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Liquidity Management around Seasoned Equity Offerings

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Abstract

We investigate firms' liquidity practices around seasoned equity offerings (SEOs). We broadly classify issuers on the basis of whether the firm belongs to an industry deemed to be financially constrained or unconstrained. We find that constrained-industry issuers tend to save more cash to conserve funding capacity in anticipating investment. Unconstrained industry issuers, in contrast, carry high debt and limited cash reflecting a sizable financial leash. We also find that the former firms experience significant cash stockpiling following new equity issues, whereas for the latter group, there is a significant decline in long-term debt. In the long run, unconstrained issuers who aggressively manage liquidity pre-issue have lower operating profit. However, the relation does not hold for market-based performance because investors, observing the liquidity information, quickly discount stock value at the time of the offering. Rather, post-issue market under-performance can be attributed to investors' downward revisions relating to the transitory nature of investment opportunities.

Key words: Liquidity management, seasoned equity offerings, long run performance
JEL classification: G14, G32, M4, M41

1. Introduction

In this paper, we study corporate liquidity management around the SEO decision and its relation to post-issue performance.[1] In particular, we seek to answer the following questions: (1) Do issuers manage their liquidity policies differently compared to industry non-issuers? And, if so, (2) How do liquidity policies affect the way firms conduct their issuance and financial decisions? (3) Does aggressive/conservative liquidity management affect the firm's future performance?

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[1] Corporate liquidity is recognized as a driving force behind financial decisions of a firm and is a meaningful component of financial structure (see, e.g., Kim, Mauer, & Sherman, 1998; Almeida, Campello, & Weisbach, 2004; Faulkender & Wang, 2006; Dittmar & Mahrt-Smith, 2007; Almeida, Campello, & Hackbarth, 2011). Meanwhile, seasoned equity offerings (SEOs) are one of the most important forms of capital-raising mechanisms, as asserted by the seminal discussion of Myers and Majluf (1984) as to how liquidity (in the form of financial slack) can disentangle the issue-invest decision and affect investment. Since then, however, the role of liquidity has been largely overlooked in the literature.

Drawing from recent research concerning the interplay between cash and debt policies in the financial constraints literature, we compare the liquidity policies used by Hi-Tech issuers to those from non-technology industries — which we characterize broadly as "constrained" and "unconstrained" issuers using the pooled industry median net debt ratio as the cut-off point. We characterize the higher cash stock (compared to industry non-issuers) by constrained issuers as consistent with investment timing – with higher funding capacity allowing firms to take advantage when investment opportunities arise. In contrast, unconstrained issuers are characterized by very high debt and low cash relative to industry peers — consistent with firms issuing equity to resolve their near-term liquidity problems.

To provide deeper insights into liquidity changes around the offering period, we proceed to model four common sources of funds (i.e. change in cash, change in short-term debt, asset sales and change in long-term debt) as our major liquidity variables. We develop a cross-sectional industry-based model to detect abnormal liquidity practices and formally estimate systematic patterns in each variable over the event period. In doing so, our model recognizes that firms' liquidity resource allocation depends on a policy mix of financial needs. We use the model to look more closely at period-to-period abnormal changes in liquidity and how equity offerings, as a means of liquidity injection, can impact on the overall liquidity situation and real operational decisions.

For a sample of 1612 seasoned equity offerings over the period 1990-2006, we report evidence consistent with predictable liquidity patterns around SEOs. For constrained issuers, we observe a generally conservative liquidity strategy in the pre-issue period, consistent with the fact that these issuers tend to limit access to liquidity in anticipation of future investment opportunities. Furthermore, the asset-scaled abnormal change in cash and discretionary expenditure show dramatic increases in the offering year (median values of 46.85% and 13.41%, respectively). In subsequent years, the asset-scaled abnormal cash flow from operations indicate improved cash flow performance relative to pre-issue levels. Together, these results are consistent with the cash stockpiling motivation for equity offers. They also suggest that issuers invest significant amounts on new product developments in which the project typically impacts future cash flows with initial discretionary expenses directed towards marketing and development objectives.

For unconstrained issuers, we observe a rather restrictive liquidity strategy in the pre-issue period. The asset-scaled abnormal change in long-term debt before and in the offering year have median values of 2.50% and -5.40%, respectively. This might reflect a debt-related motivation for equity offers, presumably because the extremely high net debt condition might have prompted them to avoid debt issuance to cover existing debt payments (i.e. debt trap). The result is also consistent with the liquidity-need hypothesis of DeAngelo, DeAngelo, and Stulz (2010), where firms raise equity to resolve a near-term liquidity problem.

Finally, we explore whether conservative/aggressive liquidity management pre-issues affect long-run performance. We rely on the liquidity-adjusted matching approach to generate control firms for both operating and return performance evaluations. This approach, while different from previous studies, allows us to draw unified comparisons of both operating and returns performance. Our main results are as follows. We find that (abnormal) operating performance improves within 2-3 years post-issue and then diminishes. This transitory operating improvement, however, is not accompanied by patterns in contemporaneous return performance (which is negative and deteriorating). While we do find a negative relation between pre-issue liquidity management and operating performance post-issue for unconstrained issuers, such a relationship is not replicated in

the post-issue returns analysis. Our results suggest that return underperformance is related to the forward-looking behaviors of investors: liquidity information is observed/realized at the time of SEOs (thus insignificant in the return regression), while subsequent underperformance is related to investors' surprise attached to the transitory nature of the operating improvement from the corresponding investment opportunity.

Our study complements several recent research articles on cash-related issues. In particular, DeAngelo, DeAngelo, and Stulz (2010) find that the primary motive for selling equity is to overcome a near-term cash need from operations, with market-timing opportunities and lifecycle stage exerting only ancillary influences.[2] A number of other recent papers, however, focus on post-issue cash saving and the use of issue proceeds. McLean (2011) finds a secular trend that issuers keep reserves of cash from issue proceeds and the phenomenon is regarded as being caused by increasing precautionary motives and declining operating cash flows over time. Kim and Weisbach (2008) provide international evidence on a "cash stockpiling" effect by high growth firms and interpret their findings as supportive of managers capitalizing on market timing rather than investment opportunities. The approach in our paper, in contrast to the above studies, goes beyond the narrow focus on cash-related issues and investigates the management aspects of corporate liquidity.

The remainder of this paper is organized as follows. Section 2 describes data and sampling issues. Section 3 discusses the effects of financial constraints on firms' liquidity policies and issuance decisions. Section 4 presents the estimation methods and results on issuers' period-to-period liquidity management practices. Section 5 provides evidence on the relationship between liquidity and post-issue performance. Section 6 concludes.

2. Data and Sample Description

The initial SEO sample consisted of 4761 US common stock public offerings from 1990 to 2006 sourced from the Securities Data Company (SDC) New Issue database.[3] The sample requires issuers to be listed on NYSE, NASDAQ, or AMEX and excludes 1) private and rights offerings; 2) pure secondary offerings; 3) unit offerings packages; 4) closed-end funds, unit investment trusts, ADRs, REITs, CD bank deposits, and limited partnerships; 5) non domestic offers; 6) issues with offer prices less than $5.[4] Financial and market data are sourced from the CRSP-Compustat Merged (CCM) database. The investigation window is set from three years before to three years after the issue year. Years -1 and 0 are the indexed fiscal years before and after the issue date.

Starting with the SDC sample, several data restrictions are imposed. First, we exclude issues that occur within 2 years after a spin-off or merger to avoid any potential contamination effect between the two corporate events. Second, Issuers' data must be present and available on Compustat for the fiscal year preceding the issue date (i.e. year -1), and must have CRSP's returns data on the first month after the issue date or four

[2] They report that without the SEO proceeds, 62.6% of issuers would have run out of cash without the offer proceeds, and 81.8% would have had below normal cash holdings in the year after the offer.

[3] Our data period started in 1990 after the SFAS 95 came into effect for fiscal years ending after July 15, 1988 allowing us to obtain consistent and standardized measures for comparison.

[4] We did include mixed offerings that contain both primary and secondary shares. The inclusion allowed us to control for the differential effects of mixed offerings (in term of % offered) to post-issue long-run performance.

Table 2

Industry Characteristics

This table reports the industry characteristics based on two-digit SIC groupings. Non-issuer observations are non-overlapping industry-years corresponding to the year before an SEO is conducted within the industry. Industry characteristics are reported in medians, which include firm size (book assets in 2005 million of dollars), Tobin's Q (market-to-book value of assets), long-term debt, cash and net debt (short-term plus long-term debt minus cash) ratios. Probability of issue is the issue count divided by the sum of issue and non-issue observations. Industries are ranked in ascending order based on the net debt ratio. "A" stands for ending period of total assets. All variable definitions are presented in Appendix A.

					Industry median (excluding issuers)				
Industry	SIC Code	Issue count	Non-issuer observations	Prob. of issue	Firm size (mil.)	Tobin's Q	Long-term debt/A	Cash/A	Net debt/A
Chemical products	28	228	6500	3.39%	53.08	2.42	0.06	0.24	-0.08
Scientific Instruments	38	162	5400	2.91%	30.21	1.83	0.02	0.16	-0.05
Computer equipment and services	35,73	272	13869	1.92%	50.46	1.76	0.02	0.17	-0.04
Engineering, accounting & mgmt	87	44	1757	2.44%	37.25	1.65	0.04	0.13	-0.01
Electronic equipment	36	160	5882	2.65%	58.30	1.57	0.05	0.14	0.00
Retail	53,54,56,57,59	88	2357	3.60%	190.77	1.33	0.12	0.05	0.14
Paper and paper products	24-27	39	1217	3.11%	178.41	1.41	0.17	0.04	0.18
All others	10,16,22,23,52,55,72,82	56	1001	5.30%	105.66	1.26	0.13	0.04	0.20
Eating & drinking establishments	58	27	944	2.78%	58.04	1.36	0.19	0.05	0.20
Oil and gas	13,29	118	2909	3.90%	71.46	1.37	0.19	0.05	0.21
Manufacturing	30-34	85	2750	3.00%	159.98	1.20	0.19	0.03	0.22
Transportation	37,39,40,42,45	86	2612	3.19%	124.10	1.30	0.17	0.04	0.22
Health	80	48	1654	2.82%	70.68	1.47	0.19	0.07	0.22
Durable goods	50	55	2317	2.32%	93.28	1.16	0.13	0.03	0.23
Non-durable goods	51	22	949	2.27%	122.33	1.31	0.16	0.03	0.23
Food products	20	23	1261	1.79%	165.33	1.43	0.20	0.03	0.24
Communications	48	65	1866	3.37%	373.89	1.65	0.28	0.06	0.32
Entertainment Services	70,78,79	34	911	3.60%	67.06	1.31	0.27	0.07	0.34

Table 3

Issuer Statistics Relative to Industry

This table reports summary statistics of issuers classified into their respective industry rankings in the year prior to the SEO (year -1). Issuers are first divided into "constrained" and "unconstrained" groups according to the net debt-to-assets ratio relative to the pooled industry median (at 0.01) and then, within each group, they are assigned to one of three percentile thresholds (Low, Normal, High) in their respective industry. For example, among all credit-constrained issuers, 65.22% have cash/A exceeding the 70th percentile of their respective industry peers. The pooled industry median was calculated by pooling all non-issuer observations in the issuers' respective two-digit SIC industry. Variables across four fields are reported: liquidity position, long-term debt profile, financial constraints and investment opportunities. Liquidity and debt profile are indicators of internal liquidity resources. The last two fields are common proxies of external financing frictions and investment opportunities. Specifically, Altman's z-score is the "unleveraged" measure of financial distress [3.3 * (pretax income) + sales + 1.4 * (retained earnings) + 1.2 * (current assets minus liabilities)]/assets, payout ratio is the ratio of total distributions (dividends and repurchases) to operating income. Firm size is total assets. Bond rating is a dummy equal 1 if the firm both lacks S&P long-term bond rating and reports positive debt, and 0 otherwise. Cash flow is operating income before depreciation and amortization. Tobin's Q is the market-to-book value of assets. Issue proceeds are in 2005 million of dollars. "A" stands for ending period total assets. All variable definitions are presented in Appendix A.

	Constrained issuers *(with net debt ratio < 0.1)*			Unconstrained issuers (with *net debt ratio ≥0.1)*		
Variables	Low (<30th)	Normal (31-70th)	High (>70th)	Low (<30th)	Normal (31-70th)	High (>70th)
Liquidity position						
Cash/A	2.34%	32.44%	65.22%	44.08%	46.35%	9.57%
Short-term debt/A	51.17%	39.30%	9.53%	20.81%	51.18%	28.01%
Asset sale/A	19.90%	55.18%	24.92%	29.19%	40.14%	30.67%
Long-term debt/A	50.00%	39.46%	10.54%	5.23%	33.73%	61.05%
Net debt/A	67.56%	32.44%	0.00%	4.04%	43.79%	52.17%
Long-term debt profile						
Long-term debt issuance/A	46.48%	36.88%	16.64%	13.76%	30.28%	55.96%
Long-term debt reduction/A	42.98%	42.13%	14.89%	15.70%	40.88%	43.43%
Debt due in 1 year/A	49.08%	33.95%	16.97%	19.21%	46.73%	34.06%
Debt maturing in 2nd year/A	52.26%	30.00%	17.74%	14.89%	41.74%	43.38%
Debt maturing in 3rd year/A	54.06%	28.54%	17.39%	13.19%	36.17%	50.64%
Debt maturing in 4th year/A	48.68%	36.60%	14.72%	12.81%	35.51%	51.69%
Debt maturing in 5th year/A	36.55%	51.33%	12.12%	13.06%	33.37%	53.56%
Interest expense /A	8.57%	80.48%	10.95%	3.70%	35.19%	61.11%
Financial distress and constraint measures						
Altman's z-score	28.98%	42.38%	28.64%	14.34%	57.67%	27.99%
Payout policy	6.70%	83.42%	9.88%	10.45%	62.43%	27.12%
Firm size	14.05%	68.90%	17.06%	6.31%	47.04%	46.65%
Bond ratings	60.27% (ind)		59.20% (issuer)	39.45% (ind)		47.83% (issuer)
Investment opportunities						
Cash flow/A	32.78%	31.77%	35.45%	12.43%	53.06%	34.52%
Capital expenditure/A	21.42%	41.32%	37.27%	22.16%	40.12%	37.72%
Tobin's Q	3.68%	27.59%	68.73%	17.65%	53.16%	29.19%

that of the pooled industry median, at 0.01.[6] The formation of two groups reflects the manner in which firms display differential industry-specific preferences towards managing their cash and debt capacity as illustrated in Table 2. Then within each group, the statistics relating to issuers (measured in the year before the offering) are sorted into one of the three categories (Low, Normal, High) based on their percentile ranking (cutoffs at 30th and 70th) within the industry sample distribution. For example, an issuer having cash-to-assets above (below) the 70th (30th) percentile among its industry peers is categorized as High (Low). This procedure repeats for each firm and for each dimension. The summary table reports the overall percentage of issuers statistics' which fall within the three categories.

The distinctive liquidity characteristics of issuers relative to their industry peers are evident in Table 3. For the group of issuers with net debt-to-assets below industry median (i.e. those in high-tech industries), 65.22% are raised by firms with Large (above 70th industry percentile) cash-to-assets ratio, with only 2.34% at the Low (below 30th industry percentile) end of the industry distribution. Moreover, about half of the issuers' short-term and long-term debt ratios are ranked Low. The liquidity patterns are also consistent with those reported in the debt profile panel, with the portion of debt maturing in future years tending to be Low and steady. Together, Low net debt issuers tend to have higher cash and more flexible debt capacity compared to the relatively constrained industry peers, yet why do they respond to costly external financing while others do not?

To provide further insights, we examine some common measures related to the costs and benefits of external capital from the financial constraints literature:[7] (1) Altman's z-score, (2) payout ratio, (3) firm size, (4) bond rating, (5) cash flow-to-assets, (6) capital expenditure-to-assets and, (7) Tobin's Q. The first four proxies pertain to the costs related to financial distress, information asymmetry or demand for liquidity, while the remaining ones capture benefits linked to financing investment if other sources of funding are not available or insufficient. Relevant to our purposes, there seems to exist no evidence in Table 3 that Low net debt issuers are particularly financially distressed or constrained, with a clear majority of issuers located within the Normal (30th to 70th) percentile range. In addition, analysis of investment demand reveals similarly indifferent percentile patterns in cash flows and capital expenditures. One major exception is the forward-looking Tobin's Q measure, with 69% of constrained issuers assigned to the High category.

Collectively, these results suggest the use of external capital by Low net debt issuers for investment timing—with higher liquidity weakening their financial constraint restrictions

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[6] The selection of the pooled industry median for cut-off is somewhat arbitrary, but at the 2-digit SIC level, our conclusion is qualitatively unaffected.

[7] These proxies follow the the large number of studies on the impact of financial constraints on corporate policies. Specifically, financial distress alone may drive differences in the way firms make their cash and debt choices (Almeida & Campello, 2007); cash payouts are likely to be lower for constrained firms (Fazzari, Hubbard, & Petersen, 1988); firms with smaller asset size are more vulnerable to capital market imperfections (Gilchrist & Himmelberg, 1995); market's assessment of a firm's credit quality differs under financial constraints (Whited, 1992); cash flow, Tobin's Q and capital expenditures are investment proxies that may pick up different information about investment demand (Almeida et al., 2004; Faulkender & Wang, 2006); asset sales is also included as another liquidity measure because it may influence investment expenditures for constrained firms (Hovakimian &Titman, 2006). Detailed variable definitions are presented in Appendix A.

and encouraging investment. Our interpretation here is grounded upon the relationship between investment and liquidity which, according to Boyle and Guthrie (2003), has a first-order effect in accelerating investment under financing constraints.[8] Because projects have uncertain future value, the optimal policy is to invest only when high-liquidity exceeds a positive threshold above the cost of external capital. In contrast, low-liquidity industry peers carry a higher cost of external financing that can reduce the attractiveness of investment. Overall, the salient feature concerning issuers' behavior here is that most firms have high liquidity before equity issuance in relatively constrained industries to complement investment opportunities.[9]

Regarding issuers with net debt-to-assets above industry median (i.e. those in unconstrained industries), three main results emerge. First, the issuers' cash-to-assets distribution is heavily right skewed, with 44.08% and 9.57% of firms at the Low and High end of industry percentiles, respectively. Second, sufficiently high debt may curtail further debt issues before reaching distress levels, with over 61% of issuers reached an alarmingly High long-term debt-to-assets and a consistently large proportion of debt matures in the next five years. Finally, these issuers tend to be larger in size but have moderate profitability (cash flow) and investment prospects compared to their respective industry firms.

Together, these results suggest the use of external capital by 'high' net debt issuers with a liquidity shortage — with lower cash and higher debt comes a sizable operating liquidity deficit relative to their internal cash flow (which is not particularly high within industry). The interpretation here also accords with the findings of Shyam-Sunder and Myers (1999) and Acharya, Almeida, and Campello (2007), who report that debt issues are positively related to a firm's fund flow deficit (i.e. a negative relation between debt issues and cash flows) for larger firms.[10] Yet, large debt alone is not sufficient in itself to explain the question why these firms raise equity, as it does not take into account the overall effect of liquidity. For example, DeAngelo, DeAngelo, and Stulz (2010) show that issuers operating on a tight financial leash, would have exhausted cash reserves had they not received the offer proceeds. Consistent with their liquidity-need hypothesis, the notable characteristic concerning issuers' behavior is that most firms have very poor liquidity, as indicated by low cash and sufficiently high debt ratios, in relatively unconstrained industries to support their profitable business.

4. Liquidity Management Around SEOs

As shown in the previous section, assessing how issuers manage their liquidity around SEOs requires careful delineation between two liquidity scenarios (in the year preceding the offering). To capture a more complete picture, we model the periodic change in liquidity practices over the event window. Essentially, the two scenarios provide a static representation of liquidity information, while the latter reflects the trend effect in change

[8] They also document an opposing second-order effect on investment because increases in cash flow relax the constraints of low-liquidity firms more than their high-liquidity counterparts (as argued by Kaplan & Zingales, 1997; Cleary, 1999). We do not consider this possibility because issuers' cash flow distributions are similar to low-liquidity industry non-issuers.

[9] Investment opportunities may arise within "windows of opportunity", for example, through rapid technological evolution or customer instability (See Maksimovic & Pichler, 2001). Alternatively, the findings mirror recent work of Acharya et al., 2007), where they predict that constrained firms prefer higher cash stocks in order to hedge investment against future income shortfalls.

[10] Shyam-Sunder and Myers (1999) investigated a sample of large firms with rated debt and, as argued by Acharya et al. (2007), are comparable to their sample classification of unconstrained firms.

of liquidity over time. The two cases are interrelated with one another in the sense that the liquidity position accumulates the effects of previous liquidity changes and, in particular, a constrained liquidity position can also restrain a manager's ability to manage liquidity.

4.1. Specification

To detect liquidity management, we investigate patterns in the issuers' common sources of funds as reported in the cash flow statement. Analysis of these cash receipts facilitates better understanding of the liquidity policy and the impact of the equity issuance on fund flow and financial conditions. We specify a cross-sectional industry regression model to capture issuers' normal levels of liquidity changes for each fiscal year. Our model setup is in the spirit of the earnings management literature (see, e.g., Teoh, Welch, & Wong, 1998; Roychowdhury, 2006), in which variation in the determinants of liquidity management are homogeneous across firms within the same industry and fiscal year. The model is estimated using all non-issuing firms in the same two-digit SIC code as the issuer, and re-estimated for each year in the investigation window from years -3 to +3, relative to the fiscal year of the issue.

The model formalizes the intuition that firms adjust their funding resources (i.e. liquidity policy) to support incremental funding needs from business activities. Specifically, for each of the sources of fund items, we estimate:

$$\frac{SOURCE_{it}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{i,t-1}} + \beta_1 \frac{SOURCE_{i,t-1}}{A_{i,t-1}} + \beta_2 \frac{INT_{it}}{A_{i,t-1}} + \beta_3 \frac{\Delta NWC_{it}}{A_{i,t-1}} + \beta_4 \Delta MB_{it} + \varepsilon_{it} \quad (1)$$

where, for fiscal year t and industry firm i, *SOURCE* represents one of four sources of funds: change in cash ($\Delta CASH$), change in short-term debt (ΔSTD), asset sales (*ASALE*) and change in long-term debt (ΔLTD). *INT* is internal funds, defined as [operating income before depreciation minus (interest expense minus interest income) minus (income taxes minus deferred taxes)] plus ΔNWC. ΔNWC is change in net working capital, defined as change in current assets minus $\Delta CASH$ minus change in current liabilities plus ΔSTD. ΔMB is change in market-to-book ratio. *A* is total assets. Detailed variable definitions (and all remaining cases) are provided in Appendix A. The set of coefficient estimates from Equation (1) are then used to model the issuer-specific "normal" source of funding level and deviations from the normal levels are termed "abnormal".

Intuitively, the source of funding (*SOURCE*) is expressed as a linear function of liquidity allocation. Firms can allocate liquidity to support the previously established financial opportunity set as represented by the own-lagged *SOURCE* variable. For example, if there is no change to the financial environment (i.e. prospective financial opportunities and associated payoff distributions) from the previous year, then liquidity policy will also remain the same this year.[11] Similarly, liquidity is allocated to support opportunity set changes in any of the three segments in the cash flow statement. Firms can allocate liquidity to support change in the financing and investment opportunity set in this period. Thus, *INT* proxies for the change in needs from financing and investment in the current period. The variable ΔNWC, is included to capture the change in the operating liquidity available to a business,

[11] Gatchev, Pulvino, and Tarhan (2010) support the inclusion of a lagged dependent variable to allow for the relation between lagged and current decision variables because firms are usually engaged in projects that may take longer than one year to complete. They argue that by excluding the lagged variable, the modeling relation may suffer from an omitted variables bias. In the R&D context, Berger (1993) also includes the lagged variable as a regressor to address the first order autocorrelation found in the residuals.

we implicitly assuming that the profit margin on funding is fairly stable within an industry. Finally, ΔMB is intended to capture the change in growth expectations as an exogenous variable.

The unscaled intercept term controls for a potential mean effect such that the average abnormal value calculated is centered at 0 for all industry regressions. The scaled intercept term is to remove the spurious correlation problem induced by the use of total assets as a common divisors (Barth & Kallapur, 1996). All variables are scaled by beginning-year total assets. In developing the above model, we do not suggest or require that a significant relationship exist with all the explanatory variables. Rather, we expect some degree of joint significance across them and an insignificant intercept because the collectively exhaustive nature of the chosen variables should encompass the entire range of possible needs in financial activities.

For the purposes of comparison, we also evaluate financial performance using accrual-based and real activities management models. Specifically, we report the estimated abnormal accruals (*ACC*) from Jones' (1991) earnings management model, and the estimated abnormal production costs (*PROD*), abnormal discretionary expenses (*DISEXP*) and abnormal cash flow from operations (*CFO*) from the real activities management model of Dechow, Kothari, and Watts (1998), as implemented in Roychowdhury (2006) and Cohen and Zarowin (2010). Rather than identifying potential manipulation activities in the year before the offering, our intention is to examine the effect of equity proceeds, as a liquidity injection, on period-to-period change in real activities and earnings performance. For example, if the equity proceeds are used for new product development, we would expect an abnormal increase in discretionary expenses as initial outlay, and subsequently, increases in abnormal cash flow from operations when the new product generates future cash flows. See Appendix A for variables and descriptions of models.

To provide insights on some properties of the coefficient estimates, we report the weighted average of the coefficients estimated from each of the 9062 cross-sectional industry-year regressions, where the weights are equal to the inverse of the associated standard errors of these estimates divided by the sum of the inverse of all standard errors from the regressions. The weighted average provides a more economically meaningful measure than a simple mean because it takes into account the different variability of the sampling distribution of the dependent variable associated with the estimated coefficient in each regression sample.[12] That is, the coefficient estimated with a large standard error (i.e. smaller regression sample or with less random variation) is assigned a lower weight to indicate the degree of imprecision contributing to the mean calculation.[13]

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[12] The inverse-variance weighting method is typically used in statistical meta-analysis to combine results from multiple studies. The analysis increases statistical power by reducing the standard error of the weighted coefficient and shrinks the confidence interval around it (e.g. Cohn & Becker, 2003).

[13] Also note that the estimates from a particular regression model represent liquidity resource allocation that is regarded as "normal" liquidity management practice specific for that industry and year. To capture all possible liquidity strategies, we do not predict the sign and significance of the coefficients but allow the coefficient to capture liquidity strategies under different business environments. Because one could argue that industry liquidity characteristics are too heterogeneous, we also report the number and percentage of significantly (at the 5% level) positive and negative results to illustrate the broader nature of the coefficient distribution. Finally, the adjusted R^2 is a simple average across regressions.

4.2. Results

Table 5 presents the median abnormal liquidity management proxies around seasoned equity offerings. We separate the SEO sample into constrained and unconstrained groups based on the pre-issue net debt ratio and follow the group throughout the event period. With respect to the interpretation of results, the two groups yield some unique aspects which could deem the standard aggressive/conservative interpretation insufficient.[16] For instance, if the issuer is operating under a tight liquidity position, then a series of negative changes in liquidity would indicate a restrictive (as opposed to conservative) policy — because the firm can only channel limited funds under current levels of liquidity. That is, we expect the interpretation to differ across the two liquidity scenarios. To further assist in the interpretation of fund use and effects to firms' operational and earnings performance, we also report results for the median abnormal measures using the accrual-based and real activities-based earnings management models (as specified in Appendix A).

Panel A of Table 5 reports the results for the group of issuers with a net debt ratio below the pooled industry median in the year preceding the offer, that is, those with higher cash stock and limited debt capacity within the financially constrained (high-tech) industries. Starting from the pre-offering period, the median abnormal measures of the four sources of funds are mostly negative and significant (with the exception of $\Delta CASH$ in years -1), The pattern is consistent with a conservative liquidity strategy relative to their industry peers, where issuers tend to limit access to liquidity in anticipation of future investment opportunities. This finding also conforms to Acharya, Almeida, and Campello (2007) and the survey results reported by Lins, Servaes, and Tufano (2010), where constrained firms tend to hedge against the possibility that information friction might prevent them from funding valuable investment opportunities in potential good times ahead.

Consistent with Kim and Weisbach (2008) and McLean (2011), we find that the median abnormal change in cash ($\Delta CASH$; 0.4685) is significant and positive and substantial in the year of the SEO. Thus, constrained issuers exhibit the same precautionary motive and stockpiling of cash proceeds as documented in the literature. In addition, there is a significant increase in abnormal discretionary expenditure (*DISEXP;* 0.1341) in year 0 and consecutive cases of positive abnormal cash flow from operations (*CFO*; 0.1061, 0.0756, 0.0661) from year 1 onwards. These results support the interpretation that high-tech issuers are undertaking new product developments, in which the project typically impacts future cash flows through a product lifecycle (i.e. introduction, growth and then decline) with initial discretionary expenses directed towards marketing and development objectives.[17] Together with the significant positive abnormal discretionary accruals (*ACC*) in year 0 and year 1, our results suggest that the liquidity injection is at least partly being used for cash stockpiling, new investment and improving existing operations.[18]

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[16] Earnings management studies tend to interpret a series of positive (negative) measures as aggressive (conservative) management strategy.

[17] For example, new product introduction would involve initial outlays such as R&D and promotional expenses. In the growth stage, sales begin to rise and firms realize substantial profits. Through to the "decline" stage, the successful product attracts competitors to enter with duplicate products, reducing its market share and profitability.

[18] Unlike Cohen and Zarowin (2010), we did not interpret our results in year 0 in terms of real activity manipulation. Since we are analyzing a subset of issuers (in constrained industries), the measures within this subset are clearly of a different proportion and magnitude compared to unconstrained issuers in Panel B. An unreported test of median difference is significant at the 1% level.

Table 5

Time Profile of Median Abnormal Liquidity Management Proxies Across SEO Issuers

This table reports the time trend of abnormal liquidity-based, real activities-based and accrual-based management proxies from year -3 to year +3 relative to the issue year 0 (the fiscal year of reporting after the issue date). The first four rows represent abnormal sources of funds (*SOURCE*) estimated as the deviations from the predicted values from the following industry year regression:

$$SOURCE_{it}/A_{i,t-1}=\alpha_o+\alpha_1(1/A_{i,t-1})+\beta_1(SOURCE_{i,t-1}/A_{i,t-1})+\beta_2(INT_{it-1}/A_{i,t-1}+\beta_3(\Delta NWC_{it-1}/A_{i,t-1})+\beta_4\Delta MB_{it}+\varepsilon_{it}$$

where, for fiscal year *t* and industry firm *i*, *SOURCE* represents one of the four sources of funds: either change in cash ($\Delta CASH$), change in short-term debt (ΔSTD), asset sales (*ASALE*) and change in long-term debt (ΔLTD). *INT* is internal funds. ΔNWC is change in net working capital. ΔMB is the change in market-to-book ratio. *A* is total assets. The next three rows represent abnormal real activities management estimated as the deviations from the expected production costs (*PROD*), discretionary expenses (*DISEXP*) and cash flow from operations (*CFO*) following Roychowdhury (2006). The last row represents abnormal earnings management estimated as the deviations from the expected accruals (*ACC*) following Jones (1991). See Appendix A for variable definitions. The regressions are estimated for every event year and for every issuer two-digit SIC industry. Issuer's industry must have at least 15 non-issuing firms to be included in the estimation. Reported results are summarized by median across issuers partitioned into two groups based on the cut-off point of 0.01 in net debt/assets in the year preceding the offerings. The same group of issuers is followed throughout the investigation window. Panel A refers to the 'constrained' group with net debt/assets lower than 0.01 and Panel B to the 'unconstrained' group with net debt/assets higher than 0.01. [a], [b], [c] represent statistical significance levels at the 1%, 5% and 10% levels respectively, using Wilcoxon *p*-values for the group median.

Year	-3	-2	-1	0	1	2	3
Panel A: Constrained issuers (with net debt ratio < 0.1 at year -1)							
Abnormal ΔCASH	-0.0279[b]	-0.0205	**0.0148[a]**	**0.4685[a]**	-0.0306[b]	-0.0489[a]	-0.0471[a]
Abnormal ΔSTD	-0.0059[a]	-0.0098[a]	-0.0136[a]	-0.0138[a]	-0.0053[a]	-0.0059[a]	-0.0085[a]
Abnormal ASALE	-0.0117[a]	-0.0154[a]	-0.0161[a]	-0.0156[a]	-0.0152[a]	-0.0163[a]	-0.0172[a]
Abnormal ΔLTD	-0.0241[a]	-0.0257[a]	-0.0216[a]	-0.0331[a]	-0.0176[a]	-0.0126[a]	-0.0248[a]
Abnormal PROD	-0.0443[b]	-0.0679[a]	-0.0765[a]	-0.0720[a]	-0.0544[a]	-0.0618[a]	-0.0590[a]
Abnormal DISEXP	0.0227[b]	0.0330[a]	0.0401[a]	**0.1341[a]**	-0.0842[a]	-0.0786[a]	-0.0687[b]
Abnormal CFO	0.0368[b]	0.0357[b]	0.0454[a]	0.0308	**0.1061[a]**	**0.0756[a]**	**0.0661[a]**
Abnormal ACC	0.0138[b]	0.0039	0.0009	**0.0421[a]**	**0.0326[a]**	0.0098	0.0157
N	330	433	598	534	491	458	393
Panel B: Unconstrained issuers (with net debt ratio ≥0.1 at year -1)							
Abnormal ΔCASH	-0.0136[b]	-0.0128	-0.0142[a]	**0.0232[a]**	-0.0128[b]	-0.0122[a]	-0.0082[a]
Abnormal ΔSTD	-0.0033[a]	-0.0011[a]	0.0002[a]	-0.0135[a]	-0.0025[a]	-0.0001[a]	-0.0024[a]
Abnormal ASALE	-0.0080[a]	-0.0090[a]	-0.0084[a]	-0.0086[a]	-0.0090[a]	-0.0104[a]	-0.0103[a]
Abnormal ΔLTD	-0.0012[a]	-0.0046[a]	**0.0250[a]**	**-0.0540[a]**	-0.0097[a]	-0.0160[a]	-0.0192[a]
Abnormal PROD	-0.0078[b]	0.0100[a]	0.0032[a]	-0.0098[a]	0.0061[a]	0.0041[a]	-0.0029[a]
Abnormal DISEXP	-0.0641[b]	-0.0567[a]	-0.0520[a]	-0.0551[a]	-0.0675[a]	-0.0764[a]	-0.0780[b]
Abnormal CFO	0.0232[b]	0.0237[b]	0.0211[a]	0.0201	0.0283[a]	0.0375[a]	0.0356[a]
Abnormal ACC	0.0114[b]	0.0133	0.0241	**0.0364[a]**	**0.0247[a]**	0.0088	0.0124
N	604	796	1014	967	888	821	735

Abnormal real activities measures are calculated as the deviations from the following industry-year regressions predictions:

$PROD_{it}/A_{i,t-1}=\alpha_0+\alpha_1(1/A_{i,t-1})+\alpha_1(S_{it}/A_{i,t-1})+\hat{a}_2(\Delta S_{it}/A_{i,t-1})+\alpha_3(\Delta S_{it-1}/A_{i,t-1})+\alpha_{it}$

$DISEXP_{it}/A_{i,t-1}=\alpha_0+\alpha_1(1/A_{i,t-1})+\alpha_2(S_{i,t-1}/A_{i,t-1})+\alpha_{it}$

$CFO_{it}/A_{i,t-1}=\alpha_0+\alpha_1(1/A_{i,t-1})+\alpha_1(S_{it}/A_{i,t-1})+\alpha_2(\Delta S_{it}/A_{i,t-1})+\alpha_{it}$

Abnormal accruals measure is calculated as the deviation from the following industry-year regression prediction:

$ACC_{it}/A_{i,t-1}=\alpha_0+\alpha_1(1/A_{i,t-1})+\alpha_1(\Delta S_{it}/A_{i,t-1})+\alpha_2(PPE_{it}/A_{i,t-1})+\alpha_{it}$

Panel B of Table 5 reports the results for issuers with net debt ratios above the pooled industry median, that is, those with very high debt and low cash within "unconstrained" industries. Recall from Section 3 that these issuers have likely exhausted their funding options and launch SEOs to resolve a tight operation "leash". From Table 5, we also observe over the pre-issue period a generally significant and negative pattern in the four sources of funds measures (with the exception of ΔSTD and ΔLTD in year -1). Together, these results indicate that the provision of liquidity is relatively restrictive during the 3 years leading up to the offering.[19] Furthermore, the significant and positive abnormal change in long-term debt (ΔLTD; 0.0250) in year -1 might indicate a debt trap situation, where an issuer resorts to new debt issue in order to cover existing debt payments. This is then followed by a significant reduction in abnormal change in long-term debt (-0.0540) and an increase in abnormal change in cash (0.0232) in the following year when the SEO takes place.

Thus, the findings suggest that insufficient liquidity causes constrained issuers to raise additional funds from outside capital. Scrutinizing the real activities variables further down the rows in Table 5, we find that the measures are noticeably more stable and of different magnitude compared to those reported for constrained firms in the Panel A (e.g., the median abnormal cash flows is within 0.02~0.04 here, while in Panel A, the range is between 0.03 and 0.11). This suggests that the offering proceeds are not being used to improve real fundamentals or new investment, nor do firms manipulate real earnings before the offer. The post-issue median abnormal cash flow from operations, however, is around 1% higher than the pre-issue levels. The pattern of median abnormal accruals is quite similar to Panel A and peaks in years 0 and +1, respectively.

In sum, our results illustrate that there are predictable patterns in how issuers manage liquidity around SEOs; these firms are conservative compared to industry non-issuers and have liquidity motives for the equity offer, being to raise funds to cover underlying liquidity constraints and/or to support investment. Our analysis further supports the liquidity-need hypothesis of DeAngelo, DeAngelo, and Stulz (2010) and provides new insights on the integrative links between liquidity, SEOs and corporate decisions. The two-group classification also helps to avoid confronting effects on the median abnormal measurements and track abnormal patterns more reliably over time: one classification emphasizes the importance of liquidity constraints (i.e. extremely high net debt) and subsequent debt repayments; the other classification stresses the large cash and debt capacity of high-tech firms and product developments.[20]

5. Association Between Post-issue Performance and Pre-issue Liquidity Management

There are important reasons why a linkage might exist between pre-issue liquidity management and operating and stock market performance, post-issue. Most notably, a

[19] That is, the unconstrained issuer might have used very aggressive liquidity policies in the past such that debts accumulate and cash balances decrease to the point where the constraint on normal business operations is binding.

[20] As a robustness check, we repeat our analyses by using a measure based on performance- and net debt-adjusted matching. As argued by Kothari et al. (2005), studies that do not use performance-adjusted evaluation are likely to draw biased inferences. Accordingly, for each issuer-year observation, we create a set of five by five portfolios by sorting the industry non-issuers into quintiles of ROA and net debt/assets ratio measured a year prior to the estimation year. The results using these alternative measures are consistent with those reported in our main analysis and are not reported to conserve space. Full details are available from the authors upon request.

seasoned equity offering is a form of liquidity injection. If the issue decision is indeed motivated by liquidity concerns or a desire to pay down debt, then the management of liquidity pre-issue would potentially hold back on the offering proceeds available to carry out production and investment plans. Thus, firms with more aggressive liquidity policies will have fewer liquid resources available to support the normal operation of the business in the next period and this, thereby, reduces future operating performance. Alternatively, for constrained issuers who prepare for higher liquidity in anticipation of investment, we would expect those who have conserved more liquidity to improve their funding capacity (and, hence, the firm's ability to undertake new investment opportunities) and improve their operating performance post-issue.

Accordingly, we examine both the cumulative change in operating performance (ΔROA) and buy-and-hold abnormal returns (*BHARs)* post-issue. The operating proxy, ΔROA, is measured as income (Income before extraordinary items; Compustat item 123) scaled by beginning year total assets (following Cohen & Zarowin, 2010). Following Barber and Lyon (1996), we adjust the operating performance by a single control firm matched on pre-issue 2-digit SIC code, ROA and net debt ratio.[21] Specifically, for each issuer-year, we identify all non-issuers within the same two-digit SIC group, return-on-assets (*ROA*) within ±30% or within ±0.01, net debt ratio within ±30% or within ±0.01 for the fiscal year preceding the offering. If no firms meet the criteria, we relax the industry criterion to a one-digit SIC. If still no firms meet the criteria, we disregard the industry criterion. Finally, if still no firms meet the criteria, we disregard the industry and ROA criterion. From this subset of firms, we select the firm with the net debt ratio closest to that of the issuer. We label the adjusted performance based on these control firms as "liquidity-adjusted".

The buy-and-hold abnormal return performance is measured as follows. We construct return portfolios beginning the month after the issue, or four months after the previous fiscal year end, whichever is later.[22] The period is through to the end of the five-year period or until either the issuer or control firm delists, whichever is sooner. The BHAR for issuer *i* over the period from time *a* to time *b* is defined as:

$$BHAR_{i,a:b} = \prod_{i=a}^{b}(1 + R_{i,t}) - \prod_{i=a}^{b}(1 + R_{control,t}) \quad (2)$$

where $R_{i,t}$ is the issuer's stock return in month t, $R_{control,t}$ is the return of the control firm over the same time period. The average buy-and-hold abnormal return is:

$$BHAR_{a:b} = \frac{1}{n}\sum_{i=1}^{n} BHAR_{i,a:b} \quad (3)$$

where *n* is the number of firms in the sample. In evaluating the abnormal returns from the reference portfolios formed on alternative characteristics, Lyon, Barber, and Tsai (1999) show that controlling for size and book-to-market yield well-specified statistics from random samples. However, they also highlight that misspecification in non-random event samples is pervasive and that controlling for these factors alone is not sufficient to yield

[21] We further matched on pre-issue net debt ratio in order to better discriminate the two groups of issuers.

[22] The four-month lag follows Teoh, Welch, and Wong (1998). It also fits our sample with shelf offerings likely to have shorter lags and firm-commitment offers to have longer lags.

well-specified test statistics. Here, we differ from this standard approach in that we re-use the control sample from the operating performance evaluation.[23] In doing so, it effectively facilitates a unified comparison of operating and market performance based on the same set of matching control firms.

To capture the total effect of liquidity management, we combine the four individual measures to obtain a metric of aggregate liquidity management (*LM*). More specifically, it is computed as the sum of abnormal change in short-term debt, abnormal asset sales, abnormal change in long-term debt minus abnormal change in cash. To improve statistical inference under the liquidity- adjusted performance measures, we adapt Kothari, Leone and Wasley's (2005) approach to adjust the aggregate liquidity measure of issuers using a matched-firm design. Specifically, for each industry (based on two-digit SIC codes), we create a set of five by five portfolios by sorting the data into quintiles of ROA and net debt ratio prior to the year of the portfolio formation. The adjusted aggregate liquidity management is computed as the difference between the aggregate liquidity management of an issuer and the average of a portfolio matched on industry, ROA and net debt ratio a year prior to the estimation year.

We model the long-run performance after seasoned equity offerings using the following two regressions:

$$\Delta ROA_{i,-1;t} = \alpha_0 + \alpha_1 LM_{i,-1} + \alpha_2 RM_{i,-1} + \alpha_3 EM_{i,-1} + \alpha_4 \Delta SALE_{i,0} + \alpha_5 CAPX_{i,0} + \alpha_6 \Delta DEBT_{i,0} + \alpha_7 \Delta CASH_{i,0} + \alpha_8 PSHARE_{i,-1} + \alpha_9 YEAR_i + \varepsilon_i \quad (4)$$

$$BHAR_{i,0;p} = \alpha_0 + \alpha_1 LM_{i,-1} + \alpha_2 Neg\Delta ROA_{i,0;p-1} + \alpha_3 RM_{i,-1} + \alpha_4 EM_{i,-1} + \alpha_5 \Delta SALE_{i,0} + \alpha_6 CAPX_{i,0} + \alpha_7 \Delta DEBT_{i,0} + \alpha_8 \Delta CASH_{i,0} + \alpha_9 PSHARE_{i,-1} + +\alpha_{10} SIZE_{i,-1} + \alpha_{11} BM_{i,-1} + \alpha_{12} YEAR_i + \varepsilon_i \quad (5)$$

where, for issuer *i*, ΔROA is the t^{th} event year liquidity-adjusted cumulative change in return on assets relative to the base year -1; *BHAR* is the *p*-year liquidity-adjusted buy-and-hold abnormal return; *LM* is an aggregate measure of the previously defined liquidity management proxies at year -1, defined as the difference between the aggregate abnormal sources of funds of an issuer and the average aggregate of a portfolio matched on prior-year return-on-assets, net debt-to-assets and industry; *RM* and *EM* are proxies for aggregate real activities management and earnings management at year -1 (based on previously defined measures), both are also adjusted by the prior-year ROA, net debt and industry-

[23] That is, the operating and returns performance measures are both adjusted by industry, return on assets and net debt ratio of matched non-issuers, using the same control sample. There are several reasons why it is of particular interest. First, it is potentially informative from an investor perspective to compare the return performance of issuing firms to a control firm based on similar operating performance and industry characteristics. Second, following Lyon et al. (1999), industry clustering and performance reversal are two potential sources of misspecification that are commonly overlooked in tests of long-run abnormal returns evaluation. The industry distribution of SEO samples, as illustrated in Table 1 and among many previous studies, are unevenly clustered across two-digit SIC codes. Moreover, return performance also tends to be unusually high pre-issue and reverses after. Assuming a positive return on assets (ROA)-expected return relation (recently recognized by Chen, Novy-Marx, & Zhang, 2011), this return reversal can be proxied using return on assets.

matched portfolio; $\Delta SALE$, $\Delta CAPX$, $\Delta DEBT$ and $\Delta CASH$ are the asset scaled change in sales, change in capital expenditures, change in debt and change in cash in the year of issue (year 0); *PSHARE* is the percentage of primary shares offered; *SIZE* and *BM* are the log of market capitalization and the book-to-market ratio prior to the equity offers (year -1). The term *Neg*ΔROA is a logarithmic scaled proxy for the extent of downward movement in the reported operating performance within the p^{th} portfolio year (corresponding to event year p-1) relative to the level reported within the commencing year (event year 0), where *Neg*ΔROA is multiplied by -1 if < 0 and is set to 0.0001 otherwise. *YEAR* are dummy variables to control for year effects. See Appendix A for detailed variable descriptions.

Despite the apparent appeal of liquidity management and the substantial literature on earnings management (e.g. Teoh, Welch, & Wong, 1998) to predict long-run underperformance, we believe that these explanations are unlikely to be the only reason for this phenomenon. Here, we include a second possibility based on our unified investigation across operating and return performance (under the same set of control benchmarks). Specifically, we argue that existing studies evaluate the returns from post-issue undertaking of positive NPV projects without controlling for the transitory/permanent nature of these projects. For example, if a firm issues seasoned equity to fund a transitory investment opportunity, then we would expect an initial rise in performance that later tapers off. When subsequent cash flows are not sustained, investors may revise the firm value down against the remaining expected cash flows from the transitory investment.[24]

To measure the possible effect of investors' downward revision of possible transitory investment, we construct a measure, *Neg*ΔROA, that captures the subsequent downward deviation in the liquidity-adjusted operating performance relative to year 0. Accordingly, we assume that investors face uncertainty in the long-term nature of the investment opportunity and rely on the abnormal operating profit observed at year 0 as a reference point. When subsequent abnormal profits deviate negatively from this figure, investors update their beliefs that the investment is of a transitory nature (i.e., has a short lifespan without replacement) and revise downward the perceived future cash flows from the investment. Thus, we expect that the negative deviations can also lead to a long-run decline in market performance.

The two models also include a number of control variables based on the prior SEO long-run underperformance literature. In particular, *RM* and *EM* control for the portion of underperformance attributable to real activities and accrual-based earnings management (Cohen & Zarowin, 2010). $\Delta SALE$ and *CAPX* control for the portion of underperformance attributable to rapid growth in sales and capital expenditure in the issue year (Loughran & Ritter, 1997). $\Delta DEBT$ and $\Delta CASH$ control for the influence of change in financing activities in the issue year to long-run performance (Billett, Flannery, & Garfinkel, 2011). *PSHARE* is

[24] Note that our argument here is not the same as the real-investment-based explanation, which points to a negative relationship between investment opportunities and expected return as characteristics related to risk. Hirshleifer, Hou, Teoh, and Zhang (2004), however, (footnote 6), considered several alternative ways that investment could be correlated with future profitability and investor perception. One example that they identify is investment to replace fixed assets that are rendered obsolete by adverse events, leading to value-increasing investment but lower future profits. Another example is that certain expenditures that are unlikely to provide long-term payoffs are classified as investments rather than as expenses, and if investors fail to discount fully for this possibility, they will tend to overvalue firms with high investment levels. Our arguments here closely mirror this point.

Table 7

Regression analysis of long-run return performance on pre-issue liquidity management.

This table reports results from median regression estimates of the equation:

$$BHAR_{i,0:p} = \alpha_0 + \alpha_1 LM_{i,-1} + Neg\Delta ROA_{i,0:p-1} + \alpha_3 RM_{i,-1} + \alpha_4 EM_{i,-1} + \alpha_5 \Delta SALE_{i,0} \alpha_6 CAPX_{i,0} + \alpha_7 \Delta DEBT_{i,0} + \alpha_8 \Delta CASH_{i,0} + \alpha_9 PSHARE_{i,-1} + \alpha_{10} SIZE_{i,-1} + \alpha_{11} BM_{i,-1} + \alpha_{12} YEAR_t + \varepsilon_i.$$

The dependent variable is the *p*-year buy-and-hold returns, computed as the paired difference between the BHAR of issuer and that of control firm matched by pre-issue 2-digit SIC, ROA and net debt ratio. The main independent variables are: pre-issue aggregate liquidity management (*LM*); and *(NegΔROA)*, which is a proxy for investors downward adjustment to expected abnormal profit remaining from the issue-invest opportunity, measured as the negative deviation of current year liquidity-adjusted ROA relative to the level in year 0, where negative deviations are multiplied by -1 and non-negative deviations are set to 0.0001 before taking the log transformation. Control variables are defined in notes to Table 6. See Appendix A for variable definitions. The group "constrained" and "unconstrained" tracks the long-run performance of the subset of firms having net debt ratio below and above the pooled industry median of 0.01, respectively. The *t*-statistics (represented in parentheses) are based on the bootstrapped standard errors with 5000 replications. ***, **, * represent statistical significance levels at the 1%, 5% and 10% levels, respectively, using a two-tailed test. The last two rows reports the median BHARs, from Wilcoxon signed rank tests ([a], [b], [c] denotes significance at 1%, 5% and 10% levels).

	Constrained issuers (LO)				Unconstrained issuers (HI)			
Variables	1-year BHAR	2-year BHAR	3-year BHAR	4-year BHAR	1-year BHAR	2-year BHAR	3-year BHAR	4-year BHAR
LM_{-1}	-0.085	0.015	0.163	0.140	-0.085	0.004	-0.065	-0.064
	(-0.55)	(0.07)	(0.50)	(0.21)	(-0.87)	(0.03)	(-0.32)	(-0.20)
$Neg\Delta ROA_{0:p-1}$		-0.059**	-0.092***	-0.041		-0.085***	-0.091***	0.084***
		(-2.39)	(-2.68)	(-0.81)		(-4.90)	(-4.64)	(-2.96)
RM_{-1}	0.004	0.093	0.064	0.097	0.027	0.069	0.082	0.081
	(0.09)	(1.53)	(0.57)	(0.60)	(0.77)	(1.29)	(0.93)	(0.57)
EM_{-1}	-0.041	-0.140	-0.120	-0.127	-0.033	-0.056	0.016	0.048
	(-0.80)	(-2.24)	(-1.15)	(-1.16)	(-0.52)	(-0.59)	(0.14)	(0.28)
$\Delta SALE_0$	0.065	0.188	0.324	0.150	0.063	0.122	0.162	0.148
	(0.48)	(0.87)	(1.23)	(0.36)	(0.76)	(0.84)	(1.24)	(0.73)
$\Delta CAPX_0$	-0.134	-0.713	2.225	-1.889	-0.185	-0.561	-0.628	-1.847
	(-0.11)	(-0.35)	(0.82)	(-0.47)	(-0.31)	(-0.63)	(-0.47)	(-1.44)
$\Delta DEBT_0$	-0.143	-0.311	-0.194	-0.530	0.107	-0.014	0.166	-0.201
	(-0.42)	(-0.76)	(-0.42)	(-0.55)	(0.92)	(-0.06)	(0.57)	(-0.58)
$\Delta CASH_0$	-0.019	-0.081	-0.141	-0.037	0.226	0.092	0.114	0.551
	(-0.20)	(-0.68)	(-0.82)	(-0.11)	(1.46)	(0.40)	(0.36)	(1.16)
$SIZE_{-1}$, BM_{-1} & $PSHARE_{-1}$		Not reported				Not reported		
YEAR		YES				YES		
N	285	233	190	145	645	535	437	354
Pseudo R^2	7.18%	9.63%	19.00%	10.26%	2.91%	7.27%	8.09%	8.49%
Med. BHAR	-4.47%	-10.06%[b] (pre-SEO) $BHAR_{-1,0}$	-10.04%[a] =82.49%[a]	-11.84%[c]	-1.10%	-2.40% (pre-SEO) $BHAR_{-1,0}$	-10.38%[c] =50.54%[a]	-7.77%

The median *pre-issue* BHAR (from time -1 to 0) for the constrained issuers is at 82.49%. This translates into a four-year BHAR of 60.88% (i.e. (1 + 82.49%) * (1 – 11.84%) - 1). For the unconstrained group, the pre-issue BHAR in the announcement year is 50.54% and the four-year BHAR of 38.84% (i.e. (1 + 50.54%) * (1 – 7.77%) – 1). This means that investors do impound the liquidity information of issuers and partially discount the offering information into stock prices in the year of the SEO announcement.

Delving into the regression estimates, the results generally show no evidence that post-issuance market underperformance is related to pre-issue aggregate liquidity management, with the estimated *LM* coefficients all insignificant across years and for both groups of issuers. The estimated coefficients on the year 0 control variables, in all cases, are also insignificant. We interpret these results, given the pre-SEO BHARs shown in Table 8, as suggesting that investors correctly impound the impact of the liquidity and offerings information on the expected year 0 cash flows into stock prices accordingly and as such, when year 0 cash flows are realized, investors are not surprised and no revision of stock prices is needed.[27] Results also show that the 2-year BHAR is significantly negatively associated with pre-issue *EM* for credit-constrained issuers. Because the *EM* measure appears to be predominately negative (with an untabulated median of -0.024 for the group), this means that in the cross-section, issuers with poorer pre-issue abnormal accruals perform significantly better two years after the SEOs relative to their respective control matches.

Finally, what can we say regarding the ability of the transitory investment (*Neg*Δ*ROA*) measure to explain longer-run market underperformance? Consistent with our prediction, we find that transitory investment has very significant and negative impacts on the 2-year and 3-year BHARs for both groups of issuers, with *t*-statistics above -2.3 and -4.6 for constrained and unconstrained issuers, respectively. In terms of economic significance, a one median absolute deviation increase (276.85% and 330.65% in constrained and unconstrained samples, respectively) in the log scaled *Neg*ΔROA is associated with abnormal performance declines of 25.47% (= 276.85%*0.092) and 30.09% (= 330.65%*0.091) in 3-year BHARs for the former and latter groups, respectively. These results again support the explanation that investors face uncertainty in the long-term nature of investment and by observing how subsequent abnormal profits deviate from predicted, investors update their beliefs that the investment is transitory and discount stock prices accordingly.

As a final piece of analysis we examine the buy-and-hold abnormal return performance of issuers based on two alternative methods to generate benchmark control firms: (1) a size- and book-to-market- matched sample, and (2) a size-, book-to-market- and net debt/ assets matched sample. Table 8 reports the results. Overall, the table indicates a BHAR pattern comparable to the liquidity-adjusted (industry-, performance- and net debt-

[27] This interpretation is consistent with Shivakumar (2000) in that manipulation behaviors are observed by investors at the time of SEOs and investors lower their assessment of next period surprises from the adverse consequences of manipulation, and rationally discount firm value at the time of these offerings. Moreover, any significantly negative relationship detected between BHAR and a variable is interpreted as surprises not being picked up at the time of SEOs, rather than as evidence of poorer firms leading to underperformance. Further, the surprise is better quantified by the difference between the subsequent realized value towards the level predicted at the time of SEOs. This explains why the variables in our model are mostly unable to detect a significant relation in the longer run except for *Neg*ΔROA because it better proxies the surprises towards the level predicted at the time of SEOs.

Table 8

Long-run Stock Performance Following Seasoned Equity Offerings

This table reports buy-and-hold abnormal returns (BHARs) for the sample issuers using alternative control firms matching procedures: $BHAR_{a:b} = (1/n)\sum_{i=1}^{n} BHAR_{i,a:b}$, where n is the number of issuers in the sample over the period a to b. The yearly BHAR are estimated relative to time 0 — the month after the issue date, or four months after the fiscal year end preceding the issue, whichever the later, and through the end of the five-year period. The buy-and-hold abnormal return is the difference between the BHAR of the issuer and the matched control firm. The control firms chosen are not required to have monthly returns available throughout the event period. Size- and B/M- adjusted return is the paired difference between the raw return of the issuer and the control match chosen within 10% market capitalization of the issuers and the smallest absolute difference in book-to-market ratio. Size-, B/M- and net debt- adjusted returns is the paired difference between the raw return of the issuer and the control match chosen within 20% market capitalization and book-to-market of the issuers and the smallest absolute difference in net debt ratio. The groups "constrained" and "unconstrained" refer to the subset of firms having net debt to assets below and above the pooled industry median at 0.01, respectively, in the fiscal year preceding the offerings. Returns are winsorized at the 1% and 99% level. Numbers in brackets are Wilcoxon p-values for the median.

	Buy-and-hold returns relative to matched firms					
Portfolio	$BHAR_{-1,0}$ (pre-SEO)	$BHAR_{0,1}$ (1-year)	$BHAR_{0,2}$ (2-year)	$BHAR_{0,3}$ (3-year)	$BHAR_{0,4}$ (4-year)	$BHAR_{0,5}$ (5-year)
Panel A: Size- and BM- adjusted results						
Full sample	56.58%	-0.29%	-6.24%	-11.04%	-9.15%	-16.19%
	[0.00]	[0.75]	[0.00]	[0.00]	[0.00]	[0.00]
Constrained	74.52%	-1.41%	-6.69%	-16.60%	-18.50%	-28.21%
	[0.00]	[0.87]	[0.02]	[0.00]	[0.00]	[0.00]
Unconstrained	48.24%	-0.15%	-6.22%	-5.69%	-6.99%	-11.70%
	[0.00]	[0.64]	[0.03]	[0.06]	[0.11]	[0.03]
Panel B: Size-, BM- and net debt- adjusted results						
Full sample	51.92%	-1.19%	-11.39%	-10.41%	-17.36%	-20.06%
	[0.00]	[0.50]	[0.00]	[0.00]	[0.00]	[0.00]
Constrained	64.70%	0.33%	-2.24%	-8.08%	-2.98%	-7.62%
	[0.00]	[0.73]	[0.23]	[0.01]	[0.06]	[0.04]
Unconstrained	47.40%	-2.63%	-17.73%	-11.97%	-18.98%	-21.89%
	[0.00]	[0.24]	[0.00]	[0.00]	[0.00]	[0.00]

matched) benchmark employed above. The mean one-year to five-year BHARs for the size- and book-to-market-matched sample are 0.31%, -10.74%, -19.23%, -26.20% and -42.36%, respectively. The conventional t-statistics are all significant from the second year onwards. In Panel B, we observe that controlling for additional net debt decreases some of the underperformance. The liquidity-adjusted method shows further decreases in the mean BHARs (especially in the unconstrained group) and smaller t-statistics. Overall, these results are consistent with the underperformance documented in previous literature.

Overall, the evidence suggests that liquidity management impacts post-issue operating performance (for unconstrained issuers); aggressive issuers have lower transitory profit compared to their conservative counterparts in the cross-section. In contrast, post-issue stock performance is better described by the forward-looking behaviors of investors: liquidity information is observed/realized at the time of SEOs, while subsequent underperformance is related to the investors surprise relating to the transitory nature of the issue-investment decision.

6. Conclusion

This paper provides a systematic study of liquidity practices around SEOs. It shows, through the examination of the link between liquidity policy and financial constraints, that the effect of liquidity management has important implications on the way firms conduct their issuing decisions and investment policies. Our analysis points to an investment timing motive behind constrained issuers' cash management policies, where in the presence of financing frictions, they prefer saving higher cash so as to match up funding capacity for upcoming investment. In contrast, unconstrained issuers are characterized by their alarmingly high debt and low cash (i.e. high net debt) levels — pointing to the motivation to conduct the SEO to resolve near-term liquidity problems.

To probe further into atypical liquidity management behaviors around SEOs, we examine period-to-period changes across four sources of funding measures: change in cash, change in short-term debt, asset sales and change in long-term debt. Using a modeling setup analogous to that of the earnings management literature, we find that constrained issuers are relatively conservative (compared to industry non-issuers) in pursuing their liquidity policies pre-issue, and tend to stockpile cash proceeds and increase investment (e.g. through real investment activities such as expenditures on R&D) post-issue. This contrasts with unconstrained issuers, whose liquidity policies are fairly restrictive (given high net debt levels) building up to the offer. Furthermore, we do not find much of a stockpiling effect and real investment, post-issue. Overall, the analysis further demonstrates the differential effect of corporate liquidity governing the two groups of issuers.

Finally, our evidence on post-issue performance differs from existing relevant studies in that we propose a unified comparison of both operating and return performance under the same liquidity-matched control sample. Our analysis indicates that operating performance improves within 2-3 years post-issue and then diminishes. This transitory operating improvement, however, is accompanied by a deteriorating return performance. For unconstrained issuers, we find a negative relation between pre-issue liquidity management and post-issue operating performance (i.e. aggressive liquidity management leads to subsequent decrease in performance). However, such a relationship is not replicated in the post-issue returns analysis. Indeed, liquidity information is observed by investors at the time of offering and does not constitute a future surprise. Rather, post-issue market underperformance can be attributed to investors' downward revisions related to the transitory nature of investment opportunities from the SEOs.

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RM_{-1}	Aggregate real activities management is captured following Zang (2012) and is calculated as Abnormal PROD minus Abnormal DISEXP, adjusted by the average of a portfolio matched on industry, ROA and net debt/ assets a year prior to the estimation year	
EM_{-1}	Abnormal ACC, adjusted by the average of a portfolio matched on industry, ROA and net debt/assets a year prior to the estimation year	
$\Delta SALE_0$	Change in sales, scaled by beginning total assets	SALE [12], AT [6]
$\Delta CAPX_0$	Change in capital expenditure, scaled by beginning total assets	CAPX [128], AT [6]
$\Delta DEBT_0$	Change in long-term debt, scaled by beginning total assets	DLTT [9], AT [6]
$\Delta CASH_0$	Change in cash and cash equivalents, scaled by beginning total assets	CHE [1], AT [6]
PSHARE	Percentage of primary shares offered	PRIMSHR_SHARES from SDC database
$Neg\Delta ROA_{0:p-1}$	The natural logarithm of the cumulative liquidity-adjusted change in ROA reported within portfolio year 0 to p, where the cumulative measure is multiplied by -1 if < 0, and set to 0.0001 otherwise	
$SIZE_{-1}$	Log of market capitalization = log(Share price * Common shares outstanding)	PRCC, CSHO [25]
BM_{-1}	Book-to-market ratio = Book value of equity / (Share price * Common shares outstanding)	BVE, PRCC, CSHO [25]