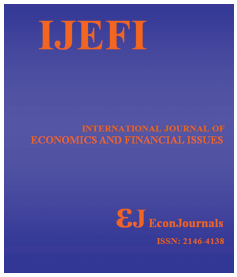

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The Impacts of Overinvestment and Financial Constraints on Seasoned Equity Offering Long-Run Performance

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ABSTRACT

This study considers overinvestment and financial constraints as factors that associate with managerial incentives of firms conducting seasoned equity offerings (SEOs). The results show that pre-issue overinvestment and financial slack are negatively related to the long-run performance of SEO firms. It implies that SEOs of firms with these two characteristics are driven by managerial incentive misalignment, resulting in their lackluster long-run performance after SEOs. In other words, overinvesting and financially unconstrained firms may conduct SEOs due to managers' empire-building desires. These results should remind the board of directors to prevent managers' equity financing from serious overinvestment and that long-run investors should avoid buying new-issue shares of firms with overinvestment and financial slack.

Keywords: Seasoned Equity Offerings, Overinvestment, Financial Constraints, Managerial Incentives
JEL Classifications: G30, G32

1. INTRODUCTION

Financial studies document that several factors affect firms' long-run performance following their seasoned equity offerings (SEOs), such as earnings management (e.g., Rangan, 1998; Teoh et al., 1998), pre-issue risk (e.g., Carlson et al., 2006; 2010), and changes in institutional ownership (Gibson et al., 2004; Chemmanura et al., 2009). These findings can be explained by the market timing model, changes in risk, and the agency theory, respectively.

This study investigates this issue by examining how SEO firms' pre-issue abnormal investment and financial constraints affect their post-issue long-run performance. Specifically, abnormal investment signifies that a firm's investment significantly differs from the level it should have. Financial constraints refer to frictions that prevent the firm from funding all desired investments, which could be due to credit limitation, difficulty of borrowing, lack of collateral, illiquidity of assets, and the like. We argue that these two factors are related to agency problems.

We consider overinvestment as a proxy for managerial incentive misalignment because - as Jensen (1986; 1993) argues - managers have incentives to expand firm size to pursue their private benefits. To acquire personal interests rather than good investment opportunities, they may spend significant capital expenditures that result in overinvestment. These overinvesting firms prefer SEOs to debts to build their empires because they do not need to disclose the use of funds raised and receive little oversight.

Titman et al. (2004) document a significantly negative relation between corporate capital investment and subsequent stock returns. Lyandres et al. (2008) show that compared to firms without new equity issue, SEO firms earn lower average returns due to overinvestment. Fu (2010) finds that firms tend to overinvest after SEOs, and this behavior is negatively associated with their operating performance. We contend that firms with pre-issue overinvestment would persist in overinvesting after SEOs, because they are then likely to use the proceeds from new issues to invest in their ongoing or new projects. Hence, SEO firms with pre-issue overinvestment are

likely to perform poorly in the long run due to their empire-building desires.

We consider financial constraints our second factor because it may affect managers' financing decisions. Jensen and Meckling (1976) suggest that budget restrictions and bonding contracts can control managers' behavior and make them more closely aligned with shareholders' interests. In practice, managers of financially constrained firms need to make more efforts when they raise funds, such as persuading the board and major stockholders, obtaining debt holders' understanding, and giving greater offer price discounts. These firms are more likely to be cautious about issuing equity (i.e., low agency costs).

In addition, the literature shows that financially constrained firms tend to have a greater risk of operating inflexibility (Zhang, 2005) and systematic risk (Campello and Long, 2010) than financially unconstrained firms. Campello et al. (2010) find that financial constraints hamper investment in valuable projects, which produces undesirable real effects and lowers long-run growth. Based on these studies, we infer that SEOs allow financially constrained firms to gain operating flexibility and to engage in growth activities. Hence, they are likely to exhibit better stock performance than financially unconstrained firms.

Empirically, we employ Richardson's (2006) method to measure firms' abnormal investment and KZ (Kaplan and Zingales, 1997) values to gauge the condition of firms' financial constraints. The results show that (1) firms with high pre-issue abnormal investment (i.e., overinvestment) tend to perform poorly 3 years after SEOs and (2) financial constraints are positively associated with firms' long-run performance after SEOs. These findings hold in both portfolio sorts and regression analysis after controlling for the effects of changes in risk and other related factors. We also find that these two factors generate a cross effect: Overinvesting and financially unconstrained firms underperform in the long run (marginally significant in the regression analysis).

We describe the negative relation between pre-issue overinvestment and post-issue performance to the agency problem arising from managers' empire-building desires. Further, we interpret the underperformance of financially unconstrained firms due to weak monitoring of managers' use of the proceeds from SEOs. In other words, managers' choice to raise funds by new equity issues rather than by debts is due to less oversight that they will receive, although issuing equity is indeed a more expensive option (higher cost of capital).

This study contributes to the literature by showing that firms with pre-issue overinvestment and financial slack tend to perform poorly in the long run after SEOs. These findings imply that two types of agency problems, managers' empire-building desires and avoidance of oversight, mitigate the firm value. They should remind boards of directors to prevent managers from excessive investment and to confine managers' equity financing when debt financing is still available. Also, the results suggest that long-run investors need to be cautious of buying new-issue shares of overinvesting firms, especially those without financial constraints.

The remainder of this study is organized as follows. Section 2 introduces the methodology. Section 3 describes the data and sample characteristics. Section 4 reports the empirical results. Finally, Section 5 summarizes the findings.

2. METHODOLOGY

2.1. Measure of Abnormal Investment

We use Richardson's (2006) method to measure a firm's abnormal investment. The total investment is defined as:

$$I_{j,t} = CAPEX_{j,t} + Acquisition_{j,t} + R\&D_{j,t} - SalesPPE_{j,t}, \quad (1)$$

Where, $CAPEX_{j,t}$, $Acquisition_{j,t}$, $R\&D_{j,t}$, and $SalesPPE_{j,t}$ are firm j's capital expenditures, acquisition expenses, research and development expenses, and receipts from the sale of property, plant, and equipment in year t, respectively. The total investment is decomposed into the maintenance and new-investment parts:

$$I_{j,t} = I_{Maintenance,j,t} + I_{New,j,t} \quad (2)$$

Where, $I_{Maintenancej,t}$ is firms j's required investment expenditure to maintain assets in place, which is measured by its amortization and depreciation, and $I_{Newj,t}$ is investment expenditure on new projects. $I_{Newj,t}$ is further split into two components:

$$I_{New,j,t} = I^{*}_{New,j,t} + I^{\varepsilon}_{New,j,t} \quad (3)$$

Where, $I^{*}_{New,j,t}$ is expected investment expenditure in new positive net-present-value projects, and $I^{\varepsilon}_{New,j,t}$ is abnormal (or unexpected) investment. They are estimated by the following model:

$$I_{New,j,t} = \alpha + \beta VP_{j,t-1} + \sum_{k=1}^{K} \varphi_k Z_{j,k,t-1} + \varepsilon_{j,t} \quad (4a)$$

Where, $VP_{j,t-1}$ is the ratio of firm j's value of assets in place (V_{AIP}) to its market value of equity. V_{AIP} is estimated as $V_{AIP} = (1-\alpha r)$ $BV + \alpha\ (1 + r)\ X - \alpha rd$, where $\alpha = (\varpi/(1 + r-\varpi))$, $r = 12\%$, and ϖ (= 0.62) is the abnormal earnings persistence parameter (Ohlson, 1995), BV is the book value of common equity, X is operating income after depreciation, and d is annual dividends. $Z_{j,k,t-1}$ is the k^{th} determinant of firm j's investment expenditure, including its size, age, stock of cash, financial leverage, and prior investment level.

We run regression of equation (4a) with the yearly and industry effects and use the residual as firm j's abnormal investment:

$$\hat{I}^{\varepsilon}_{New,j,t} = I_{New,j,t} - (\hat{\alpha} + \hat{\beta} VP_{i,t-1} + \sum_{k=1}^{K} \hat{\varphi}_k Z_{j,k,t-1}) \quad (4b)$$

A positive value $\hat{I}^{\varepsilon}_{New,j,t}$ of indicates that firm j has overinvestment in year t.

2.2. Measure of Financial Constraints

This study adopts KZ (Kaplan and Zingales, 1997) index to measure firms' financial constraints. Following Lamont et al. (2001), we estimate the KZ value of firm i at time t as follows:

$$KZ_{it} = -\beta_1(CF/TA)_{it} + \beta_2(LD/TA)_{it} - \beta_3(DIV/TA)_{it} - \beta_4(LA/TA)_{it} + \beta_5 Q_{it} \quad (5)$$

Where, β_j is the j^{th} estimated coefficient[1], *CF/TA* is cash flow over total assets, *LD/TA* is long-term debt over total assets, *DIV/TA* is dividends over total assets, *LA/TA* is liquid assets over total assets, and *Q* is Tobin's *q*, calculated as (*BV* of assets − *BV* of equity − Deferred taxes + *MV* of equity)/*BV* of assets, where *BV* and *MV* are book and market values, respectively.

SEO firms that have missing values for the above ratios are excluded. We calculate the KZ index using two sets of data: One at the end of the fiscal year and the other at the end of the quarter preceding the SEO date. Since the results are qualitatively the same, for brevity we only report those based on the yearly data which are free of the seasonal effect.

We first rank SEO firms by their KZ values each year and divide them evenly into the high- and low-KZ groups. We then aggregate each group over years to form a portfolio. For convenience, we use the "constrained" and "unconstrained" (or slack) groups as shorthand references to the high- and low-KZ portfolios, respectively.

2.3. Long-run Performance Measures

We calculate the buy-and-hold abnormal return of a portfolio as follows:

$$BHARs_p = \frac{1}{N}\sum_{j=1}^{N}\left[\prod_{t=1}^{T}(1+R_{j,t}) - \prod_{t=1}^{T}(1+R_{becnh,t})\right] \quad (6)$$

Where, $R_{j,t}$ and $R_{bench,t}$ denote firm j's return and benchmark return on day t, respectively, and N is number of firms. We adopt three benchmark portfolios: Returns on Center for Research in Security Prices (CRSP) value-weighted index, size × BM portfolios, and matching firms[2]. Return is calculated from the new issue day to day T (756 days by the convention of 252 trading days per annum). If a firm is delisted, returns are compounded until the delist date.

We construct the matching sample by the following steps. First, we select firms that do not issue new shares within the 3 years before and after the sample firm's SEO issue date. Second, the firms should operate in the same industry as the SEO firm (2-digit SIC code) and have 0.6-1.4 time of the SEO firm's capitalization. Finally, among these firms, we select the one with the closest book-to-market (BM) ratio to that of the SEO firm.

1 The values of the coefficients are β_1 = 1.0019, β_2 = 3.1392, β_3 = 39.3678, β_4 = 1.3148, and β_5 = 0.2826 (Whited and Wu, 2006. p. 543).

2 We collect data from Kenneth French's website to calculate returns on size × BM portfolios (http://mba.tuk.dartmouth.edu/pages/faculty/ken.french/index.html).

The event-time methodology has been criticized of overstating issuers' long-run underperformance (Schultz, 2003; Gompers and Lerner, 2003). To overcome this defect, we use the Fama-French (1993) model plus price momentum (i.e., the four-factor model) to conduct time-series regressions, which can be expressed as:

$$R_{p,t} - R_{f,t} = \alpha_{j,T} + \beta_1 RMRF_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 Momentum_t + \varepsilon_t \quad (7)$$

Where, $R_{p,t}$ is return on the portfolio, $R_{f,t}$ is risk-free rate, $RMRF_t$ is market return minus risk-free rate, SMB_t is return on a portfolio of small firms minus return on a portfolio of large firms, HML_t is return on a portfolio of high BM firms minus return on a portfolio of low BM firms, *Momentum* is return on a portfolio of good performers minus return on a portfolio of poor performers, and subscript t indicates month t. The intercept (α_j) is the estimate of monthly abnormal performance.

3. DATA

We collect data on SEOs completed during 1990-2008 (19 years) from the Thomson/SDC New-Issues database and trace their returns up to 2011. The data items include firm name, CUSIP number, SEO announcement and effective dates, SIC code, number of new shares offered, number of shares outstanding, and offer price. We then use the following criteria to screen the sample.

1. The SEOs must be common stocks of firms (share codes 10 and 11) listed on NYSE, AMEX, and NASDAQ. American depository receipts, real estate investment trusts, closed-end mutual funds, and partnership are dropped from the sample
2. Non-underwritten offerings, rights offerings, standby offerings, shelf offerings, pure secondary offerings, and unit offerings (equity issue with warrants) are excluded
3. As do other studies (e.g., Loughran and Jay, 1995), we exclude SEOs of the financial and utility industries since firms in these industries may issue equity to meet regulatory requirements rather than their capital demand. Also, accounting items of these two industries are distinct from those of other industries, which complicates empirical tests
4. SEOs with an offer price below $5 are dropped since many of them involve price manipulation
5. Cases of multiple SEOs that span <3 years are excluded. In other words, only SEOs that have no other SEO within the previous and subsequent 3 years are included in the sample. This criterion is used to avoid serious dependence of statistical tests (e.g., multiple SEOs conducted by one firm can have the same explanatory variables in regressions). Also, firms with frequent SEOs are likely to have high growth or potential financial problems. Including such firms may yield biased inferences since their performance comes from other reasons (e.g., certain hot industries) rather than SEOs.

Daily returns and number of shares outstanding of the sample firms and daily market indices (CRSP VW and EW) come from the CRSP database. Quarterly accounting data are extracted from the Compustat database, including assets, book value of debt and equity, accounts receivables, inventory, and sales. We collect

quarterly institutional equity holdings from the Thomson CDA Spectrum database, which are from institutional investors' 13-f filings[3].

Panel A of Table 1 reports the number of SEOs every 2 years. There are 2695 SEOs in total, of which there were more cases in the new economy era (1995-2000) and fewer in the financial crisis period (2007-08). The offer prices in the Internet bubble period (1999-2000, median $33.0) were significantly greater than those in other years due to investors' over-optimism. Panel B summarizes the basic characteristics of SEO firms and their matching sample. The size of the SEOs is greater than that of their matching sample (e.g., median $315 and 208 million for the SEO and matching firms, respectively). The BM ratio of SEOs is lower than the matching sample, indicating that SEO firms receive better valuations from investors. The pre-SEO excess returns are positive (median 7.47%), reflecting the price run-up phenomenon before SEOs.

4. RESULTS

4.1. Abnormal Investment

Table 2 shows the median abnormal investments estimated by Richardson's (2006) method (i.e., the regression residual) from year −1 to year 4 relative to the SEO. We use year 1 to express the SEO year (i.e., no year 0). The median residuals of the SEOs are positive in years −1 and 1 (0.0046 and 0.0063) but become negative after year 2. By contrast, the median residuals of the matching sample are all negative. These numbers indicate that not all SEO firms overinvest after new issues, but SEO firms invest more than their matching firms.

Panel B divides the sample firms evenly into two groups according to their abnormal investment measures in year −1 (i.e., firms with residuals greater than 0.0046 are assigned to the high-abnormal-investment group). It can be seen that firms of the high and low abnormal-investment groups tend to overinvest and underinvest before SEOs (median 0.0842 and −0.0415), respectively. We separate each abnormal-investment group into two subgroups according to their BM ratios. The low-BM subgroup has greater residuals than the high-BM group (e.g., 0.0575 and 0.1276 in the high abnormal-investment group, respectively), implying that firms with greater growth opportunities (low BM) invest more.

4.2. Systematic Risk

Carlson et al. (2010) argue that firms do not underperform because their risk declines after SEOs. It is possible that our two variables, abnormal investment and financial constraints, are associated with changes in systematic risk. We utilize systematic risk (i.e., beta) by the market model using 60-day data to examine this issue.

Table 1: Summary statistics of the SEOs

Panel A: Number of SEOs					
Year	Number	Proceeds (million $)		Offer price ($)	
		Mean	Median	Mean	Median
1990-92	388	65.70	33.46	19.64	16.25
1993-94	347	62.57	40.00	20.98	19.00
1995-96	420	66.46	44.80	21.87	19.50
1997-98	359	83.20	52.66	23.11	20.00
1999-00	307	215.61	102.00	42.36	33.00
2001-02	229	217.78	98.07	24.56	22.00
2003-04	296	142.11	86.93	20.09	18.25
2005-06	241	155.18	89.25	22.66	20.00
2007-08	108	196.63	106.50	23.35	19.50
Total	2695				

Panel B: Basic firm characteristics			
Groups	Capitalization (million $)	BM before SEO	3-month pre-SEO excess returns
SEOs			
Mean	1428.14	0.3249	0.1586
Median	315.13	0.2765	0.0747
Matching firms			
Mean	1141.27	0.5121	
Median	208.12	0.4021	

Panel A of Table 1 reports the number of the sample SEOs completed during 1990-2008. Proceeds indicate the amount of capital raised in the SEOs. In Panel B, capitalization is the market value of equity on the 11th day prior to the SEO announcement day. BM is the book-to-market ratio at the end of the month preceding the SEO. 3-month pre-SEO excess return is firm return minus market return in the 3 months preceding the SEO announcement. Each SEO is matched with a non-issue firm with similar size (0.6-1.4 times of the SEO firm's capitalization) in the same industry (2-digit SIC code) and the closest BM ratio. SEO: Seasoned equity offerings

Panel A of Table 3 reports quarterly betas of SEO firms and their matching sample. SEO firms' median beta increases from 0.818 in quarter −4 to 1.089 in quarter 1, and drops to 0.936 in quarter 12. This humped-shape pattern is consistent with Carlson et al. (2010). On the other hand, the median beta of the matching sample does not show a clear pattern, which is relatively flat (0.763, 0.795, and 0.805 in quarters −4, 1, 12, respectively).

Panel B presents the median betas of the high- and low-abnormal-investment groups around SEOs. The pre-issue median betas of the low-abnormal-investment group (e.g., 0.821 in quarter −4) are slightly greater than those of the high-abnormal-investment group (0.748 in quarter −4), but they are not significantly different. The betas of both these two groups show a humped-shape pattern over time.

Panel C lists the median betas of the high and low groups divided by the KZ value. Both the changes in betas of these two groups exhibit a humped shape and do not differ significantly (e.g., beta declines from 1.008 in quarter 1 to 0.889 in quarter 12 for the high KZ group, and from 1.128 to 0.955 for the low KZ group). We thus argue that abnormal investment and financial constraints are not associated with systematic risk.

The purpose of Table 3 is to distinguish whether the patterns of changes in systematic risk differ according to the variables we use. For instance, if the systematic risk of firms with high abnormal investment exhibits a humped-shape pattern while that of firms

3 Institutional investors with more than $100 million in equities must report their equity ownership to the SEC in quarterly 13-f filings. CDA Spectrum classifies institutional investors of five ways: Bank (trust departments), insurance companies, investment companies (mutual funds and closed-end funds), independent investment advisors (principally pension fund advisors), and others (miscellaneous institutions such as endowment funds or public pension funds).

Table 2: Abnormal investment measures around SEOs

Panel A: Median regression residuals					
Groups	**Year relative to SEO**				
	−1	**1**	**2**	**3**	**4**
SEO firms	0.0046	0.0063	−0.0025	−0.0097	−0.0125
	(0.067*)	(0.000***)	(0.213)	(0.021**)	(0.007***)
Matching firms	−0.0616	−0.0619	−0.0631	−0.0662	−0.0642
	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)

Panel B: SEO firms' regression residuals in year−1			
Abnormal investment	**Residuals**	**Subgroups**	
		High BM	**Low BM**
High	0.0842	0.0575	0.1276
	(0.000***)	(0.043**)	(0.000***)
Low	−0.0415	−0.0548	0.0136
	(0.000***)	(0.000***)	(0.153)

Table 2 reports the abnormal investment of 2695 SEOs completed during 1990-2008, which is measured by the regression residuals of Richardson's (2006) method. The regression model is as follows:

$$I_{New,\,j,\,t} = \alpha + \beta VP_{j,t-1} + \sum_{k=1}^{K} \varphi_k Z_{j,k,t-1} + \varepsilon_{j,t}$$

Where, $I_{New,\,j,t}$ is investment expenditure on new projects (capital expenditures, acquisition expenses, research and development expenses, receipts from the sale of property, plant, and equipment, and amortization and depreciation in year t), $VP_{j,t-1}$ is the ratio of firm j's value of assets in place (V_{AIP}) to its market value of equity. V_{AIP} is estimated as $V_{AIP}=(1-\alpha r)\,BV+\alpha\,(1+r)\,X-\alpha rd$, where $\alpha=(\varpi/(1+r-\varpi))$, r=12%, and ϖ (=0.62) is the abnormal earnings persistence parameter, BV is the book value of common equity, X is operating income after depreciation, and d is annual dividends. $Zj_{k,\,t-1}$ is the k^{th} determinant of firm j's investment expenditure, including its size, age, stock of cash, financial leverage, and prior investment level. Panel A reports median residuals ($\varepsilon_{j,t}$) from year−1 to year 4 relative to the SEO. Each SEO is matched with a non-issue firm with similar size (0.6-1.4 times of the SEO firm's capitalization) in the same industry (2-digit SIC code) and the closest BM ratio. In Panel B, firms are divided into two groups by their regression residuals. Each group is further separated into the high and low subgroups according to their book-to-market ratios. Numbers in parentheses are the P values of one-sample Wilcoxon rank sum test for median equal to 0. Superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. SEO: Seasoned equity offerings

Table 3: Systematic risk around SEOs

Panel A: Median systematic risk										
Quarter	**−4**	**−3**	**−2**	**−1**	**1**	**2**	**3**	**4**	**8**	**12**
SEOs	0.818	0.861	0.891	0.968	1.089	1.089	1.053	1.065	0.980	0.936
Matching	0.763	0.727	0.745	0.803	0.795	0.781	0.772	0.825	0.782	0.805
Panel B: Median systematic risk according to abnormal investment										
Quarter	**−4**	**−3**	**−2**	**−1**	**1**	**2**	**3**	**4**	**8**	**12**
Investment	SEOs									
High	0.748	0.824	0.865	0.894	1.030	1.089	1.022	1.046	1.028	0.936
Low	0.821	0.860	0.909	1.015	1.100	1.064	1.086	1.081	0.945	0.896
Matching sample										
High	0.761	0.715	0.711	0.787	0.725	0.758	0.768	0.793	0.791	0.800
Low	0.730	0.706	0.809	0.774	0.805	0.788	0.783	0.836	0.782	0.767
Panel C: Median systematic risk according to KZ values										
Quarter	**−4**	**−3**	**−2**	**−1**	**1**	**2**	**3**	**4**	**8**	**12**
KZ	SEOs									
Low	0.773	0.796	0.852	0.873	1.008	0.985	0.984	0.992	1.008	0.889
High	0.779	0.897	0.929	1.027	1.128	1.162	1.108	1.142	0.971	0.955
Matching sample										
High	0.761	0.766	0.803	0.816	0.811	0.810	0.788	0.855	0.810	0.850
Low	0.730	0.681	0.706	0.739	0.687	0.743	0.768	0.770	0.760	0.724

Table 3 reports the median systematic risk of 2695 SEOs completed during 1990-2008. Each SEO is matched with a non-issue firm with similar size (0.6-1.4 times of the SEO firm's capitalization) in the same industry (2-digit SIC code) and the closest BM ratio. Systematic risk is estimated by the market model using 60-day data (e.g., the beta of quarter −1 is estimated from day −65 to day −6 relative to the SEO). Panel A reports the median systematic risks of SEO and matching firms. Panels B and C, respectively, divide the SEO firms and their matching sample into two groups by their abnormal investment measures (Richardson, 2006) and KZ (Kaplan and Zingales, 1997) index (the high KZ group is financially constrained). SEO: Seasoned equity offerings

with low abnormal investment does not, it could be due to the greater changes in firm size for the former. In this case, the effect of abnormal investment on post-SEO performance may come from changes in systematic risk, rather than from agency problems. The results of Table 3 show that the patterns of changes in systematic risk are similar for the groups divided by abnormal investment and financial constraints, respectively. Hence, these two variables are unrelated to changes in systematic risk (i.e., the impacts of these two variables on SEO firms' performance cannot be explained by the real option theory).

4.3. BHARs

Panel A of Table 4 shows 3-year BHARs of the SEO and matching firms. The SEO firms' BHARs are significantly lower than the

benchmarks (e.g., −15.44%, −10.53%, and −12.30% adjusted by the CRSP VW index, Size×BM portfolios, and matching firms, respectively). These results are consistent with the findings of previous studies using the event-time method: SEO firms underperform the market in the long run (e.g., Loughran and Jay, 1995).

Panel B presents 3-year BHARs of the high and low groups divided by the pre-issue abnormal investment. The high-abnormal-investment (overinvesting) group underperforms the low-abnormal-investment group for all three benchmarks (e.g., BHARs adjusted by the matching firm benchmark are −16.07% and −8.53%, respectively). Panel C shows BHARs of the high- (constrained) and low-KZ (unconstrained) groups (−1.80% and −22.80% by the matching firm benchmark, respectively), where their differences are all statistically significant for the three benchmarks.

Panel C conducts a 2 × 2 (abnormal-investment × KZ) analysis by splitting the sample into two groups by the abnormal investment, and each group is further separated into two subgroups by their KZ values. Among the four groups, the low × high and high × low subgroups tend to have the highest and lowest BHARs, respectively, indicating that firms with overinvestment and financial slack underperform after SEOs.

Table 4: 3-year BHARs according to abnormal investment and KZ

Panel A: 3-year BHARs			
Benchmark		**BHAR**	**P value**
CRSP VW		−0.1544	(0.000)***
Size×BM		−0.1053	(0.034)**
Matching firms		−0.1230	(0.000)***
Panel B: 3-year BHARs according to abnormal investment			
Benchmark	**Abnormal investment**		**Difference**
	High	**Low**	
CRSP VW	−0.2078	−0.1011	(0.002)***
Size×BM	−0.1412	−0.0695	(0.083)***
Matching firms	−0.1607	−0.0853	(0.045)**
Panel C: 3-year BHARs according to KZ			
Benchmark	**KZ**		**Difference**
	High	**Low**	
CRSP VW	−0.0908	−0.2179	(0.012)**
Size×BM	−0.0556	−0.1551	(0.064)*
Matching firms	−0.0180	−0.2280	(0.000)***
Panel D: 3-year BHARs according to abnormal investment and KZ			
Benchmark	**KZ**	**Abnormal investment**	**Difference**
		High	**Low**	
CRSP VW	High	−0.1358	−0.0154	(0.060*)
	Low	−0.2798	−0.1868	(0.372)
	Difference	(0.171)	(0.078)*	
Size×BM	High	−0.0841	−0.0327	(0.633)
	Low	−0.1983	−0.1063	(0.312)
	Difference	(0.090)*	(0.287)	
Matching firms	High	−0.1029	−0.0123	(0.079*)
	Low	−0.2183	−0.1583	(0.591)
	Difference	(0.166)	(0.141)	

Table 4 reports 3-year BHARs of 2695 SEOs completed during 1990-2008. Each SEO is matched with a non-issue firm with similar size (0.6-1.4 times of the SEO firm's capitalization) in the same industry (2-digit SIC code) and the closest BM ratio. BHAR is calculated as $\frac{1}{N}\sum_{j=1}^{N}\left[\prod_{t=1}^{T}(1+R_{j,t})-\prod_{t=1}^{T}(1+R_{bench,t})\right]$, where $R_{j,t}$ and $R_{bench,t}$ are, respectively, returns on firm j and the benchmark portfolio (returns on CRSP value-weighted index, size×BM portfolio, and matching firms), and N is the number of firms. Panels B and C separate the SEO sample into two groups according to their pre-issue abnormal investment (by Richardson's, 2006 method) and KZ values, respectively. Panel D separates the sample into 2×2 groups by their pre-issue abnormal investments and KZ values. Numbers in parentheses are the P values of t-test for BHAR equal to 0 (Panel A) and the difference in BHARs between two cells. Superscripts *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. CRSP: Center for Research in Security Prices, BM: Book to market, BHAR: Buy-and-hold abnormal returns

4.4. Estimation of the Fama-French Four-Factor Model

Table 5 reports the estimation results of the Fama-French four-factor regression, in which the intercept measures the monthly abnormal performance. As shown in Panel A, the coefficients of the market-risk-premium (*RMRF*), size (*SMB*), and BM (*HML*) factors are quite similar for the SEOs and the matching sample but not for *Momentum*. The intercept of the SEO portfolio is statistically significant and negative (−0.003), while that of the matching portfolio is positive but not significant (0.003), indicating that SEO firms underperform their matching peers.

Panel B shows the coefficients of the two groups divided by pre-issue abnormal investment. The intercepts of the high- and low-abnormal-investment portfolios are negative and positive (−0.017 and 0.010), respectively, and their difference is statistically significant. These results indicate that overinvestment is negatively related to issuers' long-run performance. Panel C estimates the performance of the high and low groups divided by KZ value. The intercepts of the high- and low-KZ portfolio are significantly positive and negative, respectively (0.003 and −0.003). Their difference reveals that financially constrained firms outperform financially unconstrained firms.

Panel D presents the Fama-French four-factor estimates of the 2 × 2 (abnormal-investment × KZ) groups. The intercepts of the high × low and low × high portfolios are negative and positive, respectively (−0.006 and 0.004). These numbers imply that abnormal investment and financial slack can generate an interactively negative effect on SEO firms' long-run performance.

4.5. Cross-sectional Regressions

This section performs regressions to examine the effects of abnormal investment and financial constraints on the long-run performance of SEO firms. We adopt 3-year BHARs of SEO firms adjusted by the matching sample as the output variable. There are two main explanatory variables (pre-issue abnormal investment and KZ measures) and a number of control variables, including institutional ownership, changes in beta, pre-issue excess returns (CER(−3, −1)), percentage of new-issue primary shares, size, BM ratio, and debt ratio. We estimate regressions with the yearly and industry effects.

We include institutional ownership in quarter 1 to capture the private information and monitoring effects from institutional investors (Gibson et al., 2004; Chemmanura et al., 2009). Changes

Table 5: Fama-French four-factor regressions

Panel A: All SEOs						
Groups	**Intercept**	**RMRF**	**SMB**	**HML**	**Momentum**	**Adjusted R^2**
SEOs	−0.003**	1.218***	0.280***	−0.256***	0.019	0.871
	(0.041)	(0.000)	(0.000)	(0.000)	(0.722)	
Matching	0.003	1.091***	0.891***	−0.133**	−0.231***	0.911
	(0.136)	(0.000)	(0.049)	(0.000)	(0.000)	
Difference in intercepts	−0.006*	(0.091)				
Panel B: Portfolios by abnormal investment						
High	−0.017	1.276***	0.818***	−0.088	−0.358***	0.873
	(0.131)	(0.000)	(0.000)	(0.169)	(0.000)	
Low	0.010	1.242***	0.869***	−0.111*	−0.146***	0.890
	(0.503)	(0.000)	(0.000)	(0.070)	(0.004)	
Difference in intercepts	−0.026**	(0.021)				
Panel C: Portfolios by KZ index						
High	0.003*	1.248***	0.799***	0.102*	−0.290***	0.890
	(0.053)	(0.000)	(0.000)	(0.069)	(0.000)	
Low	−0.003**	1.199***	0.943***	−0.323***	−0.228***	0.914
	(0.042)	(0.000)	(0.000)	(0.000)	(0.000)	
Difference in intercepts	0.005*	(0.098)				

Panel D: Portfolios by abnormal investment and KZ index							
Abnormal investment	**KZ**	**Intercept**	**RMRF**	**SMB**	**HML**	**Momentum**	**Adjusted R^2**
High	High	−0.005	1.239***	0.705***	−0.132	−0.344***	0.802
		(0.235)	(0.000)	(0.000)	(0.123)	(0.007)	
	Low	−0.006*	1.213***	0.328***	−0.507***	−0.146*	0.612
		(0.069)	(0.000)	(0.000)	(0.002)	(0.075)	
Low	High	0.004	1.272***	0.584***	−0.397***	0.154	0.643
		(0.657)	(0.000)	(0.000)	(0.007)	(0.138)	
	Low	0.002	1.204***	0.208*	−0.404***	0.301**	0.687
		(0.510)	(0.000)	(0.070)	(0.005)	(0.012)	
Difference (Hi×Lo−Lo×Hi)		−0.010**	(0.047)				

Table 5 reports the results of the Fama-French four-factor model using a sample of 2695 SEOs completed during 1990-2008. The model can be expressed as:

$$R_{p,t}-R_{f,t}=\alpha_{j,T}+\beta_1 RMRF_t+\beta_2 SMB_t+\beta_3 HML_t+\beta_4 Momentum_t+\varepsilon_t$$

Where, $R_{p,t}$ is return on the (equally weighted) portfolio, $R_{f,t}$ is risk-free rate, $RMRF_t$ is market return minus risk-free rate, SMB_t is return on a portfolio of small firms minus return on a portfolio of large firms, HML_t is return on a portfolio of high BM firms minus return on a portfolio of low BM firms, $Momentum_t$ is return on a portfolio of good performers minus return on a portfolio of poor performers, and subscript t indicates period t. The regressions use 228 observations from January 1990 to December 2008. Panels B and C separate the SEO sample into two groups according to their pre-issue abnormal investment and KZ values, respectively. Panel D divides the sample into 2×2 groups by their pre-issue abnormal investments and KZ values. Numbers in parentheses are P values. Superscripts *,**, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. SEO: Seasoned equity offerings, BM: Book to market

in betas (ΔBeta (36)) are the difference between the beta 3 years after SEOs (estimated by data from day 631 to day 883) and the beta in the SEO year (estimated from day −126 to day 126). We consider this variable to include Carlson et al.'s (2010) argument that changes in risk result in SEO underperformance. Pre-issue excess return is used to detect the price run-up phenomenon (i.e., the market timing model). Percentage of primary shares is a factor considering the price pressure from share supply.

Table 6 reports the regression results. Among the control variables, the BM ratio is statistically significant and positive, indicating that value stocks (high BM ratio) outperform glamour stocks. As to our target variables, the coefficient of abnormal investment is negative and significant at the ten percent level (e.g., −0.263 in Model 1), suggesting that firms with high abnormal investments before SEOs tend to underperform after SEOs. The coefficient of the KZ index is significantly positive (e.g., 0.016 in Model 2), indicating that firms with financial constraints have better post-SEO long-run performance. We also set up a dummy (D_{Low_KZ}) equal to 1 if the firm belongs to the low KZ group, in order to examine the cross effect of abnormal investment and financial slack on SEO firms' performance. As shown in Model 4, the coefficient of this variable (D_{Low_KZ} × Abnormal Inv.) is negative (−0.084) and marginally significant, indicating that overinvesting and financially unconstrained firms tend to perform poorly in the long run.

In summary, the results of Tables 4-6 show that firms with high pre-issue abnormal investments and low KZ values tend to underperform after SEOs. These results support the argument that these firms have more severe managerial incentive problems, resulting in poor long-run performance after SEOs.

5. CONCLUSION

The agency theory suggests that managerial incentive misalignment would mitigate the firm value. We investigate this issue by examining the impacts of two factors related to managerial incentives on the long-run performance of SEO firms: Pre-issue abnormal investment and financial constraints.

We select abnormal investment as a proxy for managerial incentive misalignment because overinvestment can result from managers' empire-building desires. The result shows that firms with overinvestment underperform following SEOs; this is consistent with Lyandres et al.'s (2008) finding that overinvesting SEO

Table 6: Regressions: Factors affecting SEO long-run performance

Variables	Model 1	Model 2	Model 3	Model 4
Abnormal investment	−0.263*		−0.275*	−0.235*
	(0.090)		(0.080)	(0.098)
KZ (financial constraint)		0.016**	0.012**	0.012**
		(0.031)	(0.033)	(0.031)
$D_{Low\text{-}KZi}$×abnormal investment				−0.084
				(0.121)
Institutional ownership	0.010	0.009	0.010	0.011
	(0.908)	(0.915)	(0.923)	(0.915)
ΔBeta(36)	0.004	0.005	0.004	0.005
	(0.727)	(0.688)	(0.735)	(0.687)
CER(−3, −1)	−0.029	−0.024	−0.030	−0.023
	(0.706)	(0.757)	(0.694)	(0.764)
% of primary shares	0.338*	0.292	0.349*	0.288
	(0.087)	(0.137)	(0.079)	(0.141)
Size	0.001	0.001	0.001	0.001
	(0.435)	(0.379)	(0.462)	(0.377)
BM	0.055***	0.052**	0.055**	0.054**
	(0.008)	(0.011)	(0.015)	(0.018)
Debt ratio	−0.143	−0.183	−0.172	−0.165
	(0.179)	(0.126)	(0.154)	(0.120)
Constant	−1.123***	−1.099***	−1.130***	−1.102***
	(0.000)	(0.000)	(0.000)	(0.000)
Adjusted R^2	0.046	0.045	0.044	0.049

The regressions employ 3-year BHARs (using matching firms as the benchmark) as the output variable and include the yearly and industry effects. The sample contains 2695 SEOs completed during 1990-2008. Abnormal investment is measured by Richardson's (2006) method. KZ value (Kaplan and Zingales, 1997) is a measure of financial constraints. $D_{Low\text{-}KZ}$ is a dummy equal to 1 if the firm belongs to the low KZ group. Institutional ownership is the fraction of shares owned by institutional investors in the quarter before the SEOs. ΔBeta (36) denotes changes in systematic risk (beta) 3 years after SEOs. % of primary shares is the ratio of new-issue primary shares to total shares outstanding. Size (market value of equity), BM ratio, and debt ratio are data prior to the SEO announcement. CER(−3, −1) denotes cumulative excess return (firm return minus market return) from month−3 to month−1 relative to the SEO announcement. Numbers in parentheses are P values. Superscripts *,**, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. SEO: Seasoned equity offerings, BM: Book to market

firms earn lower average returns and Fu's (2010) evidence that the post-issue overinvestment leads firms to have poor operating performance. Like Fu (2010), we ascribe this finding to managers' pursuit of their own benefits (i.e., empire building).

We also find that financially unconstrained firms tend to have poor long-run performance after SEOs. These firms can raise funds by increasing debt but choose to issue new equity, which is a more costly option. We argue that this action arises from managers' avoidance of oversight, resulting in a decrease in the firm value.

This study contributes to the literature by showing that pre-issue abnormal investment and financial constraints affect the post-issue long-run performance. The evidence supports the agency theory that managerial incentive misalignment mitigates the firm value. It not only helps long-run investors select SEO firms but should serve to remind boards of directors to prevent their managers from excessive investment and to confine managers' equity financing when debt financing is still available. In sum, our findings expand our understanding about the underperformance of SEO firms and shed light on the interactions between corporate governance and financing decisions.

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