	7	2	0	28.6
2004	26	10	1	38.5
2005	13	7	1	53.8
2006	16	5	0	31.3
2007	15	9	1	60.0
2008	0	0	0	0
2009	1	0	0	0
2010	12	10	0	83.3
2011	9	7	0	77.8
2012	9	8	0	88.9
2013	37	28	0	75.7
2014	52	43	0	82.7
Total	197	129	3	65.5

D. *Insider participation*

To assess the participation by existing stockholders, including venture capitalists, in the IPO we examine the prospectus front page and ‘The Offering’ section in the prospectus summary in each IPO prospectus.

Our three variables are: (1) insider participation – the fraction of the total shares offered in the IPO that pre-IPO shareholders buy, (2) venture capital participation - the fraction of the total shares offered in the IPO that only the venture capitalist/s buys, and, (3) corporate participation – the fraction of the total shares offered in the IPO that only the corporate partners buys.

Table 1 reports the distribution of IPOs during the period 2003 to 2014.

TABLE II.

OLS regressions of first-day returns (IPO underpricing) and price revision								
	(1) Initial return OLS	(2) Initial return OLS	(3) Investment bank ranking OLS	(4) Initial return 2SLS	(5) Price revision OLS	(6) Price revision OLS	(7) Price revision OLS	(8) Price revision 2SLS
Insider participation at the IPO								
Participation	0.071 (0.746)				-0.358*** (0.000)			
VC participation		0.120 (0.616)	-0.150 (0.411)	0.149 (0.436)		-0.387*** (0.000)		-0.380*** (0.000)
Corporate participation		-0.276** (0.017)	0.251 (0.318)	-0.286*** (0.007)		-0.006 (0.979)		-0.011 (0.959)
ΔInsider participation (S-1 to 424)							-0.009*** (0.002)	
Spillover variables								
Mean contemporary underpricing	-0.118 (0.480)	-0.116 (0.492)	-0.607** (0.019)	-0.013 (0.919)	0.369*** (0.005)	0.372*** (0.005)	0.235** (0.032)	0.406** (0.015)
Industry return	0.388*** (0.003)	0.383*** (0.003)	-0.409 (0.128)	0.453*** (0.000)	0.292 (0.103)	0.305* (0.096)	0.182 (0.231)	0.326* (0.078)
Instrument								
ln(expected issue size)			0.804*** (0.001)					
Firm and offer characteristics								
Underwriter ranking	0.010 (0.798)	0.013 (0.752)		0.121 (0.477)	0.094*** (0.008)	0.092*** (0.010)	0.073** (0.014)	0.147 (0.301)
Price revision	0.451*** (0.010)	0.469*** (0.010)	0.333*** (0.007)	0.452** (0.032)				
Firm age	0.069 (0.433)	0.084 (0.361)	-0.002 (0.988)	0.103 (0.158)	-0.011 (0.232)	-0.010 (0.234)	-0.011 (0.242)	-0.010 (0.210)
Firm size	0.039 (0.402)	0.043 (0.343)	0.262*** (0.000)	-0.007 (0.933)	-0.033 (0.714)	-0.043 (0.640)	-0.054 (0.506)	-0.040 (0.653)
Gross spread	-1.630 (0.752)	-1.182 (0.821)	-8.102 (0.478)	-0.273 (0.960)	-0.043 (0.300)	-0.051 (0.206)	-0.024 (0.519)	-0.071 (0.318)
Share overhang	0.187 (0.357)	0.207 (0.271)	-0.106 (0.735)	0.168 (0.300)	0.789*** (0.001)	0.752*** (0.001)	0.673*** (0.002)	0.731*** (0.001)
Days between S-1 and 424	-0.0002 (0.166)	-0.0002 (0.155)	0.0002 (0.422)	-0.0002* (0.055)	-0.0005*** (0.010)	-0.0005** (0.011)	-0.0002 (0.122)	-0.0005*** (0.008)
Constant	-10.201 (0.470)	-7.789 (0.594)	-0.672 (0.492)	-0.548 (0.180)	0.386* (0.059)	0.423** (0.033)	0.436*** (0.010)	0.419** (0.022)
Number of observations	197	197	197	197	197	197	197	197
Adj R ²	0.246	0.253	0.256	0.228	0.338	0.345	0.490	0.337
F-value	5.98	5.80	16.80	103.92	10.53	10.65	24.00	100.28
(p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

a. This table provides the estimates of the ordinary least squares (OLS) regressions. The sample consists of 197 venture-backed biotechnology IPOs in the years 2003-2014. The dependent variable in models 1, 2 and 4, initial return, is computed as the percentage change from the offer price to the first-day closing price. The dependent variable in models 5-8 is computed as the percentage change from the offer price to the mid-point of the filing range. Standard errors are adjusted for time clustering by assuming that observations are independent for companies at different points in time, but not necessarily for companies which go public in the same month. They are more conservative than White (1980) standard errors [26]. p-values are displayed in parentheses. *, **, and *** indicate values that are significantly different from zero at the 10%, 5%, and 1% levels, respectively.

III. Empirical results

A. *IPO underpricing and insider participation*

In this section, we examine the association between IPO underpricing and insider participation. We estimate an ordinary least squares (OLS) regression of first-day (or initial) returns on our experimental and control variables to provide a benchmark estimation model. To control for potential endogeneity, we estimate a two-stage least squares (2SLS) regression model that treats both price revisions and underwriter choice as endogenous. Standard errors are adjusted for the potential bias caused by time clustering. The results of the regression analyses are reported in Table 2. The dependent variable, first-day return, is defined as the percentage change from the offer price to the first-day closing price. In model 1, insider participation, measured as the fraction of the total shares offered that preexisting shareholders buy. The coefficient on insider participation is insignificant (p-value = 0.746) maybe because enough preexisting shareholders are viewed as compromised in such a way that a subscription precommitment provides no certification. This result does not necessarily mean that there is no certification effect by participation by preexisting shareholders in the offering. Subscription precommitments set a lower bound on expected take-up (as long as there is no false signaling) and may decrease the likelihood of withdrawing the offering. In model (2), we disentangle insider participation into participation by venture capitalists and corporations, respectively. The coefficient on VC participation is positive, although statistically insignificant (p-value = 0.616). In contrast, the coefficient on corporate participation is negatively associated with underpricing and statistically significant (p-value < 0.05). This is consistent with Nicholson et al. (2005), who argue that if investors have less information than pharmaceutical firms regarding the likely success of a biotech firm's products and the quality of its science and management, then by doing a deal with a pharmaceutical firm, a biotech firm can signal its quality to financial markets [9].

However, we ignored that not all of the variables in the underpricing model are exogenously determined. Benveniste and Spindt (1989) argue that price revisions and underpricing should be modeled simultaneously [27]. In particular, conditional on information revealed during bookbuilding, the underwriter simultaneously determines the offer price (and thereby the price revision) and how much money to leave on the table (underpricing). Therefore, we estimate a two-stage model that treats both underwriter choice and price revisions in the underpricing regression as endogenous. In the first stage, we regress underwriter ranking on all independent regressors in model (3) and one additional variable to ensure identification: the log of the intended offer size, in millions of dollars. The economic rationale for the instrument is as follows. A given degree of percentage underpricing translates into a larger wealth loss to the preexisting shareholders, the larger the offering. This in turn creates an incentive to choose

a top-tier underwriter in an attempt to reduce the degree of underpricing. The underwriter ranking equation is reported as model (3). In short, high-ranked underwriters are selected by larger firms and those filing larger offers. Using the predicted value for underwriter ranking from model (3) as instruments, model (4) provides consistent estimates of the effect of underwriter ranking on underpricing. A comparison of the OLS coefficients in model (2) and the 2SLS coefficients in model (4) reveals little change in the influence of our measures of insider participation and the firm and offer characteristics, indicating that our results for these variables appear robust.

B. *Insider participation and offer price revisions*

In this section, we examine the association between price revisions from the mid-point of the filing range and insider participation. The results of the regression analyses are reported in Table 2. In model (5), the coefficient on insider participation is negative and statistically significant (p-value < 0.01). In model (6), we disaggregate the insider participation ratio into purchases by venture capitalists and corporations. Consistent with expectations, the coefficient on VC participation is negative and statistically significant (p-value < 0.01), whereas the coefficient on corporate participation is negative, although not statistically significant (p-value > 0.05). Typically, the first amended S-1 filing contains information about the number of shares, the indicative price range and information about subscription commitments by existing investors. If there is no demand for the shares at a given offer price, the venture capital investors may either decide to withdraw the IPO or purchase a larger fraction than of the shares. The demand side explanation is tested by examining changes in the amount of capital between the S-1/A filing and the final prospectus that preexisting investors are willing to commit. In model (7), we link offer price revisions with insider participation changes between the S-1 and 424 filings. For example, the Δ insider participation variable is defined as the difference in the amount of dollar (in millions) that insiders have made indications of interest to buy in the 424 minus the amount in the S-1/A. The coefficient is negative and statistically significant (p-value < 0.01), which indicates that when the offer price is downward revised during the bookbuilding period, preexisting investors commit to purchase additional shares. This provides some support for the demand side explanation. If the issuing firm receives negative feedback during the bookbuilding period, preexisting investors may commit to purchase additional shares or the firm may decide to withdraw the offer.

In the next step we estimate a two-stage least squares (2SLS) regression to allow for potential endogeneity of key explanatory variables. Model (8) in Table 2 reports the results. A comparison of the OLS coefficients in model (6) and the 2SLS coefficients in model (8) reveals little change in the influence of our measures of insider participation and most of the firm and offer characteristics, indicating that our results for these variables appear robust.

IV. Conclusions

One of the key issues in venture capital finance is the exiting process. Venture capitalists' unique skill is the guidance of new entrepreneurial ventures in early stages of growth. The main conception of venture capital is that once a portfolio company becomes mature they will leave the firm and redeploy its resources elsewhere, where the marginal productivity will be higher [20]. The existing literature on venture capital exits has mainly treated the IPO itself as an exit event, although venture capitalists rarely sell their shares at the time of the IPO.

This paper examines the certification role of preexisting investors that participate in the IPO. We find that subscription precommitments by preexisting venture capitalists are unassociated with IPO underpricing, which may suggest that at least part of the quality signal through their reputational and significant preexisting shareholdings may already be incorporated into the offer price. In contrast, we find that the participation of corporate partners is negatively associated with underpricing, which lends support to the certification hypothesis. This is consistent with the Nicholson et al. (2005), who suggest that if outside investors have less information than pharmaceutical firms regarding the likely success of a biotech firm's products, then by doing a deal with a pharmaceutical firm, a biotech firm can signal its quality to financial markets [9]. Our analysis also sheds light on the supporting role of preexisting investors, and especially preexisting venture capitalists, when there is a lower demand for the firm's shares. Revisions in the offer price are negatively associated with venture capital participation, but unassociated with corporate participation.

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