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Seasoned equity offerings: stock market liquidity and duration of the completion cycle

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Abstract

Purpose – Short-term cash need plays a critical role in equity issuance decisions. Consequently, the ease with which a seasoned equity offer (SEO) is completed can have a direct effect on the cost of raising equity. The purpose of this paper is to examine whether liquidity is likely to affect the ease with which an offer is completed, as proxied by the length of the offer.

Design/methodology/approach – This study uses multiple regression analysis to establish the link between liquidity and the duration of the SEO completion cycle. To provide support to the findings, event study methodology is employed to study the abnormal volume turnover during the pre-SEO announcement period for firms with shorter and longer registration periods.

Findings – The paper finds that firms with greater liquidity come to market sooner. The results indicate a small yet significant effect of liquidity on the duration of the SEO completion cycle. There is also evidence that lower pre-announcement period volume turnover is associated with a longer registration period – which has some implications for issuance costs. The results are robust to the inclusion of industry or firm effects, use of different regression specifications, and application of alternative liquidity measures.

Originality/value – This paper belongs to the growing literature that examines the link between liquidity and the firm's equity issuance costs. It adds to the literature by: examining the determinants of the time it takes to complete an offering; providing the evidence that liquidity may affect the ease with which investment bankers place new shares; and presenting the evidence using newer measures of liquidity based on low-frequency data.

Keywords Liquidity, Flotation, Capital structure

Paper type Research paper

1. Introduction

Floatation costs of seasoned equity offerings (SEOs) represent a significant cost of capital to the issuing companies. There are three major components of floatation costs: underwriting fees, announcement-period market penalties, and time taken to complete an offer. The first component of floatation costs, underwriting fees, refers to the fees that a syndicate of investment banks charges as compensation for guaranteeing the purchase of the SEO at a fixed price and for bearing the risk associated with an unexpected fall in investor demand (Lee and Masulis, 2009). Studies show that an average firm pays underwriting fees ranging between 3 and 8 percent of gross proceeds (Lee *et al.*, 1996; Altinkilic and Hansen, 2000; Corwin, 2003; Butler *et al.*, 2005; among others).

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The second component of floatation costs is the price decline around the SEO announcement date. There are two explanations offered for the negative price reaction in response to the new equity offers. One explanation is based on the increased market perception of firm overvaluation. Myers and Majluf (1984) argue that investors are at an informational disadvantage relative to the managers and interpret issuing equity as a negative signal about the true value of the firm. Consistent with this argument, event studies have documented that the announcement period of equity offers is associated with significant negative returns of 2 to 3 percent (Asquith and Mullins, 1986; Masulis and Korwar, 1986; Mikkelson and Partch, 1986). The second explanation is the agency problem argument proposed by Jung *et al.* (1996). Since a debt issue puts restrictions on the use of funds, managers may issue equity to increase their private benefits of control. The consequences of increased free cash problems and sub-optimal investment policy may explain the negative stock price reaction to SEO announcements.

The third component of floatation costs is the time taken to complete an offer, which forms the basis of our paper. This cost represents an indirect yet a very significant cost to an issuer. A longer time taken to complete the SEO registration process can lead to increased expected costs to the issuer if it depletes internal resources or compels the issuer to resort to costlier sources of finance. DeAngelo *et al.* (2010) argue that near-term cash shortage is the primary motive for issuing SEOs, with market timing and lifecycle stage being only secondary considerations. They emphasize that, without the completion of the offering, 62.6 percent of these issuers would run out of cash or would be forced to modify their operating and financing decisions in the year after the SEO, and 81.1 percent would have subnormal cash levels within one year forcing them to resort to costlier sources of external capital. Consequently, any delay in completing an offering can significantly affect the financial liquidity of the company, at least in the short term. There are also other implicit costs resulting from longer SEO duration cycle. Longer time taken to complete an offering means:

- more management time devoted to the completion process;
- greater delay or loss of valuable business opportunities; and
- greater market uncertainty about the issue's value.

Accordingly, we view the registration period duration as an important component of expected floatation costs.

Although there has been a large amount of literature on firm-level and macroeconomic factors affecting underwriting fees and announcement-period price decline[1], limited attention has been paid to the determinants of the time taken to complete an offering. Our paper aims to fill this gap in the literature by shedding light on the determinants of the time it takes to complete an offering, and most importantly, testing the hypothesis that stock market liquidity lowers the duration of the completion cycle.

Researchers have long been interested in the role played by stock market liquidity in governance, performance, and cost of capital of firms. Studies such as Maug (1998), Holmstrom and Tirole (1993), Edmans (2009) and Admati and Pfleiderer (2009) show how market liquidity can reduce management-shareholder agency problems by promoting shareholder activism or providing more effective managerial incentive contracts. Maug (1998) points out that, far from being a hindrance to corporate control, liquidity mitigates the "free-rider" problem and induces shareholder activism by improving the incentives to intervene. Holmstrom and Tirole (1993), in a complementary argument,

suggest that liquidity can increase the incentives for investors to get information about firms. Edmans (2009) and Admati and Pfleiderer (2009) argue that the threat of exit induces managers to focus on long-term growth rather than interim profits. Studying the relation between liquidity and performance, Fang *et al.* (2009) show that liquidity improves performance by increasing the information content of stock prices.

Amihud and Mendelson (1986) and Easley and O'Hara (2004) focus on the relation between market liquidity and firms' cost of capital and argue that illiquid securities must provide higher returns to compensate investors for the risk they bear, as well as for the higher trading costs they incur. The notion of liquidity premium is confirmed by empirical evidence of a significant relation between stock returns and measures of liquidity such as bid-ask spreads (Amihud and Mendelson, 1986), volume turnover rates (Datar *et al.*, 1998), and adverse selection costs (Brennan and Subrahmanyam, 1996).

There are strong reasons to suspect that market liquidity will also lower the overall time taken to complete an offering. A growing body of research suggests that liquidity plays a critical role in reducing the costs of issuing equity. Starting with Demsetz (1968), authors show that intermediation costs decline with liquidity. Stoll and Whaley (1983) suggest illiquidity can explain the higher issue costs that small firms face. Authors have also shown a positive relation between liquidity and the probability of issuing equity. For example, Hennessy and Whited (2005) develop a theoretical model that suggests that debt declines with lagged liquidity measured by cash flow and profitability. Lipson and Mortal (2009) in an empirical study of the link between liquidity and capital structure decisions find that more liquid firms tend to rely on equity rather than debt. In related research, Giannetti (2003) finds that exchange-listed companies and companies in countries with better capitalized stock markets have lower leverage. More recently, Butler *et al.* (2005) provide empirical evidence that financial intermediaries find it easier to place an offering by a liquid firm. They show that the floatation costs as measured by the gross spread of an SEO are negatively related to several liquidity measures of the stock. Thus, if greater liquidity is likely to affect the ease with which investment bankers place new shares in the market, we would expect liquidity to lower the time it takes to complete an offering.

We test this hypothesis by studying a sample of 3,844 SEOs over the 1984-2008 period. We use five measures to capture the various dimensions of liquidity – trading quantity, trading speed, transaction cost, and price impact. Specifically, we employ the volume turnover measure to capture the trading quantity dimension, the illiquidity measure of Amihud (2002) and relative spread measure of Holden (2009) to capture the price impact dimension, zeros measure of Lesmond *et al.* (1999) to capture the trading cost dimension, and liquidity measure (LM*x*) of Liu (2006) to capture the trading speed dimension of liquidity.

Our empirical results support our predictions. Using cross-sectional regression analysis, we document that firms with greater liquidity during the pre-SEO period are more likely to complete the offering sooner even after controlling for other determinations. Our results hold across different liquidity measures and are robust to alternative regression specifications and different time periods. We find a small yet significant effect of liquidity on the duration on the SEO completion cycle. The main results are supported by additional evidence provided by abnormal trading volume before the SEO announcement. Using different estimation windows and alternative measures of computing abnormal volume turnover, we find that the pre-announcement period

abnormal trading volume is significantly higher for firms with shorter registration periods.

This study belongs to the growing literature that examines the link between liquidity and firm's equity issuance costs. Lipson and Mortal (2009) show that liquidity affects the probability of equity issue. Butler *et al.* (2005) show that liquidity reduces the cost of raising capital through an effect on underwriting fees. Extending this line of literature, we add that liquidity may also influence the ease with which an offering is completed, as proxied by the length of the completion cycle.

The remainder of this paper is organized as follows. Section 2 discusses the possible determinants of the duration of the SEO completion cycle. Section 3 discusses the measures of stock liquidity. Section 4 introduces the data and describes the sample selection process. Section 5 presents the empirical results. Section 6 provides the robustness tests for results and Section 7 concludes.

2. Determinants of duration of a completion cycle

In this section, we discuss various factors that can explain the cross-sectional variation in the time taken to complete an offering. We argue that firms with greater liquidity are more likely to complete an offering sooner. The rationale for this argument follows previous studies that establish the link between liquidity and cost of issuing equity. Butler *et al.* (2005) argue that it is easier for an investment banking syndicate to place an offering in a liquid market than in an illiquid market. Using theoretical models, Subrahmanyam and Titman (2001) and Khanna and Sonti (2004) show that liquidity stimulates the entry of informed traders who make prices more informative to stakeholders. Thus, a priori, a relation between liquidity and duration of the SEO completion cycle is quite plausible. To test this hypothesis, we construct five measures to proxy for the various dimensions of liquidity. These measures are described in more detail in the next section.

Previous studies have documented a positive relation between floatation costs and information asymmetry between managers and outside investors about firm performance. SEOs of these firms may be harder to place since there is an inherent uncertainty about the value of these assets. Thus, we expect firms with greater information asymmetry to take a longer time to complete an offering. Common measures of information asymmetry used in literature include stock return volatility (Altinkilic and Hansen, 2000; Corwin, 2003), proportion of intangible assets (Van Ness *et al.*, 2001), debt ratings (Liu and Malatesta, 2006), and bid-ask spreads (Corwin, 2003).

On a similar note, larger companies are more likely to have established information transmission networks including stock analysts, business news services, institutional investors, and other market participants, making it easier for the investment banker to place shares due to reduced information asymmetry. We expect large firms to complete the offering sooner.

Another important factor that may affect SEO completion cycle is the frequency of offerings. Easterbrook (1984) argues that since investors are able to track the firm's activities each time it goes to the security market, a firm that has conducted several SEOs in the past will experience reduced levels of information asymmetry. Supporting this conclusion, D'Mello *et al.* (2003) show that frequent equity issuers experience less floatation costs as measured by announcement period reactions. While explaining the revival of shelf equity offerings, Autore *et al.* (2008) show that frequent issuers have

a reduced need for certification. Since frequent seasoned equity issuers experience less asymmetric information, we expect them to complete the offering sooner.

DeAngelo *et al.* (2010) provide evidence that young firms with high market timing opportunities are more likely to conduct an SEO. Firms in the early stages of the corporate lifecycle are in a greater need of external capital than mature firms who finance investments internally. Thus, we expect growth-stage issuers to complete an offering sooner. We also expect issuing firms with market-timer characteristics represented by high market-to-book ratios, profitability ratios, and stock price run-up to complete the offering sooner to tap into their opportunistic advantages.

Highly levered firms tend to have more volatile earnings and higher risks of financial distress due to the presence of fixed charges. The managers of highly levered firms may also have greater incentives to use the SEO proceeds to reduce debt, thereby driving down the demand for their offerings. As a result, investment bankers may find it harder to place SEOs of highly levered firms.

Butler *et al.* (2005) argue that investment bankers may find low-priced stocks difficult to place than high-priced stocks. Accordingly, we expect offers of low-priced securities to have a longer completion cycle than offers of high-priced securities, all else equal.

Finally, we also expect firms with greater funding needs (as proxied by capital expenditure) and more stable financial conditions (as proxied by z-scores) to have a shorter registration cycle.

3. Measuring stock liquidity

Liu (2006, p. 631) points out that liquidity can be generally described as "the ability to trade large quantities quickly at low cost with little price impact". This description suggests that liquidity has a much broader scope and can be examined from four dimensions, namely, trading quantity, trading speed, transaction cost, and price impact. Accordingly, we employ volume turnover measure to capture the trading quantity dimension, illiquidity measure of Amihud (2002) and relative spread measure of Holden (2009) to capture the price impact dimension, zeros measure of Lesmond *et al.* (1999) to capture the trading cost dimension, and liquidity measure (LM*x*) of Liu (2006) to capture the trading speed dimension of liquidity.

Unlike prior studies that rely on intraday (high frequency) Trades and Quotes (TAQ) database, we calculate liquidity measures using daily (low-frequency) data from the Center for Research in Securities Prices (CRSP) database. The use of daily data allows us to conduct an analysis over a longer timeframe [2]. In a study based on competing proxies for liquidity Goyenko *et al.* (2009) sample liquidity proxies based on daily data and compare them with those calculated from the intraday TAQ database. They find that liquidity measures calculated from daily data are good proxies of high-frequency transaction cost benchmarks. They conclude that "in many applications, correlations are high and mean squared error low enough that the effort of using high-frequency measures is simply not worth the cost". The use of daily data is supported by recent studies such as Lesmond *et al.* (1999), Amihud (2002), Lesmond (2005), Hasbrouck (2009), Goyenko *et al.* (2009) and many others who use daily data to estimate the effective transaction costs for a given firm, exchange, or time period.

The liquidity measures we use in this study are described in greater detail below. All liquidity measures are computed over the six-month period prior to the SEO:

- *Volume turnover measure.* We use volume turnover, instead of trading volume, to measure the trading quantity dimension of liquidity. Volume turnover is calculated as the natural logarithm of the percentage of trading volume divided by outstanding shares:

$$V_{i,t}, = Log\left(\frac{100\, n_{i,t}}{S_{i,t}} + 0.000255\right), \quad (1)$$

where $n_{i,t}$ is the number of shares traded for security i on day t, and $S_{i,t}$ is the number of shares outstanding on day t. Following Campbell and Wasley (1996), before transformation, a small constant of 0.000255 is added to accommodate zero-trading volume. Several studies (Campbell *et al.*, 1993; Chordia and Swaminathan, 2000; Chae, 2005) have used volume turnover as a measure of trading volume. One advantage of volume turnover over trading volume is that, despite high correlation with trading volume, it has a weak correlation with firm size. Chordia and Swaminathan (2000) find a strong correlation between raw trading volume and firm size (0.78) and raw trading volume and turnover (0.60), but a correlation between firm size and turnover of only 0.15. We follow the recommendation by Ajinkya and Jain (1989) and Cready and Ramanan (1991) to use the log-transformation of raw volume data to approximate a normal distribution. In recent research, Chae (2005) shows that skewness and kurtosis are closer to normal when the log function of volume turnover is used. Studies such as Amihud and Mendelson (1986) and Atkins and Dyl (1997) have shown that turnover is negatively correlated to illiquidity costs, and thus, a high volume turnover ratio indicates a more liquid market.

- *Illiquidity measure of Amihud (2002).* This measure is calculated as the average of absolute return divided by dollar volume over all positive-volume days. Amihud (2002) points out that this price impact measure captures how daily stock price reacts to a dollar of trading volume. It is based on the intuition that, for an illiquid stock, large price changes are associated with low trading volume levels. Accordingly, a smaller Amihud illiquidity measure indicates improved liquidity. Hasbrouck (2009) evaluates the empirical reliability of high-frequency (daily) proxies of liquidity and finds the Amihud's (2002) illiquidity measure to be highly correlated with the TAQ-based price impact measure.

- *Relative spread measure of Holden (2009).* For NYSE and AMEX stocks, Holden (2009) develops an estimate of a dollar spread using daily data that based on price clustering. In his model with a fractional price grid, Holden shows that the dollar spread can be inferred by checking the frequency of closing price that occurs on odd 1/16 s, odd 1/8 s, odd 1/4 s, odd 1/2 s, and whole dollars. Similarly, in his model with a decimal price grid, the dollar spread can be inferred by checking the frequency of transactions that occur on off pennies, off nickels, off dimes, off half dollars, and whole dollars. The dollar spread is calculated as the weighted average of each spread size[3]. Like other cross-sectional studies, the dollar spread is standardized to adjust for stock price to arrive at the relative spread measure. A low relative spread is indicative of improved liquidity.

  For NASDAQ stocks, the bid and ask prices are available from the CRSP stock database. We calculate the dollar spread as the ask price minus the bid price. The relative spread is then calculated as the dollar spread divided by the average of the bid and ask prices.

- *Zeros measure of Lesmond et al. (1999).* Zeros measure is calculated as the ratio of days with zero returns to the total number of trading days. This measure is based on the premise that marginal investors will not trade or trade less if transaction costs are high and value of information signal does not exceed the transaction cost threshold. Thus, the zeros measure is a good proxy for transaction costs and we can infer stocks with lower liquidity to have more observed incidences of zero returns.
- *Liquidity measure (LMx) of Liu (2006).* Developed on the idea that more zero-trading occurrences indicate higher level of illiquidity and higher transaction costs, we calculate Liu's (2006) liquidity measure, LM*x*, as the standardized turnover-adjusted number of days with zero-trading volume over the prior *x* days:

$$LMx = \left[Number\ of\ zero\ daily\ volume\ in\ prior\ x\ months + \frac{1/(x - month\ \ turnover)}{Deflator}\right] \times \frac{21x}{NoTD}, \quad (2)$$

where "*x*-month turnover" is the stock's turnover in the prior months calculated as the sum of daily turnover over the prior *x* months, daily turnover is the ratio of the number of shares traded on a day to the number of shares outstanding at the end of the day, NoTD is the total number of trading days in the market over the prior *x* months, and Deflator is chosen such that:

$$0 < \frac{1/(x - month\ \ turnover)}{Deflator} < 1$$

for all sample stocks (for example, Liu used a deflator of 11,000 in constructing LM6 and LM12, and a deflator of 480,000 for LM1).

Liu (2006) shows that this measure which captures the multiple dimensions of liquidity such as trading speed, trading quantity, trading cost, and trading speed is highly correlated with traditional measures of liquidity such as bid-ask spread, turnover, and Amihud's (2002) illiquidity measure. The Liu's (2006) LM*x* measure identifies liquid stocks by first sorting on the occurrences of pure zero-trading volumes and then sorting on turnover. Conditional on the number of zero-trading volume days, a stock with high turnover is more liquid. Thus, a high LM*x* measure implies lower liquidity.

4. Sample selection

Our sample of SEOs comes from Thomson Financial Securities Data Corporation's (SDC) Global New Issues database. We focus our analyses on those firms that issued shares of common offerings during the period 1984-2008. From the initial sample, we exclude initial public offerings, rights offers, warrants, unit offers, shelf registrations, REITs, ADRs, closed-end mutual funds, offers by financials (SIC code 6000-6999) and utilities (SIC code 4900-4999), and offerings by non-US firms. To be included in the sample, all SEOs must meet the selection criteria as follows:

- firms must have all necessary data available on the CRSP-Compustat Merged database, including total assets and book value of equity data available for the most recent fiscal year prior to the completion of the equity offering;

- firms must be listed on the NYSE, AMEX, or NASDAQ;
- firms must have at least six months of pre-offer data available from CRSP for computing our liquidity measures; and
- following Corwin (2003), the offer price must be between $3 and $400 to ensure that small or illiquid firms are not driving the results[4].

These restrictions give us a sample of 3,844 SEOs. We adopt Corwin's (2003) volume-based correction procedure to correct for possible errors in offer dates as reported by SDC. This correction procedure results in an offer-date change for 47.42 percent of the sample offers[5]. We deflate monetary variables to constant $2,000 using the gross domestic product (GDP) implicit price deflator. Data for the GDP implicit price deflator are available from the Bureau of Economic Analysis (http://bea.gov/).

We divide our sample into firms with short and long registration periods. We define firms with less than 30 days in the registration period as firms with shorter registration periods. We define firms with 30 or more days in the registration period as firms with longer registration cycle. About 75 percent of the firms in the sample have registration periods shorter than 30 days.

Table I provides the total number of SEO and the mean and median days in the registration period in each year from 1984 to 2008. Confirming previous findings, SEOs are highest in the 1990s. Both the short and the long registration samples exhibit an increase in offerings during this period. However, we do not observe any trend over time. The mean (median) number of days in the registration period is 27.20 (21) days. The mean (median) number of days in the registration period is 17.46 (17) days for firms with short registration periods and 55.17 (39) days for firms with long registration periods.

5. Empirical results

5.1 Univariate results

Table II presents the summary statistics broken down into firm-level characteristics, SEO-related characteristics, and liquidity proxies for firms with long and short registration periods. We find that firms with shorter completion cycle are large firms with lower volatility of returns and debt levels, and higher stock price run-up, pre-offer stock price, and z-scores. The median (average) firm size is $82.69 ($523.28) million for firms with shorter registration periods compared to $68.05 ($451.34) million for firms with longer registration periods. The difference is statistically significant with a *t*-statistic of 1.79. Consistent with our expectations, short registration firms comprise of frequent seasoned equity issuers with greater market timing opportunities. The median (average) underwriting fees for firms in the short registration period sample are 5.7 percent (5.6 percent). Firms with a longer completion cycle face higher fees (median underwriting fees are 6.1 percent and average underwriting fees are 6.2 percent). The median (average) level of share price is $22.5 ($26.85) for short registration firms and $16.25 ($20.32) for long registration firms, respectively. This is consistent with the argument that investment bankers charge lower fees to high-priced firms that are placed quickly.

Table II also reports the levels of liquidity for short and long registration firms based on the volume turnover measure, Amihud's (2002) illiquidity measure, Holden (2009)'s relative spread, Lesmond *et al.* (1999)'s zeros ratio, and Liu's (2006) multi-dimensional LM*x* measure. All liquidity measures are obtained from the six-month period prior to the SEO. On average, all five liquidity measures provide results consistent with

Year	Entire sample Obs	Mdays	MDdays	Short registration firms Obs	Mdays	MDdays	Long registration firms Obs	Mdays	MDdays
1984	46	19.13	16	39	15.21	14	7	41.00	36
1985	141	16.73	13	128	13.36	12.5	13	49.92	35
1986	184	20.60	15	154	14.48	14	30	52.00	37
1987	162	18.38	15	135	14.42	14	27	38.19	36
1988	65	18.92	18	59	17.44	17	6	33.50	32.5
1989	86	22.53	19	68	16.63	17.5	18	44.83	36.5
1990	97	28.75	22	74	18.34	17.5	23	62.26	36
1991	213	25.42	22	153	17.28	16	60	46.17	34
1992	240	25.75	22	170	18.36	18	70	43.71	36
1993	271	30.61	23	192	18.79	19	79	59.33	38
1994	227	26.56	21	158	17.97	17	69	46.20	35
1995	277	34.46	22	206	18.21	18	71	81.59	39
1996	373	25.78	24	257	19.38	19	116	39.97	36
1997	289	26.38	21	208	18.53	18.5	81	46.54	40
1998	215	27.50	21	163	18.20	18	52	56.67	41.5
1999	163	37.48	24	104	18.61	19	59	70.76	42
2000	209	28.77	21	159	18.86	19	50	60.28	40
2001	107	38.10	22	78	18.54	19	29	90.72	44
2002	100	33.38	19.5	75	17.16	17	25	82.04	57
2003	98	26.98	17	73	15.05	15	25	61.80	51
2004	96	30.72	21	61	16.15	16	35	56.11	48
2005	60	26.37	20	45	17.82	17	15	52.00	42
2006	59	29.61	21	40	16.88	16	19	56.42	45
2007	42	22.98	17.5	33	15.36	15	9	50.89	47
2008	24	22.92	15.5	19	14.37	14	5	55.40	51
Total	3,844	27.20	21	2,851	17.46	17	993	55.17	39

Notes: The sample consists of 3,844 completed offerings during the period 1984-2008 by firms listed on the CRSP NYSE, AMEX, and NASDAQ tapes; short registration firms are firms with less than 30 days in the registration period; long registration firms are firms with 30 or more days in the registration period; the sample is obtained from the Security Data Corporation's Global New Issues database; offerings by closed-end funds, REITs, ADRs, warrants, unit offerings, rights offerings, shelf registrations, firms with missing book value of total assets or equity, and firms with offer prices lower than $3 or higher than $400 are excluded from the final sample; Obs is number of observations; Mdays is mean registration days; MDdays is median registration days

Table I.
Frequency distribution and number of days in registration period, 1984-2008

our predictions. The pre-SEO average volume turnover measure is significantly higher for short registration firms with a *t*-statistic of 4.81. The Amihud's (2002) illiquidity measure shows a decrease in the price impact of trades during the pre-SEO period for short registration firms. The median (average) illiquidity ratio is 0.04 (0.28) and 0.07 (0.88) for short and long registration firms, respectively. The difference is statistically significant at the 1 percent level. The transaction costs as proxied by the proportion of zero daily trading volume days are lower for short registration firms. The median (average) proportion of days with zeros daily trading volume is 0.13 (0.14) for short registration firms which is significantly lower than the median (average) number of zeros of 0.14 (0.16) for long registration firms. The LM*x* measure is significantly lower for short registration firms. The pre-SEO average LM*x* is 17.97, indicating that an average firm with shorter completion cycle has 17.97 turnover-adjusted zero-trade days during the six-month period prior to the SEO. In contrast, firms with longer registration

Table II. Descriptive statistics for firms with short and long registration periods, 1984-2008

	Short registration firms					Long registration firms					Short vs long	
	Mean	Median	Min.	Max.	SD	Mean	Median	Min.	Max.	SD	*t*-test	Wilcoxon
Regis days (days)	17.457	17.000	4.000	29.000	6.292	55.172	39.000	30.000	2,059.000	87.673	−13.540	−47.020
Fim-level characteristics												
Firm size (mill $)	523.282	82.685	0.565	137,801.744	3,220.824	451.344	68.048	0.921	47,533.596	2,371.814	1.790	5.198
Volatility	0.035	0.032	0.007	0.133	0.015	0.040	0.037	0.007	0.155	0.017	−7.650	−8.136
NbrSEO	1.403	1.000	1.000	6.000	0.727	1.308	1.000	1.000	5.000	0.635	3.640	3.783
LifeCycle	16.196	14.000	2.000	59.000	11.576	16.159	14.000	2.000	59.000	10.491	0.090	−1.444
MTB	3.194	2.121	0.609	105.090	4.261	2.981	1.842	0.258	83.745	4.355	1.350	5.187
Run-up	0.070	0.038	−0.700	2.328	0.235	−0.015	−0.039	−0.833	1.147	0.232	9.850	10.515
Leverage	0.204	0.161	0.000	0.888	0.191	0.241	0.216	0.000	0.900	0.206	−5.150	−4.670
Zscore	1.527	1.783	−32.633	15.271	2.168	0.839	1.247	−21.362	8.261	2.480	8.280	9.372
Intang	0.074	0.000	0.000	0.908	0.140	0.087	0.002	0.000	0.882	0.150	−2.500	−2.259
Capex	0.090	0.055	−0.015	1.036	0.104	0.079	0.044	0.000	0.896	0.099	2.940	4.992
Profit	0.097	0.138	−1.848	0.730	0.208	0.027	0.103	−1.804	0.535	0.270	7.390	9.460
Price ($)	26.847	22.500	3.000	305.000	20.248	20.320	16.250	2.000	249.313	16.485	9.160	12.811
SEO-level characteristics												
Offer price ($)	25.621	21.500	3.000	210.000	18.872	19.068	15.000	3.000	247.000	16.008	9.780	13.601
Proceeds (mill $)	90.732	52.275	1.480	2,763.750	143.133	73.758	38.850	1.850	2,782.500	162.141	3.110	7.734
RelOffer	0.199	0.176	0.000	2.719	0.135	0.261	0.211	0.015	6.150	0.259	−7.180	−8.749
Fees (%)	5.614	5.748	0.000	20.004	1.357	6.210	6.068	0.000	24.998	1.705	−11.110	−11.258
Liquidity proxies												
Turnover	−1.293	−1.136	−12.954	2.049	1.373	−1.625	−1.177	−14.256	2.581	2.015	4.810	2.573
Amihud	0.281	0.039	0.000	19.254	0.916	0.875	0.070	0.000	140.357	5.031	−3.690	−7.458
Holden	0.032	0.024	−0.006	0.350	0.033	0.043	0.029	0.000	0.568	0.049	−6.160	−5.282
Zeros	0.139	0.130	0.000	0.805	14.549	0.156	0.138	0.000	0.902	25.423	−3.910	−3.046
LM*x*	17.972	16.390	0.000	200.311	14.549	21.562	18.439	0.000	438.993	25.423	−4.220	−3.298

Notes: The table reports the summary statistics for the firms with short and long registration periods; short registration firms are firms with less than 30 days in the registration period; long registration firms are firms with 30 or more days in the registration period; the sample consists of 3,844 completed offerings during the period 1984-2008 by firms listed on the CRSP NYSE, AMEX, and NASDAQ tapes; 2,851 (993) firms have a registration period of up to (equal to or more than) 30 days; the sample is obtained from the Security Data Corporation's Global New Issues database; offerings by closed-end funds, REITs, ADRs, warrants, unit offerings, rights offerings, shelf registrations, firms with missing book value of total assets or equity, and firms with offer prices lower than $3 or higher than $400 are excluded from the final sample; the last two columns report the *t*-statistics and Wilcoxon test statistics, respectively, for the difference in the firm-level characteristics, SEO-based characteristics, and liquidity proxies for firms with short and long registration periods

periods experience an average of 21.56 zero-trade days during the pre-SEO period. The difference is statistically significant with a t-statistic of -4.22.

Thus, the results from the univariate analysis are consistent with our hypothesis that firms with greater liquidity are more likely to complete the offering sooner. We next use cross-sectional regression analyses to further investigate whether liquidity is one of the determinants of the SEO completion cycle.

5.2 Multivariate results

While the univariate results presented in the previous section suggest a relationship between liquidity and the duration of the completion cycle, it may be possible that some other explanatory variable may be driving this relation. In this section, we re-examine the relation between liquidity and duration of the SEO registration cycle while controlling for other explanatory variables in a multivariate regression model.

5.2.1 Logistic regression analysis. We begin our analysis by first estimating logistic regressions. In the logistic framework, we consider the probability of a short registration period, without taking into consideration the actual days taken to complete the offering. To test our hypothesis that pre-SEO liquidity is a determinant of the duration of the SEO completion cycle, we use the following logit regression model:

$$\begin{aligned} Duration_i, = & \alpha_0 + \alpha_1 Liquidity_i + \alpha_2 Firm\ \ Size_i + \alpha_3 Volatility_i + \alpha_4 NbrSEO_i \\ & + \alpha_5 LifeCycle_i + \alpha_6 MTB_i + \alpha_7 Run - up_i + \alpha_8 Leverage_i \\ & + \alpha_9 Zscore_i + \alpha_{10} Intang_i + \alpha_{11} Capex_i + \alpha_{12} Profit_i + \alpha_{13} Price_i + \varepsilon_i \end{aligned} \tag{3}$$

The dependent variable, *Duration*, is equal to one for firms with shorter registration periods, and zero for firms with longer registration periods. The model allows us to test the relation between *Duration* and *Liquidity*, after controlling for the explanatory variables. Liquidity is measured using five proxies: volume turnover ratio, Amihud's (2002) illiquidity ratio, Holden's (2009) relative spread, Lesmond *et al.*'s (1999) zeros measure, and Liu's (2006) LM*x* measure. To control for time variation in equity market conditions, we assign a dummy variable to each year's observations in the sample. Following the classification system used by Fama and French (1997), we also use a 1-0 dummy variable to control for industry effects by assigning firms to a specific industry according to four-digit SIC codes. All variables are defined in the Appendix along with their data sources. Table III reports the regression results.

According to Table III, firms with short registration periods have significantly higher pre-SEO volume turnover ratios, lower illiquidity ratios, less occurrences of zero returns, less turnover-adjusted number of days with zero-trading volume, and lower relative spreads. These regression results are consistent with our hypothesis that, *ceteris paribus*, firms with greater pre-SEO liquidity are more likely to complete the offering sooner.

As for the control variables, the signs and statistical significance of their coefficients are roughly consistent across all specifications. Table III shows that, holding other things constant, larger firms, firms with more frequent offerings, and firms with lower volatility of returns have shorter registration periods, consistent with the information asymmetry explanation. We find that young firms and firms with greater market timing opportunities as represented by higher pre-SEO market-to-book ratio, stock price run-up, and profitability ratio have shorter registration cycles, consistent with DeAngelo *et al.* (2010). Meanwhile, more levered firms are associated with longer registration periods.

Table III. Logistic regression results – determinants of time taken to complete an offering, 1984-2008

	Regression models										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	ME (%)
Intercept	1.9036	1.3259	1.5813	1.8811	1.8851	−2.3971	−1.8976	−2.2253	−2.1849	−2.1826	
	(<.0001)	(0.0416)	(0.0141)	(0.0040)	(0.0043)	(0.0040)	(0.0242)	(0.0083)	(0.0088)	(0.0089)	
Turnover	0.1243					0.0957					2.95
	(<0.0001)					(0.0009)					
Amihud		−0.2325					−0.0937				−2.71
		(<0.0001)					(0.0032)				
Holden			−9.1475					−2.6948			−2.08
			(<0.0001)					(0.0437)			
Zeros				−4.1510					−1.3907		−4.42
				(<0.0001)					(0.0269)		
LM*x*					−0.0263					−0.0108	−4.56
					(<0.0001)					(0.0010)	
Log(Firm Size)						0.1382	0.1420	0.1596	0.1355	0.1277	
						(0.0009)	(0.0007)	(0.0002)	(0.0014)	(0.0025)	
Log(Volatility)						−0.6572	−0.4473	−0.5734	−0.6086	−0.6363	
						(<0.0001)	(0.0025)	(0.0001)	(<0.0001)	(<0.0001)	
Log(NbrSEO)						0.3371	0.3812	0.4046	0.3773	0.3748	
						(0.0036)	(0.0008)	(0.0004)	(0.0010)	(0.0011)	
Log(LifeCycle)						−0.2849	−0.2712	−0.2794	−0.2885	−0.2912	
						(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	
Log(MTB)						0.4860	0.4801	0.5600	0.4929	0.4870	
						(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	
Run-up						1.8143	1.8127	1.8345	1.8376	1.8469	
						(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	
Log(Leverage)						−0.0553	−0.0568	−0.0525	−0.0571	−0.0576	
						(0.0433)	(0.0381)	(0.0574)	(0.0368)	(0.0355)	
Zscore						0.0287	0.0259	0.0312	0.0272	0.0283	

(*continued*)

Table III.

	Regression models										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	ME (%)
						(0.3550)	(0.4036)	(0.3204)	(0.3816)	(0.3655)	
Log(Intang)						0.0021	0.0023	0.0028	0.0015	0.0008	
						(0.9313)	(0.9244)	(0.9108)	(0.9510)	(0.9746)	
Capex						0.5486	0.6233	0.8274	0.5810	0.5659	
						(0.2350)	(0.1790)	(0.0856)	(0.2075)	(0.2201)	
Profit						0.9513	0.9797	0.8501	0.9552	0.9554	
						(0.0021)	(0.0015)	(0.0070)	(0.0020)	(0.0021)	
Log(Price)						0.2136	0.2395	0.1271	0.1848	0.1718	
						(0.0255)	(0.0112)	(0.2283)	(0.0721)	(0.0808)	
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Ind dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Log likelihood (%)	3.55	8.11	8.51	8.36	8.55	18.94	18.88	18.79	18.73	19.01	
Observations	3,844	3,844	3,844	3,844	3,844	3,844	3,844	3,844	3,844	3,844	

Notes: The dependent variable is equal to one if firms complete an offering in less than 30 days, and zero otherwise; the explanatory variables are defined in the Appendix; in parentheses beneath the coefficient estimates are the p-values; percentage of ME reports the change in the implied probability that the firm will complete the offering in 30 days associated with the change in the liquidity measure from the 25th to the 75th percentile of its sample distribution, holding all other variables at their mean values; percentage of ME is based on coefficients from regression models (6)-(10)

The pre-SEO stock price level is statistically significant in all models, except Model 8. Z-score, proportion of intangible assets, and capital expenditure ratio are insignificant after the inclusion of control variables. Exclusion of these variables does not affect the significance of key variables and other explanatory variables.

The last column of Table III reports the magnitude of the marginal effect of each liquidity variable. This is measured as the change in the implied probability that the firm will complete the offering in 30 days associated with the change in the liquidity measure from the 25th to the 75th percentile of its sample distribution, holding all other variables at their mean values. The marginal effects are based on coefficients from regression models (6)-(10). The marginal effect associated with the volume turnover measure of 2.95 percent indicates that moving from the first quartile to the third quartile of volume turnover measure increases the probability of completing an offering in 30 days by 2.95 percent. Similarly, an increase in the LM*x* measure from its 25th percentile to its 75th percentile decreases the probability of a short registration period by 4.56 percent. The marginal effects associated with illiquidity ratios, relative spreads, and zero-trading days are -2.71, -2.08, and -4.42 percent, respectively.

Table IV re-examines the relation between time taken to complete an offering and pre-SEO liquidity by using log of number of days in the SEO registration period as the dependent variable. To mitigate problems related to the probability distribution of the error terms, we estimate the regression using the GMM technique with a Newey-West correction. This procedure yields a heteroskedastic- and autoregressive-consistent covariance matrix. The results are generally consistent with the results from Table III. We find that short registration firms have significantly higher turnover ratios and lower illiquidity ratios, relative spreads, zero-trading days, and turnover-adjusted zero-trading days, even after controlling for other variables. The signs and significance of the control variables are consistent with the results of Table III, except that pre-SEO stock price and z-score ratios are now statistically significant across all models.

5.2.2 Poisson regression analysis. In this section, we employ a Poisson specification to analyze the relation between time to complete an offering and pre-SEO liquidity measures. The primary benefit of Poisson regression modeling over logistic regression modeling is that it allows us to capture the discrete and non-negative nature of the number of days to complete an offering. The sample construction is identical to what was used earlier in our logistic regression analysis. Following Goldstein and Nelling (1999), we use log of number of days in the SEO registration period as our dependent variable to reduce the effect of outliers.

The results from the Poisson regression models are reported in Table V. The main results are consistent with Tables III and IV. We find that the time to complete an offer significantly declines with liquidity. Among other control variables, we find that all variables, except z-score, proportion of intangible assets, and capital expenditure ratio, are statistically significant. Exclusion of the insignificant variables does not alter the significance of liquidity measures and other control variables.

The marginal effects are presented in the last column of Table V. We measure marginal effect as percentage change in the estimated mean log number of days to completion associated with the change in the liquidity measure from the 25th to the 75th percentile of its sample distribution, holding all other variables at their mean values. The marginal effects are based on coefficients from regression models (6)-(10). We find that moving the liquidity measures from the first quartile to the third quartile

Table IV.
Regression Results – Dependent variable is log of number of days in the SEO registration period, 1984-2008

	Regression models									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intercept	2.8967	3.0557	2.9530	2.8713	2.9035	4.2047	4.1295	4.1425	4.1474	4.1441
	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)
Turnover	−0.0655					−0.0311				
	(<0.0001)					(<0.0001)				
Amihud		0.0261					0.0102			
		(0.0155)					(0.0009)			
Holden			2.8502					0.5955		
			(<0.0001)					(0.0447)		
Zeros				1.4458					0.4383	
				(<0.0001)					(0.0902)	
LM*x*					0.0071					0.0020
					(<0.0001)					(0.0030)
Log(Firm Size)						−0.0739	−0.0769	−0.0791	−0.0754	−0.0740
						(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)
Log(Volatility)						0.1218	0.0675	0.0868	0.0916	0.0965
						(0.0054)	(0.0997)	(0.0390)	(0.0436)	(0.0258)
Log(NbrSEO)						−0.1181	−0.1348	−0.1371	−0.1330	−0.1324
						(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)
Log(LifeCycle)						0.0767	0.0724	0.0744	0.0770	0.0774
						(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)
Log(MTB)						−0.1368	−0.1387	−0.1504	−0.1405	−0.1393
						(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)

(*continued*)

Table IV.

	Regression models (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Run-up						−0.3842	−0.3794	−0.3875	−0.3861	−0.3876
						(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)
Log(Leverage)						0.0149	0.0161	0.0152	0.0157	0.0157
						(0.0151)	(0.0090)	(0.0143)	(0.0108)	(0.0105)
Zscore						−0.0119	−0.0109	−0.0112	−0.0114	−0.0115
						(0.0742)	(0.1005)	(0.0931)	(0.0873)	(0.0851)
Log(Intang)						−0.0035	−0.0035	−0.0030	−0.0035	−0.0033
						(0.5274)	(0.5375)	(0.5973)	(0.5346)	(0.5513)
Capex						−0.1482	−0.1621	−0.1745	−0.1654	−0.1624
						(0.1699)	(0.1339)	(0.1138)	(0.1257)	(0.1327)
Profit						−0.1569	−0.1587	−0.1388	−0.1544	−0.1548
						(0.0196)	(0.0179)	(0.0410)	(0.0219)	(0.0217)
Log(Price)						−0.0888	−0.1071	−0.0822	−0.0941	−0.0910
						(0.0004)	(<0.0001)	(0.0022)	(0.0006)	(0.0004)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2 (%)	9.63	8.69	10.19	10.89	10.27	20.69	20.46	20.38	20.34	20.45
Observations	3,844	3,844	3,844	3,844	3,844	3,844	3,844	3,844	3,844	3,844

Notes: The table reports the results of regressing log of number of days in the SEO registration period on determinants of time taken to complete the offering over the period 1984-2008; the explanatory variables are defined in the Appendix; the regression is estimated using Generalized Method of Moments with Newey-West correction; in parentheses beneath the point estimates are the *p*-values

Table V. Poisson regression analysis of the time taken to complete an offering, 1984-2008

	Regression models (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	ME (%)
Intercept	1.0650 (<0.0001)	1.1179 (<0.0001)	1.0843 (<0.0001)	1.0565 (<0.0001)	1.0697 (<0.0001)	1.4852 (<0.0001)	1.4666 (<0.0001)	1.4674 (<0.0001)	1.4675 (<0.0001)	1.4677 (<0.0001)	
Turnover	−0.0208 (<0.0001)					−0.0096 (<0.0001)					−2.04
Amihud		0.0059 (0.0176)					0.0022 (0.0015)				0.91
Holden			0.8857 (<.0001)					0.1866 (0.0405)			1.23
Zeros				0.4740 (<.0001)					0.0865 (0.0892)		1.85
LM*x*					0.0021 (<.0001)					0.0006 (0.0011)	1.97
Log(Firm Size)						−0.0246 (<0.0001)	−0.0256 (<0.0001)	−0.0261 (<0.0001)	−0.0248 (<0.0001)	−0.0245 (<0.0001)	
Log(Vo latility)						0.0371 (0.0064)	0.0211 (0.0997)	0.0269 (0.0422)	0.0289 (0.042)	0.0299 (0.0267)	
Log(NbrSEO)						−0.0391 (<.0001)	−0.0445 (<.0001)	−0.0453 (<.0001)	−0.0437 (<.0001)	−0.0436 (<.0001)	
Log(LifeCycle)						0.0245 (<.0001)	0.0231 (<.0001)	0.0238 (<.0001)	0.0247 (<.0001)	0.0247 (<.0001)	
Log(MTB)						−0.0448 (<.0001)	−0.0457 (<.0001)	−0.0493 (<.0001)	−0.0459 (<.0001)	−0.0456 (<.0001)	
Run-up						−0.1231 (<.0001)	−0.1214 (<.0001)	−0.1243 (<.0001)	−0.1240 (<.0001)	−0.1242 (<.0001)	
Log(Leverag e)						0.0050	0.0054	0.0051	0.0053	0.0053	

(*continued*)

	Regression models										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	ME (%)
						(0.0118)	(0.0067)	(0.0117)	(0.0086)	(0.0083)	
Zscore						−0.0033	−0.0030	−0.0031	−0.0032	−0.0032	
						(0.0955)	(0.1292)	(0.1192)	(0.1134)	(0.1102)	
Log(Intang)						−0.0012	−0.0011	−0.0010	−0.0011	−0.0011	
						(0.5177)	(0.5251)	(0.5954)	(0.5302)	(0.5416)	
Capex						−0.0494	−0.0537	−0.0580	−0.0546	−0.0536	
						(0.1607)	(0.1271)	(0.1074)	(0.1200)	(0.1268)	
Profit						−0.0507	−0.0507	−0.0448	−0.0499	−0.0500	
						(0.0124)	(0.0122)	(0.0294)	(0.0140)	(0.0139)	
Log(Price)						−0.0291	−0.0352	−0.0267	−0.0299	−0.0296	
						(0.0002)	(<0.0001)	(0.0013)	(0.0004)	(0.0002)	
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Ind dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Ye s	Yes	
Log likelihood	1,344.56	1,337.20	1,308.47	1,347.88	1,345.86	1,365.78	1,365.70	1,327.20	1,365.01	1,365.26	
Observations	3,844	3,844	3,844	3,844	3,844	3,844	3,844	3,844	3,844	3,844	

Notes: The dependent variable is the log of number of days in the SEO registration period; the explanatory variables are defined in the Appendix; in parentheses beneath the estimates are the *p*-values; percentage of ME reports the percentage change in the estimated mean log number of days to complete an offering associated with the change in the liquidity measure from the 25th to the 75th percentile of its sample distribution, holding all other variables at their mean values; percentage of ME is based on coefficients from regression models (6)-(10)

Table V.

yields a 0.91-2.04 percent change in the estimated mean log number of days in the SEO completion period.

6. Robustness

6.1 Alternative specifications

In this sub-section, we report the robustness of our results presented in the previous section to our choice of control variables. We re-estimate the regression models using alternative proxies for firm size (market capitalization during the most recent fiscal year prior to the offering, market capitalization five days prior to the offering, market capitalization one day prior to the offering), profitability (net income or pre-tax income scaled by assets), information asymmetry (standard deviation of daily market-adjusted returns during the six-month prior to the offering, credit rating, secondary shares), and other firm characteristics (cash scaled by assets, R&D scaled by assets, net fixed assets scaled by assets) obtained from the most recent fiscal year financial statements prior to the offering. We find that our previous results are not affected by the choice of alternative specifications.

6.2 Abnormal volume turnover during the pre-announcement periods for SEOs

To add robustness to the results in Section 5, we examine abnormal volume turnover patterns during the pre-announcement period for long and short registration firms. We compute the abnormal volume turnover using the one-factor market model and the comparison-period model approach. In the one-factor market model, we estimate the coefficient of a CRSP equally weighted log volume turnover index from the estimation period (t = announcement date – 51 to t = announcement date – 100), and apply this to compute the abnormal volume turnover during the event period as:

$$\xi_{i,t} = V_{i,t} - (\alpha_i + \beta_i V_{m,t}) \tag{4}$$

where $V_{m,t}$ is the CRSP equally weighted market volume measure, and α_i and β_i are obtained using ordinary least squares coefficients from the estimation interval. Average abnormal turnover is computed as:

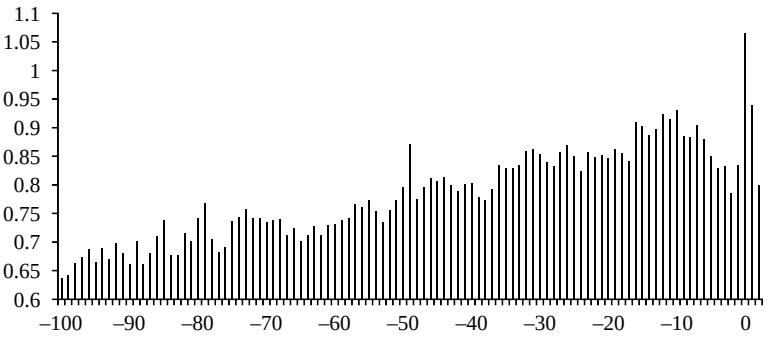
$$\sum_{t=N_2}^{t=N_1} \frac{\xi_{i,t}}{N}$$

where N = number of days in the interval.

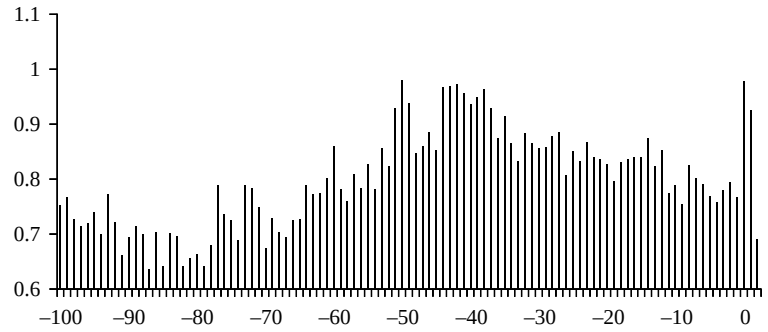
In the comparison-period model, we obtain the fixed mean from the estimation period and compute the abnormal trading volume as follows:

$$\zeta_{i,t} = V_{i,t} - \bar{V}_i, \quad \text{where} \quad \bar{V}_i = \frac{\sum_{t=-51}^{t=-100} V_{i,t}}{100} \tag{5}$$

Figure 1 shows the preliminary plots of unadjusted raw volume turnover between t = announcement date – 100 and t = announcement date + 2. Comparing the volume turnover for short and long registration firms, we can see an increasing trend in the volume turnover exists only for short registration offers. No such trend is evident for long registration offers.



(a) Short registration firms



(b) Long registration firms

Notes: The plots show the unadjusted raw turnover over the interval $t = -100$ to $t = +2$ relative to the SEO announcement date; raw unadjusted volume turnover is defined as trading volume divided by shares outstanding; the x-axis plots the days relative to the announcement date; the y-axis plots the raw unadjusted volume turnover; figure 1a plots the raw unadjusted volume turnover for short registration firms; figure 1b plots the raw unadjusted volume turnover for long registration firms; short registration firms are firms with less than 30 days in the registration period; long registration firms are firms with 30 or more days in the registration period. 2,851 (993) firms have a registration period of up to (equal to or more than) 30 days

Figure 1.
Raw volume turnover prior to the announcement date

The results (not reported) show that the average abnormal volume turnover is significantly higher for short registration offers[6]. We find that the one-factor market-based model and the comparison-period model yield very similar results and are robust to different estimation periods[7]. Overall, the abnormal trading volume patterns in the pre-announcement period are consistent with earlier findings and provide additional evidence that market liquidity matters to equity issuers. Enhanced liquidity reduces fixed issuance costs, so firms with greater trading volume prior to the announcement date are more likely to complete an offering within a shorter time period.

6.3 Time sensitivity tests

For all of the tests reported in Section 5, we use the entire sample period from 1984 to 2008. For robustness, we replicate our analysis for the following four sub-samples:

1984-1989, 1990-1995, 1996-2001, and 2002-2008. We find that firms with greater liquidity come to market sooner during the different sub-sample periods. Thus, our results are not driven by time trends in liquidity and registration period duration.

We also test the sensitivity of our results to the choice of our pre-SEO sample period. In Section 5, we calculate liquidity measures by using data from the six-month period prior to the registration of the SEO. We replicate our analysis by re-calculating liquidity measures based on the three- and 12-month periods prior to the registration. Overall, our results are consistent with the results we obtain in Section 5.

7. Conclusion

We provide new evidence on the role of liquidity in SEOs by focusing on the duration of the completion cycle. The rationale for studying the time taken to complete an offering is best presented by DeAngelo *et al.* (2010) who address the primary motive for issuing equity. They argue that short-term cash needs drive the decision to conduct an SEO, with market timing and lifecycle stage being secondary considerations. To underscore the immediate cash motive, the authors show that, without the SEO proceeds, 62.6 percent of the issuers would run out of cash and 81.1 percent would have subnormal cash balances in that year. Since the urgency of cash needs is an important consideration for an SEO issue, we examine the factors that are likely to affect the ease with which an SEO is completed with particular emphasis on the effect of liquidity.

To test the hypothesis, we use different liquidity measures to capture the four dimensions of liquidity – trading quantity, trading speed, transaction cost, and price impact. Using a sample of 3,844 SEOs over the period 1984-2008, we show that firms with greater liquidity are more likely to complete an offering sooner, even after controlling for other explanatory factors. Our results are consistent across different liquidity proxies and alternative regression specifications. Overall, we find a small yet significant effect of liquidity on the length of the offer.

We also study the pre-announcement abnormal volume turnover and find that firms with greater pre-announcement period turnover are associated with shorter registration periods. Our results are robust to alternative measures of abnormal volume turnover and estimation and testing intervals.

Our results are in line with Butler *et al.* (2005) who find that firms with higher pre-SEO liquidity pay significantly lower underwriting fees, and Lipson and Mortal (2009) who show that liquidity improves the probability of equity issuances. Our interpretation of the results is that since liquidity is likely to affect the ease with which investment bankers place new shares with the shareholders, it should be expected that liquidity, in general is likely to affect the ease with which an offering is completed, as proxied by the length of the offer.

The results of this paper contribute to understanding the relative importance of liquidity on the costs of raising equity. Based on the tests of this paper, we show that firms with greater liquidity have shorter completion cycles. To the extent that better liquidity conditions can reduce the SEO completion period, it may also affect the duration of the time from IPO to subsequent SEO. We leave the exploration of the relative importance of liquidity on the duration between IPO to subsequent SEO to future research.

Notes

1. For example, Smith (1977) and Lee *et al.* (1996) report that underwriting fees exhibit economies of scale effect. Butler *et al.* (2005) show that firm size, stock price uncertainty,

lead underwriter reputation, number of multiple book-runners, issue size, and stock liquidity play an important role in determining underwriting fees. Lee and Masulis (2009) show that improved accounting information quality is associated with lower underwriting fees. Choe *et al.* (1993) find that equity offers in economic upturns face less announcement-period market penalty because these periods are associated with having more profitable business opportunities and greater values for assets-in-place. Jung *et al.* (1996) show that firms with valuable investment opportunities experience less negative price reactions in response to the SEO announcement.

2. The US daily stock returns and volume data are available from CRSP covering NYSE/AMEX firms from 1926 to the present and NASDAQ firms from 1983 to the present, whereas the NYSE's TAQ database becomes available after 1994.
3. For detailed explanation on computation of dollar spread, refer to Holden (2009).
4. The results hold even when we relax this requirement.
5. Like other authors, we find that the frequency of corrections increases across time, with 20.22, 51.59, and 67.43percent of offer dates corrected over 1984-1991, 1992-1998, and 1999-2008, respectively. For example, Corwin (2003) finds 18.1 and 51.5 percent of offers are affected by the offer-date corrections from 1980-1991 and from 1992-1998, respectively.
6. For a summary measure, we construct the average abnormal turnover ($\sum_{t=-10}^{t=-3} \xi_{i,t}/8$), in the period from t = announcement date − 10 to t = announcement date − 3.
7. For robustness, we use estimation windows of different lengths such as (t = announcement date − 100 to t = announcement date − 51), (t = announcement date − 140 to t = announcement date − 41), and (t = announcement date − 100 to t = announcement date − 31).

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(The Appendix follows overleaf.)

Appendix

Variable	Definition
Firm level characteristics	
Regisdays	The number of days in the SEO registration period
Firm Size	Book value of total assets (Compustat item AT) in the most recent fiscal year prior to SEO offering
Volatility	The standard deviation of daily stock return during the six-month period prior to the SEO offering, taken from the CRSP database
NbrSEO	Log of number of SEO by the firm
LifeCycle	Log of number of years of financial data available in CRSP-Compustat Merged database prior to a firm's fiscal year end
MTB	Log of market-to-book ratio. Market-to-book ratio is defined as the ratio of firm's market value to book value of total assets (Compustat Item AT − Compustat Item CEQ + (Compustat Item PRCC_F *Compustat Item CSHO))/Compustat Item AT) calculated at the end of the most recent fiscal year prior to the offering
Run-up	The cumulative stock return in excess of the cumulative return on the value-weighted market index calculated over six-month prior-SEO period, taken from the CRSP database
Leverage	Ratio of book value of short- and long-term debt (Compustat Item DLC + Compustat Item DLTT) over book value of total assets (Compustat Item AT) calculated at the end of the most recent fiscal year prior to SEO offering
Zscore	(1.2 *Compustat Item WCAP +1.4 *Compustat Item RE +3.3 *Compustat Item PI +0.999 *Compustat Item SALE)/Compustat Item AT calculated at the end of the most recent fiscal year prior to SEO offering
Intang	Intangibility (Compustat Item INTAN) scaled by year-end book value of total assets (Compustat Item AT) calculated at the end of the most recent fiscal year prior to SEO offering
Capex	The capital expenditures (Compustat Item CAPX) scaled by year-end book value of total assets (Compustat Item AT) calculated at the end of the most recent fiscal year prior to SEO offering
Profit	Operating profit before depreciation (Compustat Item OIBDP) scaled by year-end book value of total assets (Compustat Item AT) calculated at the end of the most recent fiscal year prior to SEO offering
Price	Log of stock price five days prior to the offering, taken from the CRSP database
SEO-based characteristics	
Offer Price	Offer price
Proceeds	Offer proceeds, equals the offer price times the number of shares issued
RelOffer	Ratio of offer proceeds over market capitalization five days prior to the offering
Fees	Ratio of total investment banking fees over offer proceeds
Liquidity proxies	
Turnover	Average of daily log of percentage of trading volume divided by the outstanding shares: volume turnover Turnover $(V_{i,t}) =$ $\text{Log}(\text{Trading Volume}_{i,t}) \times 100/ (\text{Shares Outstanding}_{i,t})$. Before transformation, a small constant of 0.000255 is added to accommodate zero trading volume

Table AI.
Variable definitions

(*continued*)

Variable	Definition
Amihud	Illiquidity measure of Amihud (2002) calculated as the average of absolute return divided by dollar volume (shares traded multiplied by closing volume) over all positive-volume days
Holden	The relative spread measure of Holden (2009). For NYSE and AMEX stocks, Holden (2009) develops an estimate of a dollar spread using daily data that based on price clustering. In his model with a fractional price grid, Holden shows that the dollar spread can be inferred by checking the frequency of closing price that occurs on odd 1/16 s, odd 1/8 s, odd 1/4 s, odd 1/2 s, and whole dollars. In his model with a decimal price grid, the dollar spread can be inferred by checking the frequency of transactions that occur on off pennies, off nickels, off dimes, off half dollars, and whole dollars. The dollar spread is calculated as the weighted average of each spread size. Relative spread as dollar spread divided by average daily trading price For NASDAQ stocks, the relative spread is calculated as (ask price − bid price)/[(ask price + bid price)/2]
Zeros	The zeros measure of Lesmond *et al.* (1999). Zeros measure is calculated as the ratio of days with zero returns to the total number of trading days
LM*x*	The standardized turnover-adjusted number of days with zero-trading volume over the prior *x* days: $LMx = (Number\ of\ zero\ daily\ volume\ in\ prior\ x\ months + (1/(x - month\ turnover))/Deflator) \times (21x/NoTD)$ where "*x*-month turnover" is the stock's turnover in the prior months calculated as the sum of daily turnover over the prior x months, daily turnover is the ratio of the number of shares traded on a day to the number of shares outstanding at the end of the day, NoTD is the total number of trading days in the market over the prior x months, and Deflator is chosen such that $0 < (1/(x - month\ turnover))/Deflator < 1$ for all sample stocks

Table AI.

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