Do PIPOs Decrease IPO Uncertainty?

Jonathan Daigle
Monmouth University

This paper examines whether private IPOs (PIPOs) decrease information asymmetry in firms that eventually engage in an IPO. Theoretically, PIPOs can mitigate adverse selection and moral hazard problems because private investments can signal undervaluation and potentially provide more effective monitoring. Consequently, firms with larger, more recent, and frequent PIPOs should experience less underpricing and post-IPO volatility relative to other IPOs due to increased monitoring, lower signal attenuation, and positive feedback with existing investor buy-ins, respectively. Results indicate the percentage of PIPO investment compared to total equity at IPO is negatively associated with underpricing, thus suggesting PIPOs decrease information asymmetry. However, the longer the amount of time between the last PIPO and the IPO and the total number of PIPOs are positively related to underpricing.

Keywords: IPOs, private placements, information asymmetry, signaling, IPO underpricing

INTRODUCTION

In recent years, capital markets for private equity investments have significantly transformed. Since 2009, both the number and total dollar amount of private placements have increased and are now considerably larger than public debt and public equity offerings (Ivanov and Bauguess, 2013 and Bauguess, Gullapalli and Ivanov, 2015). More importantly, some private firms have utilized later stage rounds to obtain funding comparable to traditional initial public offerings (IPOs). For funding of greater than $40 million, practitioners have labeled this later stage financing as private IPOs (PIPOs) (Kopelman, 2015; PitchBook, 2015; and Tunguz, 2015). Interestingly, some firms that undergo PIPOs eventually do pursue IPOs. Despite this paradigm shift, no study has investigated the benefits of PIPOs for firms that eventually go public via an IPO. This paper fills this gap in the literature by examining whether PIPOs decrease information asymmetry when firms eventually go public.

Theoretically, PIPOs can mitigate adverse selection and moral hazard problems because private placements can signal undervaluation (Hertzel and Smith, 1993) and provide more effective monitoring (Shleifer and Vishny, 1986 and Wruck, 1989). Consequently, firms with larger, more recent, and frequent PIPOs should experience less underpricing and post-IPO volatility. Using a sample of 1,002 U.S. IPOs from 2005-2016, I find support for this argument: a percentage increase in the ratio of PIPO funding to the market value of equity at IPO reduces the first-day return by 2.53%. This result implies that firms with larger PIPOs potentially reduce moral hazard and signal their true value before going public. However, I do not find support that larger PIPOs reduce post-IPO volatility.

I also test if the length of time between a firm's PIPO and IPO impacts the firm's valuation when it goes public. Folta and Janney (2004) suggest firms with more recent private placements have less

information asymmetry. Following a private placement, confidence in the signal decreases since business conditions and opportunities can change over time. Results indicate a negative relation between the length of time since a PIPO and first-day returns. Each additional year between the latest PIPO and IPO date is associated with an 8.66% increase in first-day returns.

Folta and Janney (2004) also propose firms with more numerous private placements experience less information asymmetry. First, offerings to multiple sophisticated investors can indicate the firm's ability to convey its true valuation. Second, offerings to existing investors should provide a positive signal of either continued or increased confidence in the firm's prospects. Consequently, I test if the number of PIPOs reduces uncertainty at IPO. Contrary to Folta and Janney, I find firms with more PIPOs experience greater underpricing. Each additional PIPO is related to a 2.79% increase in first-day returns. I do not find any association between the number of PIPOs with post-IPO volatility.

This study provides several distinct contributions. First, it describes and provides information about the PIPOs market. The PIPO market has not been thoroughly examined by any other academic study to the best of my knowledge. Second, it provides evidence for how PIPOs can reduce information asymmetry in firms that eventually go public. This information can provide practitioners with strategic insights for lowering their firm's cost of equity when they file for their IPO. Third, the results may benefit regulators in private placement rulemaking. Discussion concerning investor protection is routine among all private securities, especially equity investments.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Despite the growing use of PIPOs, prior research has focused on the equity choice between private investment in public equity (PIPEs) and seasoned equity offerings (SEOs). Hertzel and Smith (1993) find firms will choose PIPEs over SEOs when management believes the firm is undervalued. They propose direct negotiation between private investors and management leads to discovering the firm's true value. Dai (2007) explains PIPEs can serve as an additional round of venture capital for companies that went public too early. Chaplinsky and Haushalter (2010) find the choice of contracting terms for PIPEs varies widely and is associated with issuer risk. Chen, Dai, and Schatzberg (2010) demonstrate stronger support that firms will choose PIPEs over SEOs when there is a high likelihood of undervaluation and cost advantages exist.

Folta and Janney (2004) investigate if PIPEs increase a firm's longer-term competitive advantage. Using a sample of biotech firms, they observe that obtaining PIPEs increases a firm's ability to gain financial capital, research partners, and commercial partners. Furthermore, they demonstrate the timing of PIPEs has positive long-term implications. Firms with more recent placements increase their ability to acquire financial capital and both research and commercial partners. In addition, firms issuing a greater number of private placements are more apt at acquiring financial capital. Overall, their results indicate PIPEs by certified investors help attenuate informational asymmetries by providing signals or enhancing monitoring.

Wu (2004) examines the choice between SEOs and PIPEs for high-technology post-IPO firms. She finds firms choosing PIPEs have higher information asymmetry than firms choosing IPO. She also finds evidence suggesting PIPE investors do not monitor more than SEO investors.

Rock (1986) develops a model to explain the underpricing of IPOs. In his model, informed investors have superior information about a new firm's opportunities than either the firm or all other investors. Consequently, if new shares are priced appropriately, then informed investors will crowd out other investors for good issues, but withdraw from the market on bad issues. The uninformed investors realize that if they have access to a new issue, it must be a bad issue. Therefore, the firm offers its shares at a discount to guarantee a full subscription to their issue. Consequently, firms with greater levels of information asymmetry experience greater underpricing and volatility (Ritter, 1984; Beatty and Ritter, 1986; Lowry, Officer, Schwert, 2010).

Theoretically, private placements can mitigate information asymmetry problems (Wruck, 1989; Hertzel and Smith, 1993). Myers and Majluf (1984) demonstrate if managers act in the interest of existing shareholders who are passive, then prospective investors, who are uninformed, will assume any equity issue

means the firm is overvalued. Therefore, managers of undervalued firms with profitable investment opportunities, but lacking financial slack will choose not to issue equity when the share of existing assets transferred to prospective stockholders exceeds the share of increased firm value retained by existing stockholders. Myers and Majluf suggest firms can alleviate underinvestment if managers disclose their private information during negotiations (e.g., merger discussions). Hertzel and Smith extend Myers and Majluf's (1984) model to add private placements as a possible choice. They show private placements aid in solving the underinvestment problem. Firms experience a 1.7% increase in firm value after announcing the issuance of private placements.

Prior studies have investigated how blockholders can increase the monitoring of management. Shleifer and Vishny (1986) demonstrate blockholders improve monitoring incentives. Furthermore, Wruck (1989) shows private placements can potentially provide more effective monitoring. Hertzel and Smith (1993) reason investment by private investors tied with management's decision to bypass the public market signals that management believes the firm is undervalued. Consistent with the benefits of increased monitoring, I expect firms with larger PIPOs will incur less underpricing and volatility than firms with smaller PIPOs.

Hypothesis 1: *Firms offering larger percentages of PIPOs relative to total equity experience less underpricing, ceteris paribus.*

Hypothesis 2: *Firms offering larger percentages of PIPOs relative to total equity experience less volatility post-IPO, ceteris paribus.*

Folta and Janney (2004) suggest firms should have less information asymmetry when a private equity placement is more recent. As time passes, confidence in the signal from the private equity placement PIPOs will decrease since business conditions, and opportunities change. Thus, I expect firms with more recent placements to incur less underpricing and volatility.

Hypothesis 3: *Firms with more recent PIPOs experience less underpricing, ceteris paribus.*

Hypothesis 4: *Firms with more recent PIPOs experience less volatility post-IPO, ceteris paribus.*

Finally, Folta and Janney (2004) indicate firms should have less information asymmetry when they have repeatedly offered private equity placements for two reasons. First, offerings to multiple sophisticated investors can indicate that the firm is more apt to convey its true valuation. Second, offerings to existing investors should provide a positive signal of either continued or increased confidence in the firm's prospects along with effective managerial monitoring. Consequently, I expect firms with more PIPOs to incur less underpricing and volatility.

Hypothesis 5: *Firms with more offerings of PIPOs experience less underpricing, ceteris paribus.*

Hypothesis 6: *Firms with more offerings of PIPOs experience less volatility post-IPO, ceteris paribus.*

METHODS

This study follows the approach outlined in Loughran and McDonald (2013) for testing the effect of PIPO activity on first-day returns and volatility. The first dependent variable, *First-Day Returns*, is defined as the percentage change from the offer price to the closing price. The second dependent variable, *Post-IPO Return Volatility*, is defined as the market model root-mean square error for each IPO over day +5 to day +64 relative to their IPO date. The value is multiplied by 1,000.

The following independent variables test the hypotheses regarding PIPO activity for both dependent variables. *PIPO* is a dummy variable set to one if the firm issued a private IPO, else zero. *PIPO%* is defined as the percentage of the total dollar amount received in PIPOs relative to the market value of equity at the

time of IPO. Both the PIPOs and market value of equity are converted to 2016 dollars. *Recent dummy* is a dummy variable set to one if the firm issued a private IPO within the year before conducting their IPO, else zero. *PIPO Count* is defined as the number of private IPOs the firm issued before its IPO.

In addition to the variables of interest, this study also uses control variables from the IPO literature that have been shown to explain first-day returns and post-IPO return volatility.

Up Revision

The percentage upward revision from the mid-point of the filing range if the offer price is greater than the mid-point, otherwise zero. Loughran and Ritter (2002) propose that firms may increase the offer price to serve as a positive signal to potential investors. Bradley and Jordan (2002), Lowry and Schwert (2004), and Loughran and McDonald (2013) find a positive relation between the up revision of the offer price and first-day returns. Therefore, I expect a positive relation between up revision and the dependent variables.

VC Dummy

Dummy variable set to one if the IPO is backed by venture capital, otherwise zero. Bajo et al. (2016) argue Venture Capital (VC)-backed firms are typically younger, higher growth companies and are expected to have greater uncertainty on their valuation. I expect a positive relation between VC-backed companies and the dependent variables.

Top-Tier Dummy

Dummy variable set to one if the IPO's lead underwriter has a value of eight or more using Carter and Manaster (1990) rankings as updated on Jay Ritter's IPO website, otherwise zero. Loughran and Ritter (2004) observe a positive relation between underwriter rank and underpricing. They argue this relation is due to two factors. First, firms are placing a greater value on obtaining analyst coverage. Second, firms are willing to have greater underpricing due to the practice of investment bankers spinning shares to venture capitalists and executives at other firms that could potentially file for an IPO. Consequently, the larger underpricing in the spun shares influences decision-makers at the potential firm to continue their relationship with the investment bank. Therefore, I expect a positive relation between lead underwriter rank and the dependent variables.

Positive EPS Dummy

Dummy variable set to one if the IPO has positive earnings per share (EPS) in the 12 months before going public, otherwise zero. Loughran and McDonald (2013) find a negative relation between positive trailing EPS and lower levels of post-IPO return volatility. Gao, Ritter, and Zhu (2013) observe a decrease in profitability among small IPO firms, with 58% having negative EPS in 1980-2000 compared to 73% in 2001-2011. Consequently, profitability may serve as a robust signal in the current IPO market. Therefore, I expect a negative relation between positive EPS and the dependent variables.

Prior Nasdaq 15-Day Returns

The buy-and-hold returns of the CRSP Nasdaq value-weighted index over the 15-trading days before the IPO date. Multiple IPO studies, including Loughran and Ritter (2002), Hanley and Hoberg (2012), and Loughran and McDonald (2013), use prior Nasdaq returns to control for IPO hot markets. Consequently, I expect a positive relation between prior Nasdaq returns and the dependent variables.

Share Overhang

The number of shares retained divided by the number of shares in the initial offering. Aggarwal, Krigman, and Womack (2002) argue managers strategically underprice IPOs to generate information momentum by attracting attention to the stock and thereby maximizing their wealth when the lockup period ends. Ofer and Richardson (2003) explain that if the public float is small relative to the shares retained by insiders, the market price will be higher due to a negatively sloped demand for shares. Consequently, I expect a positive relation between share overhang and the dependent variables.

Sales

The natural log of trailing firm annual sales in millions of dollars. Loughran and McDonald (2013) find a negative relation between sales and lower levels of post-IPO return volatility. I expect a negative relation between sales and the dependent variables.

DATA

The IPO sample includes 1,002 U.S. IPOs over 2005-2016 with an offer price of at least $5 per share, excluding ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, financial firms, and stocks not listed on CRSP. The IPO sample is obtained from Jay Ritter's IPO website, along with Thomson Financial Securities Data and SEC filings on EDGAR. The PIPO sample includes 303 PIPOs from firms that eventually undergo an IPO. PIPOs are defined as equity financing of $40 million or more in growth rounds (Series B or later). Both PIPOs and total market equity at IPO are adjusted to 2016 dollars using inflation rates provided by the Bureau of Labor Statistics. The PIPO sample is obtained from CrunchBase Pro. The final sample includes 799 traditional IPOs, firms that do not participate in PIPOs, and 203 firms that participate in PIPO activity.

Table 1 presents summary statistics for the 303 PIPOs of firms that eventually undergo an IPO for the years 2000-2016. The number of PIPOs increased substantially starting in 2004 with eight and peaked before the financial crisis in 2007 with 34. The average size of a PIPO is approximately $85.5 million, while the median size is $59 million. There is also a wide distribution in the size of PIPOs among firms, with the minimum at $40 million while the largest is $1,068 million. Due to the wide distribution of funding, PIPOs exhibit a standard deviation of $98.5 million over the sample period.

TABLE 1
SUMMARY STATISTICS FOR PIPOS THAT EVENTUALLY IPO, 2000-2016

Year	No. of PIPOs	Mean Size	Median Size	Min. Size	Max. Size	Std. Dev.
2000	8	$59,629,566	$52,726,530	$41,626,210	$104,245,250	$20,629,693
2001	7	$63,114,670	$51,705,880	$40,943,810	$136,018,030	$33,493,631
2002	5	$50,035,824	$47,260,180	$40,261,032	$60,391,548	$9,138,152
2003	5	$60,682,882	$65,677,910	$43,323,850	$72,758,530	$11,447,803
2004	18	$74,875,388	$53,493,511	$40,791,050	$322,081,100	$65,523,340
2005	13	$78,769,996	$62,032,890	$42,078,850	$245,857,430	$55,697,771
2006	17	$132,573,571	$58,111,421	$42,836,630	$1,067,758,230	$244,447,827
2007	34	$79,540,199	$59,478,885	$40,204,777	$277,327,410	$54,130,817
2008	12	$88,865,931	$56,823,105	$40,824,369	$284,137,930	$72,355,084
2009	27	$76,429,810	$63,614,040	$42,484,177	$225,789,320	$39,833,726
2010	25	$85,409,978	$60,921,520	$43,130,234	$332,299,200	$66,754,482
2011	23	$161,500,776	$74,738,199	$42,738,133	$1,041,491,564	$230,789,373
2012	30	$69,656,526	$57,644,896	$40,571,670	$208,664,373	$36,148,649
2013	25	$66,837,039	$50,643,710	$41,388,880	$173,117,260	$38,378,336
2014	26	$91,895,749	$66,940,417	$40,869,941	$225,000,001	$48,764,515
2015	27	$71,131,510	$65,952,556	$40,465,610	$202,341,625	$34,233,387
2016	1	$53,195,020	$53,195,020	$53,195,020	$53,195,020	$0
Total	303	$85,497,484	$59,052440	$40,204,777	$443,143,374	$98,551,855

The sample includes 303 private IPOs from firms that eventually undergo an IPO. Private IPOs are defined as equity financing of $40 million or more in growth rounds. Dollar figures are adjusted to 2016 dollars. The sample includes IPOs with an offer price of at least $5 per share, excluding ADRs, unit offers, closed-end funds, REITs, natural

resource limited partnerships, small best efforts offers, financial firms, and stocks not listed on CRSP. The private IPO sample is obtained from CrunchBase Pro. The IPO sample is obtained from Jay Ritter's IPO website along with Thomson Financial Securities Data and SEC filings on EDGAR.

Table 2 provides the summary statistics for the traditional IPO and the firms with PIPOs samples in Panel A and B, respectively. There are marked differences between samples. The first-day returns (13.31% vs. 24.62%) and post-IPO return volatility (3.47% vs. 4.33%) are lower for the traditional IPO sample relative to the firms with the PIPOs sample. Furthermore, firms with PIPOs compared to traditional IPOs have a greater percentage of VC-backing (97% vs. 44%) and underwriting by a prestigious investment bank (91% vs. 76%). However, PIPOs with IPOs are less profitable (48% vs. 17%) and generate less revenue before going public ($95.5 million vs. $734 million) than other IPOs. I perform univariate analysis between the groups to confirm their differences.

TABLE 2
SUMMARY STATISTICS FOR IPO SAMPLE, 2005-2016

Panel A: Summary Statistics – Traditional IPO sample, 2005-2016

Variables	Mean	Std. Dev.	5th	Median	95th
First Day Returns	13.31%	21.88%	-10.00%	7.50%	58.40%
Post IPO Return Volatility	3.47%	1.46%	1.63%	3.26%	5.85%
Up Revision	4.50%	10.57%	0%	0%	18.78%
VC dummy	0.44	0.50	0	0	1
Top Tier dummy	0.76	0.43	0	0	1
Positive EPS dummy	0.48	0.50	0	0	1
Prior Nasdaq 15-Day Returns	0.88%	3.23%	-4.52%	0.97%	6.02%
Share Overhang	3.40	4.15	1.00	2.77	6.92
Sales	734.0	5,588.9	0.1	80.5	2219.2

Panel B: Summary Statistics – Firms with PIPOs sample, 2005-2016

Variables	Mean	Std. Dev.	5th	Median	95th
First Day Returns	24.62%	35.41%	-10.31%	13.33%	91.49%
Post IPO Return Volatility	4.33%	1.89%	2.34%	4.08%	6.60%
PIPO%	24.21%	22.42%	4.81%	17.26%	70.62%
PIPO Clock	0.39	0.49	0	0	1
PIPO Count	2.37	2.44	0.25	1.50	3.16
Up Revision	5.61%	10.10%	0%	0%	19.9%
VC dummy	0.97	0.18	1	1	1
Top Tier dummy	0.91	0.28	0	1	1
Positive EPS dummy	0.17	0.37	0	0	1
Prior Nasdaq 15-Day Returns	0.97%	3.33%	-4.60%	0.66%	6.10%
Share Overhang	4.29	2.50	1.78	3.68	8.73
Sales	95.5	297.9	0.1	24.7	308.6

The sample includes 1,002 U.S. IPOs with an offer price of at least $5 per share, excluding ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, financial firms, and stocks not listed on CRSP. Panel A presents summary statistics for Traditional IPOs, IPOs that do not participate in private IPOs prior to going public and Panel B presents summary statistics for IPOs that participate in private IPOs prior to going public. The sample is obtained from Jay Ritter's IPO website along with Thomson Financial Securities Data and SEC filings on EDGAR. *First-Day Returns* is defined as the percentage change from the offer price to the closing price. *Post IPO Return Volatility* is the market model root-mean square error for each IPO over day +5 to day +64 relative to their IPO date. The value is multiplied by 1,000. *Up Revision* is defined as the percentage upward revision in the offer price from the mid-point of the filing range if the offer price is greater than the mid-point, ((offer price - mid-point)/mid-point) x 100 if offer price > midpoint, else zero. *VC dummy* is a dummy variable set to one if the IPO is backed by

venture capital, else zero. *Top Tier dummy* is a dummy variable set to one if the lead underwriter of the IPO has an updated Carter and Manaster (1990) rank of eight or more, else zero. *Positive EPS dummy* is a dummy variable set to one if trailing EPS is positive at the time of the IPO, else zero. *Prior Nasdaq 15-Day Returns* is defined as the buy-and-hold returns of the CRSP Nasdaq value-weighted index on the 15-trading days prior to the IPO date, ending on day t-1. *Share Overhang* is defined as the number of shares retained divided by the number of shares in the initial offering. *Sales* is defined as the trailing annual firm sales in millions of dollars at the time of the IPO. *PIPO%* is defined as the percentage of PIPOs relative to the market value of equity at time of IPO in 2016 dollars. *PIPO Clock* is the number of days between the most recent PIPO and IPO date divided by 365.25. *PIPO Count* is defined as the number of private IPOs the firm issued prior to their IPO.

RESULTS

Table 3 reports differences in means and medians for variables between traditional IPOs and firms with PIPOs. Univariate results show traditional IPOs have lower first-day returns and post-IPO return volatility than firms with PIPOs. PIPOs with IPOs have greater upward price revisions, higher amounts of venture capital backing, more prestigious lead underwriters at IPO, and greater amounts of share overhang. Moreover, traditional IPOs are more profitable and have greater sales than PIPOs with IPOs. These findings provide initial evidence against PIPOs decreasing information asymmetry in firms that eventually engage in an IPO. Instead, PIPOs may have the opposite effect. Investors may see PIPOs as a means for firms to exaggerate their valuations. Brown and Wiles (2015) find a quarter of their Unicorn sample have valuations at exactly $1 billion, which is highly unlikely to occur naturally.

TABLE 3
DIFFERENCES OF MEANS AND MEDIANS

Variable		Traditional IPOs	Firms with PIPOs	Difference	p-value
First-Day Returns	Mean	13.31%	24.62%	**-11.31%**	<.001
	Median	7.50%	13.33%	**-5.83%**	<.001
Post-IPO Return Volatility	Mean	3.47%	4.33%	**-0.86**	<.001
	Median	3.26%	4.08%	**-0.82**	<.001
Up Revision	Mean	4.50%	5.61%	-1.11	0.177
	Median	0.00%	0.00%	**0.00**	0.019
VC dummy	Mean	0.44	0.97	**-0.53**	<.001
	Median	0.00	1.00	**-1.00**	<.001
Top Tier dummy	Mean	0.76	0.91	**-0.15**	<.001
	Median	0.00	1.00	**-1.00**	<.001
Positive EPS dummy	Mean	0.48	0.17	**0.31**	<.001
	Median	0.00	0.00	**0.00**	<.001
Prior Nasdaq 15-Day Returns	Mean	0.88%	0.97%	-0.09	0.745
	Median	0.97%	0.66%	0.31	0.974
Share Overhang	Mean	3.40	4.29	**-0.89**	0.004
	Median	2.77	3.68	**-0.91**	<.001
Natural Log of Sales	Mean	1.40	0.27	**1.13**	<.001
	Median	1.91	1.39	**0.52**	<.001
Observations		799	203		

Table V reports differences in means and medians of regression variables between Traditional IPOs and firms with PIPOs. *First-Day Returns* is defined as the percentage change from the offer price to the closing price. *Post-IPO Return Volatility* is the market model root-mean square error for each IPO over day +5 to day +64 relative to their IPO

date. The value is multiplied by 1,000. *Up Revision* is defined as the percentage upward revision in the offer price from the mid-point of the filing range if the offer price is greater than the mid-point, ((offer price - mid-point)/mid-point) x 100 if offer price > midpoint, else zero. *VC dummy* is a dummy variable set to one if the IPO is backed by venture capital, else zero. *Top Tier dummy* is a dummy variable set to one if the lead underwriter of the IPO has an updated Carter and Manaster (1990) rank of eight or more, else zero. *Positive EPS dummy* is a dummy variable set to one if trailing EPS is positive at the time of the IPO, else zero. *Prior Nasdaq 15-day Returns* is defined as the buy-and-hold returns of the CRSP Nasdaq value-weighted index on the 15-trading days prior to the IPO date, ending on day t-1. *Share Overhang* is defined as the number of shares retained divided by the number of shares in the initial offering. *Natural Log of Sales* is defined as the natural log of trailing annual firm sales in millions of dollars at the time of the IPO.

Mean first-day returns by year are reported in Table 4. The percentage of firms with PIPOs increased in 2010, representing over 20% of total IPOs. In addition, mean first-day returns are significantly higher for firms with PIPOs than traditional IPOs in 5 of the 12 years. Overall, traditional IPOs average a mean first-day return of 13.31% compared to firms with PIPOs that average 24.62% and the difference is statistically significant. Furthermore, this trend has been more pronounced in recent years. Both years 2015 and 2016 observed a four-fold and three-fold difference, respectively, in underpricing between traditional IPOs and firms with PIPOs.

TABLE 4
MEAN FIRST-DAY RETURNS BY YEAR

	Number of IPOs		Mean First-Day Return		
Year	Traditional IPOs	Firms with PIPOs	Traditional IPOs	Firms with PIPOs	Difference
2005	108	5	10.49%	0.90%	9.59%
2006	103	8	12.09%	13.57%	-1.48%
2007	96	19	16.80%	17.52%	-0.72%
2008	15	1	6.44%	-1.67%	8.11%
2009	33	4	7.14%	32.50%	-25.36%
2010	52	17	8.26%	7.41%	0.85%
2011	44	15	13.59%	25.56%	-11.97%*
2012	58	14	22.40%	15.52%	6.88%
2013	82	30	18.35%	33.29%	-14.94%**
2014	106	44	14.25%	27.54%	-13.29%**
2015	58	33	8.17%	32.21%	-24.04%***
2016	44	13	11.31%	32.64%	-21.33%**
Total	799	203	13.31%	24.62%	-11.31%***

The sample includes 1,002 U.S. IPOs with an offer price of at least $5 per share, excluding ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, financial firms, and stocks not listed on CRSP. Statistics are subdivided between Traditional IPOs, IPOs that do not participate in private IPOs prior to going public and IPOs that participate in private IPOs prior to going public. The sample is obtained from Jay Ritter's IPO website along with Thomson Financial Securities Data and SEC filings on EDGAR. First Day Returns is defined as the percentage change from the offer price to the closing price. Significance at the 10%, 5%, and 1% levels are noted as *, **, and *** respectively.

Table 5 shows mean first-day returns by Fama-French industrial classification. Firms with PIPOs are present in 16 of the 42 industries. Pharmaceutical Products and Business Services have the greatest number of firms with PIPOs with 92 and 56, respectively. Mean first-day returns are significantly higher for firms with PIPOs compared to traditional IPOs in Healthcare, Pharmaceutical Products, Business Services, and Retail. Firms with PIPOs have a mean first-day return of 24.62% compared to 12.58% for traditional IPOs based on matching industries and is statistically significant.

TABLE 5
MEAN FIRST-DAY RETURNS BY FAMA AND FRENCH INDUSTRIAL CLASSIFICATION

	Number of IPOs		Mean First-day Return		
Industrial Classification	Traditional IPOs	Firms with	Traditional IPOs	Firms with	Difference
Healthcare	30	6	9.55%	33.29%	-23.74%**
Medical Equipment	52	10	11.87%	14.60%	-2.73%
Pharmaceutical Products	135	92	7.01%	20.02%	-
Chemicals	15	3	3.78%	4.91%	-1.13%
Construction	12	1	5.38%	47.38%	-42.00%
Electrical Equipment	5	1	11.03%	50.30%	-39.27%
Automobiles & Trucks	6	1	8.01%	41.06%	-33.05%
Petroleum & Natural Gas	17	2	4.96%	14.45%	-9.49%
Utilities	2	2	2.43%	16.24%	-13.81%
Communication	24	5	5.05%	1.96%	3.09%
Business Services	201	56	17.86%	35.65%	-
Computers	18	9	23.40%	31.33%	-7.93%
Electronic Equipment	48	7	13.10%	19.05%	-5.95%
Measuring & Control Equipment	6	4	0.50%	7.64%	-7.14%
Wholesale	16	1	3.42%	-2.27%	5.69%
Retail	49	3	20.77%	48.66%	-27.89%*
Total	636	203	12.58%	24.62%	-

This table provides statistics for Fama and French Industrial Classifications in which firms with PIPOs participate in relative to Traditional IPOs. The sample includes U.S. IPOs with an offer price of at least $5 per share, excluding ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, financial firms, and stocks not listed on CRSP. Statistics are subdivided between Traditional IPOs, IPOs that do not participate in private IPOs prior to going public and IPOs that participate in private IPOs prior to going public. The sample is obtained from Jay Ritter's IPO website along with Thomson Financial Securities Data and SEC filings on EDGAR. First Day Returns is defined as the percentage change from the offer price to the closing price. Significance at the 10%, 5%, and 1% levels are noted as *, **, and *** respectively.

Table 6 presents underpricing regressions for measuring the effect of PIPO activity on the first-day returns of the IPO sample. The PIPO variable is positive and significant, implying that firms with PIPOs average a first-day return 7.67% higher than those without PIPOs. *PIPO%* is negative and significant, indicating that a percentage increase in the ratio of PIPO funding to the market value of equity at IPO reduces the first-day return by 2.53%. This result supports hypothesis 1. Firms offering larger percentages of PIPOs relative to total equity experience less underpricing. This finding is consistent with the benefits of increased monitoring, as noted in Shleifer and Vishny (1986), Wruck (1989), and Hertzel and Smith (1993).

PIPO Clock is positive and significant. This finding supports hypothesis 3, firms with more recent PIPOs experience less underpricing. Each additional year between the latest PIPO and IPO date is associated with an 8.66% increase in first-day returns. Recent PIPOs have a stronger signal to the market, but as time passes, confidence in the signal from the PIPOs decreases since business conditions and opportunities change. This finding is similar to Folta and Janney (2004), who find firms have less information asymmetry when a PIPE is more recent.

The final PIPO variable, PIPO Count, is positive and significant. This result is inconsistent with hypothesis 5: firms with more PIPOs should experience less underpricing. Each additional PIPO is related to a 2.79% increase in first-day returns. A possible explanation for this finding could be that additional PIPOs are a bad signal. Brown and Wiles (2015) report that 38 of 142 Unicorns have exactly $1 billion valuations. They hypothesize that the valuations they receive may not reflect their true value, but rather are being used for marketing themselves to potential employees and consumers. Consequently, the market may be aware of this and consider it when valuing the firm's IPO.

TABLE 6
UNDERPRICING REGRESSIONS

Variables	(1)	(2)	(3)	(4)	(5)
PIPO		7.67			
		(4.48)			
PIPO%			-2.53		
			(-1.90)		
PIPO Clock				8.66	
				(1.97)	
PIPO Count					2.79
					(3.02)
Control Variables					
Up Revision	0.63	0.62	0.63	0.62	0.63
	(2.36)	(2.14)	(2.36)	(2.45)	(2.39)
VC dummy	10.15	8.14	10.29	9.34	8.97
	(4.43)	(3.24)	(4.40)	(3.36)	(2.52)
Top Tier dummy	4.21	2.96	4.29	3.31	3.53
	(3.36)	(9.73)	(3.46)	(2.42)	(4.29)
Positive EPS dummy	0.68	1.03	0.67	0.99	0.96
	(1.55)	(0.61)	(0.44)	(0.59)	(0.59)
Prior Nasdaq 15-Day Returns	0.47	0.48	0.47	0.48	0.48
	(2.61)	(2.87)	(2.60)	(2.76)	(2.85)
Share Overhang	0.61	0.57	0.62	0.56	0.58
	(1.50)	(1.47)	(1.50)	(1.47)	(1.51)
Natural Log of Sales	-0.31	-0.24	-0.31	-0.15	-0.30
	(-0.67)	(-0.49)	(-0.68)	(-0.35)	(-0.63)
No. of observations	1,002	1,002	1,002	203	1,002
Fama and French 48-industry dummies	Yes	Yes	Yes	Yes	Yes
Calendar year dummies	Yes	Yes	Yes	Yes	Yes
R^2	23.33%	24.38%	23.34%	24.02%	23.77%

This table presents regressions for the sample of 1,002 U.S. IPOs with an offer price of at least $5 per share, excluding ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, financial firms, and stocks not listed on CRSP. The sample is obtained from Jay Ritter's IPO website along with Thomson Financial Securities Data and SEC filings on EDGAR. The dependent variable, *First-Day Returns*, is defined as the percentage change from the offer price to the closing price. *PIPO* is a dummy variable set to one if the firm participates in a private IPO, else zero. *PIPO%* is defined as the percentage of PIPOs relative to market value of equity at time of

IPO in 2016 dollars. *PIPO Clock* is the number of days between the most recent PIPO and IPO date divided by 365.25. *PIPO Count* is defined as the number of private IPOs the firm issued prior to their IPO. All regressions include an intercept, Fama and French (1997) 48-industry dummies, and calendar year dummies. The t-statistics are in parentheses with the standard errors clustered by year and industry.

Table 7 reports regressions measuring the effect of PIPO activity on post-IPO return volatility of the IPO sample. Unlike the results with the first-day mean return, all PIPO variables are insignificant in explaining post-IPO volatility. These results indicate that hypotheses 2, 4, and 6 are unsupported, suggesting PIPOs do not impact post-IPO volatility.

TABLE 7
VOLATILITY REGRESSIONS

Variables	(1)	(2)	(3)	(4)	(5)
PIPO		0.05			
		(0.22)			
PIPO%			-0.02		
			(-0.14)		
PIPO Clock				0.07	
				(0.21)	
PIPO Count					0.17
					(0.70)
Control Variables					
Up Revision	0.01	0.01	0.01	0.01	0.01
	(2.29)	(2.32)	(2.28)	(2.36)	(2.43)
VC dummy	0.83	0.81	0.83	0.82	0.76
	(4.55)	(4.60)	(4.78)	(5.03)	(5.24)
Top Tier dummy	-0.30	-0.31	-0.30	-0.31	-0.34
	(-3.56)	(-2.86)	(-3.29)	(-3.11)	(-3.33)
Positive EPS dummy	-0.04	-0.04	-0.04	-0.04	-0.02
	(-0.53)	(-0.59)	(-0.53)	(-0.54)	(-0.42)
Prior Nasdaq 15-Day Returns	-0.02	-0.02	-0.02	-0.02	-0.02
	(-2.18)	(-2.11)	(-2.19)	(-2.19)	(-2.03)
Share Overhang	0.02	0.02	0.02	0.02	0.02
	(1.86)	(1.88)	(1.86)	(1.92)	(1.93)
Natural Log of Sales	-0.13	-0.13	-0.13	-0.13	-0.13
	(-3.37)	(-3.53)	(-3.37)	(-3.60)	(-3.39)
No. of observations	1,002	1,002	1,002	203	1,002
Fama and French 48-industry dummies	Yes	Yes	Yes	Yes	Yes
Calendar year dummies	Yes	Yes	Yes	Yes	Yes
R^2	29.52%	29.53%	29.52%	29.53%	29.92%

This table presents regressions for the sample of 1,002 U.S. IPOs with an offer price of at least $5 per share, excluding ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, financial firms, and stocks not listed on CRSP. The sample is obtained from Jay Ritter's IPO website along with Thomson Financial Securities Data and SEC filings on EDGAR. The dependent variable, *Post-IPO Return Volatility*, is the market model root-mean square error for each IPO over day +5 to day +64 relative to their IPO date. The value is multiplied by 1,000. *PIPO* is a dummy variable set to one if the firm participates in a private IPO, else zero. *PIPO%* is defined as the percentage of PIPOs relative to market value of equity at time of IPO in 2016 dollars. *PIPO Clock* is the number of days between the most recent PIPO and IPO date divided by 365.25. *PIPO Count* is defined as the number of private IPOs the firm issued prior to their IPO. All regressions include an intercept, Fama and French (1997)

48-industry dummies, and calendar year dummies. The t-statistics are in parentheses with the standard errors clustered by year and industry.

CONCLUSION

Despite the recent shift in public to private equity financing, no study has invested the benefits of PIPOs for firms that eventually file for IPO. This paper finds that firms with PIPOs experience less underpricing when the percentage of PIPO investment is greater relative to total equity at IPO. A one percent increase in the ratio of PIPO funding to the market value of equity at IPO reduces the first-day return by 2.53%. This finding suggests there are benefits due to increased monitoring. I also find support that more recent PIPOs have less underpricing compared to earlier PIPOs. I find that each additional year between the last PIPO and the IPO date is associated with an 8.66% increase in first-day returns. This finding is consistent with the PIPO signal losing strength as business opportunities change over time. I do not find support that the number of PIPOs decreases information asymmetry, and I find each additional PIPO is related to a 2.79% increase in first-day returns.

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