

Cash Shortage and Post-SEO Stock Performance

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Abstract

In this thesis we examine the long-run stock performance of seasoned equity offering (SEO) companies. We find that SEO firms facing a short-term cash shortage when they issue new shares have poor long-run stock performance. This result is robust according to tests based on two different performance measurement methods. In contrast, the stock price reaction at the time of SEO announcement is not correlated with short-term cash need. The evidence suggests that the market does not incorporate the negative information contained in cash shortage at the time of SEO. We test alternative explanations for underperformance. We find that the long-run operating performance of SEO firms with greater cash need is similar to that of other SEO firms. Also, SEO firms with greater cash need have higher Tobin's Q at the time of issuance. This evidence suggests that the poor long-run stock performance reflects a correction of market overvaluation.

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1. INTRODUCTION

Previous research documents that Seasoned Equity Offerings (SEO) stocks underperform in the long run (Loughran and Ritter, 1995, 1997; Affleck-Graves, 1995; Rangan, 1998; Jegadeesh, 2000). Loughran and Ritter (1995) show that firms issuing equity produce low returns for investors over a five-year horizon following the SEO. There is no consensus in the extant literature about the causes for the documented underperformance. This attempts to solve this puzzle.

DeAngelo et al. (2010) find that without counting the SEO offer proceeds, 62.6 percent of issuers run out of cash in the year following the SEO. The authors suggest that short-term cash need is the primary SEO motive. If the market reacts slowly to the negative information contained in cash shortage at the time of SEO, then SEO stocks will underperform and the magnitude of the underperformance will be larger for SEO firms with greater cash need. This hypothesis is explored in this thesis.

The current study builds on the above hypothesis under which the market does not incorporate negative news quickly. Market response to SEO is examined by using 1600 SEOs available from 1974 to 2014 on the US stock market. In addition, this thesis examines whether the magnitude of cash need has a differential impact on stock performance and operating performance.

We address five research questions:

1. Is cash shortage the main driver for SEOs?
2. Are SEO firms with cash shortage substantially overvalued prior to the SEO?
3. What is the long-term impact of the SEO motive on stock performance?
4. What is the impact of the SEO motive on the short-term announcement period?

5. What is the long-term impact of the SEO motive on the issuer's operating performance?

The answer to the first research question depends on the motivations for SEOs. These have been well-documented in the literature. In the current study we examine whether the fundamental decision to conduct SEOs is driven by a short-term cash need. We would expect firms which issue new equity because of this motivation to run out of cash without the offering proceeds. Otherwise, these firms would need to alter other financing or operating decisions to avoid cash shortage. Thus, the first subject of exploration in this current study is to examine the cash position of firms undertaking SEO activities.

The answer to the second question is closely related to the first question. We aim at examining whether a firm's equity is overpriced before SEO, especially for firms in need of cash. The sharp price run-up before SEO experienced by firms has been widely studied (Asquith and Mullins, 1986; Masulis and Korwar, 1986). Managers attempt to seize the opportunity to sell highly priced stocks when the market permits. However, this well-known window of opportunity hypothesis is not consistent with two financial theories: the pecking order theory and the trade-off theory. The pecking order theory states that a company should first finance itself through retained earnings. When this source of financing is unavailable, a company will resort to debt financing. The last source of financing comes from equity because of cost considerations. Trade-off theory states that firms normally focus on target leverage ratios. Firms will use debt financing to offset the deviation from the target leverage ratio when the share price increases. These two financial theories are inconsistent with the fact that firms do not lever up after share price increases; instead, firms will conduct SEOs. Thus, we will explore whether a firm's equity is overpriced before an SEO, especially for those firms with greater cash need.

For the third research question, much empirical evidence has shown that post-offering SEO firms underperform in the long-run. Robust to various return benchmarks, this underperformance is economically significant (Loughran and Ritter, 1995, 1997; Spiess and Affleck-Graves, 1995). The long-run stock underperformance could imply that SEO firms are substantially overvalued before offering. It could also imply that investors are too optimistic about future prospects, yet they overlook the negative information contained in cash shortage at the time of offering. Therefore, we investigate the long-run stock performance with both the cash position and the pre-SEO overvaluation of SEO firms.

For the fourth question, we would like to explore the SEO announcement effect by studying the average three-day stock return around the short-run announcement period. Previous literature documents a negative announcement effect (Asquith and Mullins, 1986; Masulis and Korwar, 1986). Given the firm's motivations for its SEOs, more significant negative news should be signaled if the SEO firm requires more cash. Under efficient market conditions, the negative announcement effect would be greater for firms with higher cash need. Based on our hypothesis, we would like to find out if the market responds slowly to SEO announcements.

To answer the last research question, we would like to explore the relation between long-run operating performance and cash position of SEO firms. Our results show that SEO firms with cash shortage do not exhibit poor long-run operating performance. This result implies that the poor stock performance of SEO firms with cash need may not be caused by deterioration in operating performance. This supports the assertion that SEO firms with a greater cash requirement are substantially overvalued.

Consistent with the SEO motivations of meeting a short-term cash need, we find that 73.1 percent of the issuers would run out of cash in the year following SEO without counting the

issuance proceeds. This result suggests that the cash position of SEO firms ought to be a vital determinant of offering decisions made by managers. We also find that SEO firms with higher cash need have significantly higher Tobin's Q at the time of offering. These firms are substantially overvalued compared to their non-issuer counterparts.

We also find that the average three-day announcement period return is approximately negative two percent for SEO firms. This result is independent of the firm's pre-SEO cash position. It does not show that the market is efficient to have a greater negative announcement effect on firms with higher cash need. However, long-run stock returns for SEO firms with higher cash need are significantly and economically lower than market benchmark returns. At the same time long-run negative abnormal stock returns are not significant for SEO firms with cash surplus at the time of offering. These findings suggest that the market is inefficient as manifested by its failure to fully reflect the negative information contained in cash need at the time of the SEO announcement. Instead, the market's slow reaction to the negative news signaled in the SEO announcement event causes the long-run underperformance. These results are consistent with the argument that the long-run poor stock performance reflects the correction of overvaluation.

Our study contributes to the literature in the following aspects. First, to the best of our knowledge, this is the first study to directly examine the relation between the cash position of SEO firms and overvaluation of these firms at the time of offering. Short-term cash needs and windows of opportunity collectively influence the decision to conduct SEOs. Second, the current study fills the gap between SEO motivation and long-run performance of SEO stocks. This work provides a new explanation of why SEO stocks underperform in the long run, and offers original insights about how the stock market reacts to different types of information.

The remainder of this thesis is organized as follows. Section 2 reviews the relevant literature. Sample selection and methodology are described in Section 3. Section 4 discusses the univariate analysis results of cash requirement. The relation between cash requirement and short-run stock performance is studied in Section 5. Section 6 examines the relation between cash requirement and long-run stock performance. Section 7 examines the relation between cash requirement and post-SEO operating performance. Tobin's Q of SEO firms at the time of issuance are investigated in Section 8. Section 9 concludes the thesis.

2. RELEVANT LITERATURE

The motivations for public firms to conduct seasoned equity offerings (SEOs) are widely researched and documented in the finance literature. Studies show that the issuing firms have a sharp stock price run-up in the year prior to an SEO (Asquith and Mullins, 1986; Masulis and Korwar, 1986). Loughran and Ritter (1995) suggest that windows of opportunity are largely outside issuers' control. They consider market-timing opportunities as a first-order motive for issuing activities. However, a sharp stock price run-up may mislead investors to buy the issues while failing to recognize that issuing firms are overvalued.

Myers and Majluf (1984) show that managers issue equity only when they believe the firm is overvalued with respect to the private information. This finding suggests that the market is informationally inefficient. This is a world where an information asymmetry exists between managers and other market participants. Managers with private information related to the firm attempt to issue overvalued equity.

According to DeAngelo et al. (2010), both market timing opportunities and the stage of corporate lifecycle have significant material influences on the decision to conduct SEOs. While

the lifecycle effect is quantitatively stronger, the authors argue that the explanatory power of the two effects is modest, both individually and collectively. They conclude that the foundational decision to conduct SEOs is driven by a short-term cash need. Other studies also explore the market response to SEOs. For example, Masulis (1983) and Asquith and Mullins (1986) find negative announcement period returns in early short-run event studies. Asquith and Mullins (1986) report that the average two-day announcement excess return for all industrial issues is approximately a statistically significant negative three percent. Johnson, Serrano, and Thompson (1996) find that the market reaction at the issue announcement is significantly less negative for firms which have insider buying compared to those which have insider selling or passive management. This empirical evidence supports the point of view that unexpected equity cash flows can convey information to investors. If the firm requires cash inflow from the equity market, investors would interpret this as a negative signal. This would consequently lead to a stock-price drop at the time of new issue announcements.

Empirical evidence also shows that SEO firms subsequently underperform several stock return benchmarks in the long run. Loughran and Ritter (1995) report that stocks of firms which conduct SEOs underperform by eight percent per year on average over five years. Despite the average three percent drop on the announcement of new issues, SEOs still occur. The authors relate the market's underreaction to the implication of market-timing opportunities because the issuing firms are substantially overvalued, on average. Yet there is no consensus about what causes this underperformance.

The cause of the negative reaction to SEOs has been widely debated. One view suggests that negative information about the value of the firm can be revealed through SEOs. Myers and Majluf (1984) suggest that the market can incorporate the information quickly over several days.

If the market incorporates the information slowly, the firm can take advantage of market timing opportunities and sell shares at a high price thereby transferring wealth from new shareholders to existing shareholders due to the overpricing of the firm's shares.

Jensen (1986) takes a different view suggesting that due to agency problems, managers do not utilize new equity proceeds in a value maximizing manner. Agency theory predicts that it is more likely that proceeds from new equity are wasted on agency spending without valuable growth prospects. Jensen suggests that managers tend to waste free cash flows and reduce firm value.

Market inefficiency implies that the market reacts slowly to various events. New information is not always incorporated into market prices over a short time period. The impact of announcements of corporate events can extend over longer time periods. Examples of market underreaction to corporate announcements include initial public offerings (IPOs) as well as SEOs, open market share repurchases, and mergers.¹ Market inefficiency also implies that stocks are not accurately priced, even with a price concession at the time of offering (Duffie, 2010). Managers can determine when stock prices are overvalued because of information asymmetry. This inside information is used by managers to make equity offering decisions. Therefore, investors underreact to the SEO announcement and fail to reach an agreement on the values of stocks. Thus, the long-run underperformance of SEO stocks may be related to a slow reaction to negative information contained in SEO decisions.

Loughran and Ritter (1997) find that significant underperformance happens between the seventh to twenty-fourth month following an SEO, after which the performance gap narrows.

¹ For example, Zheng (2007) finds that the market underreacts to the free cash flow-related agency problem resulting from new cash raised in IPOs. Ikenberry et al. (1995) demonstrate that the markets underreact to open market share repurchase announcements. The four-year abnormal buy-and-hold return is 12 percent higher than that of the announcement period. Asquith et al. (1983) find five-year negative abnormal returns for acquiring firms following merger announcements.

The authors do not find significant underperformance during the first six months after issuance. Jegadeesh (2000) reports that SEOs underperform during the post-SEO announcement period in terms of quarterly earnings. The author suggests that investors are too optimistic about the SEO firms' future earnings on the day of the issue.

Another indication of SEO-related market inefficiency is presented by Bilinski and Strong's (2013) who suggest that lower post-issue SEO stock returns are related to manager's private information which is revealed by the SEO announcement. The market does not incorporate this private information into the announcement return. For example, it takes 16 months for the market to incorporate the surprise element of the offering decision. This evidence is consistent with the hypothesis that the main cause of SEO abnormal performance is caused by a delayed reaction to the information contained in the issue announcement.

Loughran and Ritter's (1997) argument that first-order motive for SEOs is market timing opportunities has recently been questioned. According to DeAngelo et al. (2010) market timing opportunities are overshadowed by a near-term cash need. They find that SEO firms face imminent resource constraints when they conduct SEOs. Since cash needs are dominant in motivating offerings, stock performance should be examined to see how the market responds to the news contained in cash requirements. When exploring a three-day market response to SEO announcements, we can determine whether the market can incorporate news immediately. If the market cannot fully capitalize the negative information contained in cash shortage at the announcement period, then it shows a slow reaction to negative information which results in underperformance over the long term.

The literature provides no consensus with respect to what causes the underperformance of SEO firms. To close this gap, we hypothesise that if the market reacts slowly to the negative

information contained in cash shortage, then SEO stocks will underperform. Moreover, the magnitude of the underperformance will be larger for SEO firms with greater cash need.

3. SAMPLE SELECTION AND METHODOLOGY

3.1 Sample selection

Our initial sample of SEOs is collected over the 1974 to 2014 sample period. The data are taken from the Security Data Corporation (SDC) database, the Center for Research in Security Prices (CRSP) database, and the Compustat database. To be included in our analysis, SEOs must meet the following criteria:

- (1) The SEO stock must have stock return data available from CRSP.
- (2) The SEO firm must have financial data available from the Compustat database.
- (3) Sampled SEOs must involve the issuance of ordinary common shares and should not include rights issues, unit investment trusts, unit issues, depositary issues, REIT, or closed-end fund offerings.
- (4) The SEO must have a four-digit SIC code outside the intervals 4900-4949 (utilities) and 6000-6999 (financial companies).
- (5) An SEO by the same company occurring during the five-year holding period of a previous equity offering is excluded as well as SEOs taking place during the same year by the same issuer.
- (6) Offerings registered under SEC Rule 415 are excluded.

Our final sample includes 1,600 SEOs that satisfy these criteria. This sample only contains SEOs from which the firm received cash so that pure secondary offerings are excluded, but pure primary and combinations of primary and secondary offerings are included. Pure secondary offerings are excluded since cash raised through the SEO flows directly to insiders

who sell stocks simultaneously and the SEO firm does not receive any cash. In our sample, SEOs occurring in the same year and SEOs conducted by the same company during the five-year holding period of a previous equity offering are excluded. The adoption of this criterion is intended to avoid the severe cross-sectional correlation and test misspecification when event windows for the same company overlap (see Lyon et al., 1999). Shelf registration offerings registered under SEC Rule 415 are also dropped. Shelf registration allows the firm to fulfill all registration-related procedures up to two years beforehand and to conduct offerings within days when market conditions permit.²

3.2 Measurement Definition

Following DeAngelo et al. (2010), to measure cash needs we calculate the pro forma cash to total assets ratio (Cash/TA) for each issuer at the end of the year following the SEO. The ratio is calculated based on the scenario that firms do not receive the proceeds, but otherwise keep the other non-SEO investment and financing decisions unchanged. We divide the sample into three groups based on the level of cash needs: low, median, and high.

The most popular measures of long run stock performance are the mean buy-and-hold return and the mean size-and-book-to-market-adjusted buy-and-hold return. For each SEO firm, we calculate the returns for a three-year horizon following the SEO. If an SEO firm is delisted during the three-year period, then the returns are calculated up to the delisting day.

The short-run stock performance, which indicates the market reaction to the SEO announcement, is measured with the daily excess stock return. The excess return is the difference

² Rule 415 allows firms to register securities that they expect to issue over the next two years. Firms are able to conduct public offerings with little or no advanced notice. Autore et al. (2008) find that the median shelf offering takes place 111 days after the filing date whereas the median traditional offering takes place only 31 days after the filing date. Thus, the time gap between filing date and issue date is relatively larger for SEOs registered under Rule 415. Since it is not clear whether the SEO firm is in need of cash at the filing date, Rule 415 may weaken the announcement effect caused by the negative information contained in cash shortage at the time of the offering. Therefore, shelf offerings are excluded from our sample.

between the daily return of the SEO firm and the market return. The market return is measured by CRSP NYSE-Amex-Nasdaq value-weighted index return. The average three-day announcement period return is calculated over a three-day window around the filing date beginning from one day prior to the filing date and ending on one day after filing.

We also test the long-run operating performance of SEO firms. The accounting measures we use to proxy for operating performance are ROA, OIBD/Assets, OIBD/Sales, and Sales Growth. These data are obtained from Compustat.

4. CASH REQUIREMENTS OF SEO FIRMS

Panel A of Table 1 demonstrates that the median value of an SEO firms cash to assets ratio (Cash/TA) rises from 5.6 percent in year 0 (one year before SEO) to 7.9 percent in year 1 (the year of SEO), then drops to 5.8 percent in year 2 (one year after SEO) – near the pre-SEO level.³ These figures indicate that the increase in the median Cash/TA is induced by the SEO, but is immediately (and almost completely) reversed to the pre-SEO level one year after the offering. These results indicate that issuers utilize SEO proceeds quickly rather than stockpile these proceeds.

Table 1 here

Panel B of Table 1 further reports the median excess Cash/TA for the years surrounding the SEO. Excess Cash/TA is calculated by subtracting actual Cash/TA ratio from the normal

³ Note that cash to total assets ratio (Cash/TA) used here is based on actual cash, which accounts for SEO proceeds.

Cash/TA ratio, where normal Cash/TA is calculated using matching firm data.⁴ When an SEO firm uses SEO proceeds to cover its cash shortage one would expect it to have a zero excess Cash/TA pre-SEO, positive excess Cash/TA immediately after the SEO, and a lower excess Cash/TA once the SEO proceeds are used to cover the cash shortage. Panel B confirms this pattern and reports that the median matching firm adjusted (normal) Cash/TA ratio is equal to median actual ratio the year prior to the SEO. Post SEO, the excess Cash/TA increases to two percent to the year of the SEO and then goes down to one percent one year after the SEO.

The results reported on panels A and B indicate that SEO proceeds are utilized quickly. This implies that the offer proceeds enable the issuers to carry on with their operating and other financing decisions. Panel D reports that the full sample median proceeds raised issuers is \$23.27 million. However, according to Panel C there is only \$9.08 million in cash during the year following the SEO. This evidence indicates the rapid speed by which SEO firms put the proceeds to work.

If the primary motive for SEOs is a near-term cash need, then firms are likely to run out of cash without the offer proceeds. To find out whether the offer proceeds play a vital role, pro forma Cash/TA ratios are calculated for each issuer in the year following the SEO. In this scenario, asset sales or other security offerings are ruled out as a replacement for the offer proceeds. Similarly, pro forma excess Cash/TA for each issuer in the year after SEO is also calculated by subtracting Normal Cash/TA from pro forma Cash/TA.

Our findings strongly support the argument of DeAngelo et al. (2010) that a vast majority of issuers would immediately experience a cash shortage in the event that no SEO proceeds are raised. Recall that to measure an SEO firm cash need we use the pro forma cash to total assets

⁴ Following Purnanandam and Swaminathan (2004), each SEO is matched to the appropriate industry-sales-EBITDA margin portfolio. The benchmark portfolios are made up of non-issuers. We identify a matching firm that is closest in sales to the SEO firm within the matching portfolio.

ratio (Cash/TA) under the assumption that firms do not receive the SEO proceeds. Panel D of Table 1 reports that the median pro forma Cash/TA ratio in the year following an SEO is -7.9 percent across all issuers and the median pro forma excess Cash/TA ratio is -16.2 percent. The most striking evidence is that 73.1 percent of issuers would have negative Cash/TA and 84.9 percent would have Cash/TA shortage in the year following an SEO without the offer proceeds.

We also calculate the abnormal change in cash as described by DeAngelo et al. (2010; p. 23): “the difference between (i) the cash held in the year in question minus (ii) the cash the firm would have if it maintained its pre-SEO Cash/TA ratio.” We divide this difference by the SEO proceeds to obtain the abnormal change in cash/SEO proceeds. Panel E of Table 1 outlines the median abnormal change in cash/SEO proceeds; i.e., the entire excess cash from SEO is spent by year 1. The demand for cash is higher in the three years following the SEO. These findings are consistent with the argument that most issuers face severe internal resource constraints which result in the instant use of the SEO proceeds.

It is safe to say that a short-term cash need is a fundamental reason for most firms to conduct SEOs. We can build on the findings above to examine the impact of cash need on firms’ post-SEO stock performance and find out how the market responds to SEOs.

5. CASH REQUIREMENT AND SHORT-RUN STOCK PERFORMANCE

As described above, managers’ main motivation for conducting an SEO is resolving a problem of imminent internal resource constraints. Without the SEO proceeds, most SEO firms do not have sufficient cash to hold their operating and other financing decisions fixed. A short-term cash need is negative news which should be signaled during the announcement period in an efficient market. We would like to find out if the market can quickly incorporate the negative

news contained in cash requirement at the time of the SEO. In this sense, the magnitude of cash need would have a differential impact on the short-run stock performance.

We use the average three-day excess return on the announcement event to measure the post-SEO short-run stock performance. This daily excess return is the difference between the return of each SEO firm and market return. The market return is measured by CRSP NYSE-Amex-Nasdaq value-weighted return. The average three-day announcement period return is calculated over the three-day window around the filing dates. The results are reported in Table 2.

****Table 2 here****

Table 2 shows the relation between cash need and post-SEO stock performance during the short-run announcement event window. The sample is divided into three quantiles based on the level of cash need measured with the pro forma Cash/TA ratio.

The mean (and median) three-day excess return is approximately negative two percent for each quantile. We use a t-test for the null hypothesis that the difference in the mean three-day excess return of the low and high quantiles is zero. To test the null hypothesis that the difference in the median three-day excess return of the low and high quantiles is zero we use the Wilcoxon signed rank test. The null hypotheses hold in both cases. We also run a simple regression model of the event-window return on a variable measuring the level of pro forma cash position (the results are not tabulated here).⁵ Under this regression model the cash position variable (the pro forma Cash/TA ratio) takes the value of zero, one, or two for firms in the bottom, middle, or high quantile, respectively. The pro forma cash position regression coefficient is not statistically

⁵ All regressions in this thesis are OLS regressions. We find that the regression error term in all cases meets the OLS assumptions.

significant. We find that the stock price reaction at the time of the SEO announcement event window is not correlated with the short-term cash requirement. The negative announcement effect is not larger for SEO firms with greater cash need. These findings support our hypothesis that the market reacts slowly to the negative information contained in cash shortage. This may mean that the market underreaction would cause stock underperformance over the long term to reflect the true value of an SEO firm equity, based on the hypothesis that the stock is overpriced at the time of the offering.

6. CASH REQUIREMENT AND LONG-RUN STOCK PERFORMANCE

6.1. Univariate analysis

In this section we conduct a long-run test that examines stock returns over the three years following an SEO. We previously concluded that the market has no immediate response in the short run. I.e., we did not find a price reaction to negative news contained in cash shortage during the announcement period. This implies that the market fails to learn that firms are in need of cash to allow them to implement their operating and other financing decisions. This market underreaction can cause a poor stock return over the long run. We expect that the magnitude of the underperformance will be larger for SEO firms with greater cash need. Thus, to find out whether market underreaction is the main reason for underperformance, we test the relation between pro forma cash position and stock returns over the three years following an SEO.

Two measures of long-run stock performance are used: a buy-and-hold return and a size-and-book-to-market-adjusted buy-and-hold return. Size-and-book-to-market-adjusted buy-and-hold returns are calculated as the differences between the buy-and-hold return of each SEO firm and its benchmark portfolio return. To be specific, each SEO firm is assigned to one of 25 size-

and-book-to-market portfolios which are formed based on Fama and French (1993). The value weighted monthly returns of the benchmark portfolios are used to calculate benchmark buy-and-hold returns.

Following Brav et al., (2000), the initial size is calculated at the end of the first month after the offering and the initial book value of equity is the first book value after the SEO as long as it is not more than 18 months following the offering month. For robustness, we reconstruct the benchmark portfolios at the end of each June, and then the SEO firms are reassigned to the benchmark portfolios based on updated size and book-to-market ratio (Zheng, 2007). The results are similar based on these two methods of benchmark portfolios construction. If the SEO firm is delisted before the end of the estimation period, then we truncate the return on the delisting date. SEOs with initial negative book value of equity are dropped from the analysis. For robustness, we also calculate the mean buy-and-hold return and mean size-and-book-to-market adjusted buy-and-hold return starting from two months after the first post-SEO fiscal year end. The results show a monotonic and negative relation between cash shortage and long run post-SEO stock performance.⁶

Table 3 reports the mean and median buy-and-hold return (Panel A) and size-and-book-to-market adjusted buy-and-hold return (Panel B) over the three years following an SEO. Again we divide the sample into three (low, median, and high) quantiles based on the level of pro forma Cash/TA.

Table 3 here

⁶ These results are omitted for brevity and are available upon request.

If the pro forma Cash/TA is in low level, this means that firms would face cash shortfall without offer proceeds. Panel A demonstrates a monotonic and negative relation between the SEO firm's cash need and the three-year buy-and-hold return. The data reflects an 11 percent mean three-year buy-and-hold return for firms in need of cash (low Cash/TA), which is over 40 percent lower than that of firms with a lower cash need. This amount is economically significant. Panel B of Table 3 exhibits the same pattern as in panel A. Firms with a greater cash need (low Cash/TA) at the time of SEO strongly underperform over a long horizon in terms of risk-adjusted stock price appreciation. On average, these firms perform at 38 percent below the benchmark return. However, the mean three-year risk-adjusted return on firms with a lower cash need (high Cash/TA) is six percent, reflecting a significantly lower stock underperformance relative to high cash need firms. In general, SEO firms underperformance on a risk-adjusted basis, regardless of the magnitude of their cash need, with the underperformance magnitude being larger for SEO firms with a greater cash need. In Panel A and Panel B, we conduct a t-test for the mean sample difference and Wilcoxon signed rank test for the median sample difference between low and high quantiles. The tests show that the differences in mean and median are statistically significant.

6.2. Regression analysis

The univariate tests in the previous section control for only one or two factors that are known to influence the long-run stock performance. To control for other factors affecting the long-run stock performance, we utilize a multiple regression analysis to examine the relation between an SEO firm cash need and its size-and-book-to-market adjusted buy-and-hold return over a three-year time window (dependent variable). The independent variables include: pro forma Cash/TA ratio, Log Size (Log of market value of equity at the end of first trading day), and Log book-to-

market (BE/ME) ratio. BE is the book value of equity from the first fiscal year after the SEO date. We also control for the market return (NYSE-Amex-Nasdaq value-weighted daily returns). Teoh, Welch, and Wong (1998) find that IPOs with high accruals underperform. It is possible that SEO firms also exhibit stock underperformance with high accruals; therefore, we add accruals as a control variable. We measure accruals with the difference between income before extraordinary items and cash flow from operations for fiscal years after 1987.⁷ For fiscal years before 1987, the following formula is used to calculate accruals: change in current assets – change in cash – change in current liabilities + change in short-term debt + change in tax payable – depreciation and amortization. Accruals are scaled by total assets.

Table 4 presents the regression results. Regression (1) includes accruals and Log (Size) as control variables. Regression (2) excludes accruals from the control variables. Regression (3) controls for accruals for a winsorized sample at the upper and lower five percent return observations. In regression (4) we winsorize the upper and lower five percent return observation without controlling for accruals. In all the four regressions, we also winsorize the upper and lower five percent pro forma Cash/TA ratio.

****Table 4 here****

Similar to the univariate analysis, the regression results show a negative relation between cash need and long-run risk-adjusted stock return. An SEO firm that is not facing imminent internal resource constraints has higher long-run risk-adjusted returns. This is evident from the positive and statistically significant coefficients of pro forma cash position found in all

⁷ Starting 1987, cash flows from operations is reported under the Statement of Financial Accounting Standards No.95 (SFAS No.95, FASB 1987). We use a balance sheet and income statement data to calculate accruals for pre-1987 observations.

regression models. Since this result still holds for the winsorized samples, we conclude that the negative relation is not caused by outliers.

These findings are consistent with the hypothesis that cash requirement has a differential impact on the long-run risk-adjusted stock returns because the market reacts slowly to the negative information contained in cash shortage. It takes time for the market to incorporate the news to reflect the true stocks price. Thus, we conclude that market underreaction causes SEO firms underperformance.

7. CASH REQUIREMENT AND LONG-RUN OPERATING PERFORMANCE

To gain further insight into how the market reacts to SEOs, we explore alternative explanations for the poor stock performance in the long run. Loughran and Ritter (1997) document a poor post-SEO operating performance. In this section we examine the post-SEO operating performance to test whether the poor stock price performance over the long run is caused by a decline in operating performance.

We use the following measures for operating performance: change in return on assets, change in operating income to assets ratio, change in operating income to sales ratio, and sales growth. All measures are industry adjusted. Following Loughran and Ritter (1997), operating income (OIBD) is defined as operating income before depreciation, amortization, and tax, plus interest income. ΔROA is the difference between ROA three years following SEO and ROA in the year of SEO. Similarly, $\Delta(OIBD/Assets)$ and $\Delta(OIBD/Sales)$ are the differences between the value of each of the two measures three years following SEO and that the year of SEO. Sales growth is given by the three-year compound annual growth rate.

7.1. Univariate analysis

Table 5 presents the results of long-run operating performance for each operating performance measure. The results indicate that the post-SEO operating performance is similar for the three quantiles stratified based on cash need (pro forma cash/TA), except when operating performance is measured by sales growth. For the sales growth proxy, firms exhibit greater increases in sales when they have greater cash need at the time of the offering. This implies that the poor long-run stock performance of SEO firms with cash shortage may not be caused by operating performance deterioration.

*** *Table 5 here* ***

7.2. Regression analysis

To verify the univariate test results we now use regression analysis to control for other factors affecting operating performance. The dependent variable in the regression analysis is the SEO firm operating performance which is measured with the four alternative measures defined above. The independent variables include: pro forma Cash/TA ratio, Log (LT) (log of long term debt), Capex ratio (capital expenditure scaled by sales), R&D ratio (research and development expenses scaled by sales), EP (earnings-to-price ratio), DP (dividend payout ratio), Firm age (log of one plus the total number of years listed on Compustat), Log Size (Log of market value of equity) and SG (Sustainable growth rate). The sustainable growth rate is the product of the retention ratio and the return on equity one year prior to the SEO.

Table 6 presents the regression results. Again, we winsorize the upper and lower five percent pro forma Cash/TA ratio in all regressions. For the first and third operating performance

measures, the coefficient of pro forma cash position is not statistically significant. We do not find a relation between cash shortage and long-run operating performance for these operating performance proxies. For the regression using $\Delta(\text{OIBD}/\text{Assets})$ and sales growth as dependent variables, the coefficient of pro forma cash position is negative and statistically significant. This suggests that the higher the firm cash requirement at the time of SEO, the larger change in OIBD/Assets or sales growth rate it will experience. Similar to the univariate test analysis, these findings suggest that the poor SEO firm stock performance in the long run is not caused by deteriorating operating performance.

****Table 6 here****

8. CASH REQUIREMENT AND TOBIN'S Q

In the previous section we explore the long term operating performance for SEO firms. However, our findings indicate that this is an insufficient explanation for the poor long-run stock performance. An alternative explanation is that the poor long-run stock performance may be the result of overvaluation at the time of the SEO. DeAngelo et al. (2010) suggest that the market-timing is a secondary motivation for SEOs. SEOs typically follow share price run ups. In this section we examine the Tobin's Q of SEO firms at the time of issuance to test whether SEO firms with greater cash needs are valued higher. We use Tobin's Q to measure overvaluation of SEO firms. Following La Porta et al. (2002), the numerator of Tobin's Q is the total liabilities plus the market value of common equity. The denominator of Tobin's Q is the book value of total assets.

8.1. Univariate analysis

Again we divide the sample into three quantiles based on cash need (pro forma cash/TA) and conduct the univariate analysis. The results, reported in Table 7, indicate that the median Tobin's Q for SEOs with a greater cash need at the time of issuance is 2.25, while the median Tobin's Q for SEOs with a lower cash need is 1.56. A positive relation is exhibited between cash need and Tobin's Q at the time of offering. Similar results are reported for the log transformation of Tobin's Q. These results imply that SEO firms with higher cash need tend to be more overvalued at the time of issuance. The difference in median between quantile 1 and quantile 3 is statistically significant according to the result of Wilcoxon signed rank test; therefore, regression tests are necessary to examine whether this amount is statistically significant after controlling other factors.

Table 7 here

8.2. Regression analysis

We use regression analysis to formally examine the relation between the SEO firm pro forma cash position and its Tobin's Q. The dependent variable is Log (Q) at the time of issuance. The pro forma Cash/TA ratio is included as an independent variable. Other control variables include: Log (LT), Log (Sales), Firm age, Capex ratio, R&D ratio, DP, Lag (ROA), and Lag (ROE). Log (Sales) is log of sales. Lag (ROA) and Lag (ROE) represent ROA and ROE one year prior to SEO respectively.

Table 8 reports the results for the regression analysis. Regression (1) includes Lag (ROA) as a control variable. In regression (2), we replace Lag (ROA) with Lag (ROE) as a control

variable because both Tobin's Q and ROA have the firm's assets on the denominator. The log transformation for Tobin's Q reduces the effect of extreme observations, and therefore we are unlikely to face outliers. We also winsorize the upper and lower five percent pro forma Cash/TA ratio in the regressions to remove outliers. The coefficient of the pro forma cash position is negative and statistically significant at the one percent level under both regression specifications. At the time of issuance, we find that firms with greater cash need have a higher Tobin's Q compared to other issuers. In other word, stocks of firms with greater cash need are overpriced. This overvaluation should be signaled as negative information as well, but the market reacts slowly to the negative news. These findings suggest that SEO firms are overvalued at the time of issuance, resulting in poor long-run stock performance. It also suggests that overvaluation is larger in magnitude for SEO firms with greater cash need, resulting in a stock returns underperformance relative to various benchmarks in the long run.

****Table 8 here****

9. CONCLUSION

In this thesis, we attempt to address the causes for SEO underperformance. We find that over 70 percent of the issuers have imminent internal resource constraints at the time of issuance. We also find that SEO firms facing a short-term cash need at the time of issuance have poorer long-run stock performance. However, the stock price reaction at the time of the SEO announcement is not correlated with near-term cash requirement. The evidence suggests that the market reacts slowly to the negative information contained in cash shortage at the time of the SEO. We find

that the main reason for SEO underperformance is the market underreaction to cash shortage of SEO firms.

The results are consistent with the hypothesis that short-term cash needs serve as the primary motivation for SEOs. Our findings suggest that the market reacts slowly to the negative information contained in cash shortage. This implies that SEO stocks will underperform and the magnitude of the underperformance will be larger for SEO firms with a greater cash need. We also explore an alternative explanations using operating performance. The long-run operating performance is found to be similar among the issuers regardless of the level of cash shortage at the time of the SEO. This suggests that poor long-run stock performance is not caused by decline in operating performance.

We find that SEO firms are overvalued at the time of issuance. In particular, SEO firms with greater cash need have higher Tobin's Q. This evidence suggests that the poor long-run stock performance reflects the correction of overvaluation. Overvaluation of SEO firms with greater cash need leads to a long-run underperformance of SEOs.

The implications of post-SEO stock performance are obvious and provide insight into how the market reacts to SEOs. The slow reaction of the market enables SEO firms to transfer wealth from new shareholders to existing shareholders. Most investors on the market are inattentive because the trading cost is high. If investors are too optimistic about the future prospects of SEO firms, then they cannot reach an agreement on the true value of shares. This results in a future loss.

In this thesis, we find that SEO firms with a greater cash need are largely overvalued at the time of SEO. The cause of overvaluation for firms with greater cash need at the time of issuance is not addressed. We suggest this as a direction for future research.

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Table 1. Actual and pro forma ratios of cash to total assets (Cash/TA) if the firm does not receive the cash proceeds from the SEO: 1,600 SEOs by CRSP/Compustat industrial firms

This table uses pro forma cash level to show that SEO firms have short term cash needs. Pro forma cash to asset ratio is calculated under the assumption that the firm had not received the offer proceeds and hold non-SEO investment and other financing decisions fixed. The year before SEO refers to the fiscal year ending immediately prior to the SEO. Similarly, the year following SEO refers to the fiscal year ending immediately after the SEO.

	All issuers
Panel A	
1. Median Cash/TA in year before SEO	5.60%
2. Median Cash/TA in year of SEO	7.90%
3. Median Cash/TA in year after SEO	5.80%
Panel B	
4. Median Excess Cash/TA in year before SEO	0.00%
5. Median Excess Cash/TA in year of SEO	2.00%
6. Median Excess Cash/TA in year after SEO	1.00%
Panel C	
7. Median Cash(\$millions) in year before SEO	4.95
8. Median Cash(\$millions) in year of SEO	10.57
9. Median Cash(\$millions) in year after SEO	9.08
Panel D	
10. Median SEO proceeds (\$millions)	23.27
11. Median SEO proceeds/TA in year before SEO	30.10%
table continued	

Table 1 continued

	All issuers
12. Median pro forma Cash/TA in year after SEO	-7.90%
13. Median pro forma Excess Cash/TA in year after SEO	-16.20%
14. % with pro forma Cash/TA < 0 in year after SEO	73.10%
15. % with pro forma Excess Cash/TA < 0 in year after SEO	84.90%
Panel E	
Median abnormal change in cash/SEO proceeds	
16. From year before to year of SEO	4.00%
17. From year before to year after SEO	-0.20%
18. From year before to two years after SEO	-1.30%
19. From year before to three years after SEO	-1.60%

Table 2. Short-run market adjusted stock returns during the announcement period

This table shows the negative announcement effect during the SEO announcement period. The short-run market adjusted stock returns are three-day average daily excess returns. The daily excess return is the difference between the SEO firm stock returns and the market. The market return is measured by CRSP NYSE-Amex-Nasdaq value-weighted return. The sample is stratified into three quantiles based on the level of pro forma Cash/TA. P-values are calculated for mean sample difference t-tests and for Wilcoxon signed rank tests for median sample difference.

	Market adjusted stock return	Market adjusted stock return	Number of Observations
	Mean	Median	
Low pro forma Cash/TA	-1.95%	-2.48%	533
Median pro forma Cash/TA	-2.32%	-1.95%	534
High pro forma Cash/TA	-2.47%	-1.94%	533
P-Value(Low-High)	0.2832	0.4753	

Table 3. The relation between cash shortage and long-run stock performance

This table shows the result of post-SEO long-run stock performance. Panel A shows the result for a three-year buy-and-hold return. Panel B shows the result for a three-year size-and-book-to-market adjusted buy-and-hold return. Size-and-book-to-market adjusted return is the difference between buy-and-hold return and benchmark portfolio return. The benchmark portfolio is the 5*5 portfolios formed by Farma and French (1993) on ME and BE/ME. Each SEO firm is assigned to one of 25 portfolios based on size and book-to-market ratio. The sample is classified into three quantiles based on the level of pro forma Cash/TA. P-values are calculated for mean sample difference t-tests and for Wilcoxon signed rank tests for median sample difference.

Panel A			
	3-year buy-and-hold return	3-year buy-and-hold return	Number of Observations
	Mean	Median	
Low pro forma Cash/TA	-10.69%	-30.12%	533
Median pro forma Cash/TA	19.56%	-7.25%	534
High pro forma Cash/TA	32.12%	-12.13%	533
P-Value(Low-High)	<0.0001	<0.0001	

Panel B			
	3-year size-and-book-to market adjusted abnormal return	3-year size-and-book-to market adjusted abnormal return	Number of Observations
	Mean	Median	
Low pro forma Cash/TA	-37.10%	-52.69%	511
Median pro forma Cash/TA	-23.42%	-42.49%	510
High pro forma Cash/TA	-4.58%	-42.67%	510
P-Value(Low-High)	0.0005	0.0005	

Table 4. Regression of size-and-book-to-market adjusted abnormal return on cash shortage

This table shows the results for the regression between cash shortage at the time of SEO and long-run stock performance. The measure of long-run stock performance is size-and-book-to-market adjusted return. It is also the dependent variable. The independent variables include pro forma cash position, market return, Log (Size) (Log of market value at the end of first trading day), and Log(BE/ME). BE is the book value of equity from the first fiscal year following the SEO date. Market return is calculated using NYSE-Amex-Nasdaq value-weighted daily returns. Regression (1) includes accruals and Log (Size) as control variables. Regression (2) does not include accruals among the control variables. Regression (3) controls for accruals and is applied to a winsorized sample at the upper and lower five percent return observations. In regression (4) we winsorize observations at the upper and lower five percent returns without controlling accruals. In all the four regressions, we winsorize the upper and lower five percent pro forma Cash/TA ratio.

Independent variables	Regressions			
	(1)	(2)	(3)	(4)
pro forma Cash/TA ratio	0.24** (2.73)	0.25** (2.78)	0.12* (2.11)	0.12* (2.15)
Market return	-0.05 (-0.48)	-0.08 (-0.72)	-0.12 (-1.70)	-0.13* (-1.97)
Log Size	0.01 (0.48)	0.01 (0.43)	0.03 (1.79)	0.03 (1.77)
Log (BE/ME)	-0.04 (-0.81)	-0.05 (-0.99)	0.00 (0.14)	-0.00 (-0.08)
Accrual	-0.40 (-1.32)		-0.27 (-1.36)	
N	1439	1461	1439	1461
adj. R^2	0.01	0.01	0.01	0.01

Note: Numbers in parentheses are *t*-statistics.

*** Denotes $p < 0.001$ or the coefficient is significant at the 0.001 level.

** Denotes $p < 0.01$ or the coefficient is significant at the 0.01 level.

* Denotes $p < 0.05$ or the coefficient is significant at the 0.05 level.

Table 5. The relation between cash shortage and the three-year operating performance

This table presents the relation between cash shortage and the long-run operating performance. The measures of operating performance are given by the medians of the following variables: ROA (return on asset), change in the OIBD/Assets ratio, change in the OIBD/Sales ratio, and sales growth rate. The four measures are industry adjusted. Following Loughran and Ritter (1997), OIBD is defined as operating income before depreciation, amortization, and tax, plus interest income. Δ ROA is the difference between ROA in the three years after SEO and ROA in the year of SEO. Δ (OIBD/Assets) is the difference between OIBD/Assets the three years after the SEO and that calculated for the year of the SEO. Δ (OIBD/Sales) is the difference between OIBD/Sales three years after SEO and that calculated for the year of SEO. Sales growth is given by the three-year compound annual growth rate. The sample is stratified into three quantiles based on the level of pro forma Cash/TA. P-values are calculated based on the Wilcoxon signed rank tests.

	Δ ROA	Δ (OIBD/ Assets)	Δ (OIBD/ Sales)	Sales growth
Number of observations	(1294)	(1174)	(1206)	(1292)
Low pro forma Cash/TA	-0.019	-0.008	-0.014	0.062
Median pro forma Cash/TA	-0.006	-0.005	-0.006	0.031
High pro forma Cash/TA	-0.012	-0.003	-0.003	0.023
P-Value(Low-High)	0.2296	0.3750	0.1342	0.0048

Table 6. Regressions of three-year operating performance on cash shortage

The table presents the relation between the SEO firm cash shortage and its long-run operating performance. The dependent variables are Δ ROA, Δ (OIBD/Assets), Δ (OIBD/Sales), and sales growth respectively. The independent variables include: pro forma Cash/TA ratio, Log (LT) (log of long term debt), Capex ratio (capital expenditure scaled by sales), R&D ratio (research and development expenses scaled by sales), EP (earnings-to-price ratio), DP (dividend payout ratio), Firm age (log of one plus the total number of years listed on Compustat), Log Size (log of market value of equity) and SG (the product of the retention ratio and the ROE calculated for the year prior to SEO). We winsorize the upper and lower five percent pro forma Cash/TA ratio.

Independent variables	Regressions			
	(1a)	(2a)	(3a)	(4a)
	Δ ROA	Δ (OIBD/ Assets)	Δ (OIBD/ Sales)	Sales growth
pro forma Cash/TA ratio	-0.00 (-0.69)	-0.02** (-3.1)	-0.00 (-1.71)	-0.05*** (-3.62)
Log(LT)	-0.01* (-2.42)	-0.01*** (-4.17)	-0.00** (-2.84)	-0.01*** (-4.22)
Capex ratio	0.00 (1.31)	-0.00 (-0.29)	0.01* (1.98)	-0.00 (-1.69)
R&D ratio	-0.00** (-2.79)	-0.11*** (-3.60)	-0.00 (-0.07)	0.00 (1.60)
EP	0.002** (3.13)	-0.00 (-0.96)	-0.00 (-1.05)	-0.00 (-0.68)
DP	0.00 (0.12)	0.00 (0.28)	0.00 (0.09)	-0.00 (-0.24)
Firm age	0.00 (0.14)	0.01 (0.74)	0.01** (3.06)	-0.05 (-1.70)
Log Size	0.02*** (7.70)	0.01*** (7.43)	0.01*** (6.94)	0.03*** (8.03)
SG	0.00 (0.02)	-0.00 (-1.84)	-0.00 (-0.07)	0.00 (0.58)
N	1127	1050	1074	1123
adj. R^2	0.08	0.06	0.06	0.06

Note: Numbers in parentheses are t -statistics.

*** Denotes $p < 0.001$ or the coefficient is significant at the 0.001 level.

** Denotes $p < 0.01$ or the coefficient is significant at the 0.01 level.

* Denotes $p < 0.05$ or the coefficient is significant at the 0.05 level.

Table 7. The relation between cash shortage and Tobin's Q at the time of SEO

This table presents the relation between cash shortage and Tobin's Q at the time of SEO. We use the median of Tobin's Q to measure overvaluation of SEO firms. Following La Porta et al., (2002), the numerator of Tobin's Q is the total liabilities plus the market value of common equity. The denominator of Tobin's Q is the book value of total assets. Log (Q) is the log transformation of Tobin's Q. The sample is stratified into three quantiles based on the level of pro forma Cash/TA. P-values are calculated based on the Wilcoxon signed rank tests.

	Tobin's Q	Log(Q)	Number of Observations
	Median	Median	
Low pro forma Cash/TA	2.249	0.810	529
Median pro forma Cash/TA	1.456	0.376	530
High pro forma Cash/TA	1.575	0.454	530
P-value (Low-High)	<0.0001	0.0022	

Table 8. Regressions of Tobin's Q on cash shortage at the time of SEO

This table presents the regression results for the relation between cash shortage and Tobin's Q at the time of SEO. The dependent variable is Log (Q), which is the log transformation of Tobin's Q. The independent variables include: pro forma Cash/TA ratio, Log (LT), Log(Sales), Firm age, Capex ratio, R&D ratio, DP, Lag(ROA), and Lag(ROE). LT is long term debt. Log(Sales) is defined as log of sales. Firm age is calculated as log of one plus the total number of years listed on Compustat. Capex ratio is calculated as the capital expenditure scaled by sales. R&D ratio is calculated by research and development expenses scaled by sales. DP is dividend payout ratio. Lag(ROA) and Lag(ROE) are ROA and ROE calculated one year prior to the SEO, respectively. Regression (1) includes the Lag(ROA) as control variable. Regression (2) includes Lag(ROE) as control variable. Log transformation reduces the effect of extreme observations. We also winsorize the upper and lower five percent pro forma Cash/TA ratio to remove outliers.

Independent variables	Regressions	
	(1)	(2)
pro forma Cash/TA ratio	-0.14** (-2.73)	-0.13** (-2.54)
Log(LT)	-0.17*** (-7.56)	-0.17*** (-7.75)
Log(Sales)	0.08*** (3.40)	0.08*** (3.30)
Firm age	-0.18*** (-4.43)	-0.20*** (-4.85)
Capex ratio	-0.00 (-1.05)	-0.01 (-1.05)
DP	-0.03** (-2.73)	-0.04** (-2.90)
R&D ratio	0.00* (2.28)	0.00* (2.47)
Lag(ROA)	-0.21** (-2.59)	
Lag(ROE)		-0.04** (-3.16)
N	1454	1416
adj. R^2	0.12	0.14

Note: Numbers in parentheses are *t*-statistics.

*** Denotes $p < 0.001$ or the coefficient is significant at the 0.001 level.

** Denotes $p < 0.01$ or the coefficient is significant at the 0.01 level.

* Denotes $p < 0.05$ or the coefficient is significant at the 0.05 level.