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ABSTRACT

Adding a return factor based on capital investment into standard, calendar-time factor regressions makes underperformance following seasoned equity offerings largely insignificant and reduces its magnitude by 37-46%. The reason is that issuers invest more than nonissuers matched on size and book-to-market. Moreover, the low-minus-high investment-to-asset factor earns a significant average return of 0.37% per month. Our evidence suggests that the underperformance results from the negative investment-expected return relation, as predicted by Carlson, Fisher, and Giammarino (2005).

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1 Introduction

We study long-term underperformance following seasoned equity offerings. Our central finding is that adding a return factor based on capital investment into standard factor regressions makes the underperformance largely insignificant and reduces its magnitude by 37–46%.

Two forces are behind this result. First, the investment factor is a zero-cost portfolio from buying stocks with the lowest 30% investment-to-asset and selling stocks with the highest 30% investment-to-asset. We also use a triple sort to control for size and book-to-market. This investment factor earns an average return of 0.37% per month with a highly significant t-statistic of 4.35. Second, equity issuers invest much more than matching nonissuers with similar size and book-to-market. In the year preceding issuance, the median investment-to-asset ratio of issuers is on average 0.095 from 1970 to 2003. In contrast, this ratio is 0.056 for matching nonissuers, about 41% lower. Similar dispersion in investment-to-asset persists for two years and does not converge until about five years after issuance.

Our evidence lends support to the theoretical predictions of Carlson, Fisher, and Giammarino (2005) and Zhang (2005b). Using a real options model, Carlson et al. argue that firms have expansion options and assets in place prior to equity issuance. This composition is levered and risky. If capital investment is financed by equity, then risk must decrease because investment effectively extinguishes the risky options. Using a different but equivalent argument based on the Q-theory, Zhang derives a negative relation between investment and future stock returns. Intuitively, investment increases with the net present value of capital (e.g., Brealey and Myers (2003)). But given expected cash flows, the net present value decreases with cost of capital, giving rise to the negative relation between investment and cost of capital or expected returns. Further, firms' balance-sheet constraint implies that the sources of funds must sum up to the uses of funds, suggesting that issuers tend to invest more than nonissuers. The underperformance following equity issues then follows from the negative relation between investment and expected returns.

We also examine two alternative explanations of the underperformance of equity issuers, the market-timing hypothesis of Baker and Wurgler (2000) and the leverage hypothesis of Eckbo, Masulis, and Norli (2000). The market-timing explanation says that managers can create value for existing shareholders by timing their financing decisions to exploit systematic market mispricing. Managers can issue equity when their stock prices are overvalued and use retained earnings or debt when the stock prices are undervalued. The leverage explanation argues that issuing equity lowers issuers' leverage ratios, thereby reducing their loadings on systematic risk factors and expected returns relative to those of nonissuers.

Our evidence seems inconsistent with the market-timing view. In contrast to the time-series evidence of Baker and Wurgler (2000), we document that the associations between new equity shares and future stock returns in cross-sectional regressions are insignificantly negative once we control for size and book-to-market. Unlike new equity shares, the slopes and significance levels of investment-to-asset are comparable to those of book-to-market.

We also document some evidence that seems at odds with the leverage explanation. Even after equity issuance, issuers' leverage remains substantially higher than matching nonissuers'. From 1970 to 2003, the market leverage of issuers measured at the fiscal yearend following issuance is on average 0.29, higher than that of matching nonissuers, 0.21. And the book leverage of issuers is on average 0.37, which is about 61% higher than its counterpart of nonissuers, 0.23. Further evidence from 60-month post-event window shows that, although issuing equity lowers issuers' leverage ratios in the first two years, they remain significantly higher than those of nonissuers throughout the five-year post-issuance period.

Our paper bridges two different strands of literature in empirical finance, the literature on the new issues puzzle and that on the investment-return relation. Loughran and Ritter (1995) and Spiess and Afflect-Graves (1995) first document that seasoned-equity issuers underperform nonissuers with similar characteristics in the future three to five years. Eckbo, Masulis, and Norli (2000) show that a macroeconomic factor model can explain the underperformance in factor regressions, and argue that issuance decreases leverage and increases stock liquidity, thereby lowering issuers' risk and expected returns. Brav, Geczy, and Gompers (2000) document that the underperformance is concentrated in small-growth firms. Recent papers that document a negative relation between capital investment and future returns include Titman, Wei, and Xie (2004), Anderson and Garcia-Feijoo (2005), and Xing (2005).

To our knowledge, the only other paper that also connects the two aforementioned strands of literature is Richardson and Sloan (2003), who show that the relation between external financing and future returns is strongest when the proceeds are invested in noncash assets. Our work complements theirs because both papers conclude that capital investment is likely to be the main driving force of the seasoned-equity underperformance. But our work also differs in several ways. First, we use the Fama and French (1993) factor regression approach to study the role of investment, while Richardson and Sloan use panel regressions of returns onto characteristics. We also examine the leverage and market-timing explanations, while Richardson and Sloan do not. Perhaps more important, Richardson and Sloan interpret the negative investment-relation relation as suggesting investor underreacting to overinvesting and aggressive accounting. But we argue the evidence is consistent with recent rational theories.

The rest of the paper is organized as follows. We develop the investment-based explanation of underperformance following equity issuance in Section 2, and describe sample construction in Section 3. Section 4 reports our empirical results, and Section 5 concludes.

2 Hypothesis Development

The investment hypothesis of underperformance following seasoned equity offerings, abbreviated as SEOs in the sequel, states that the underperformance is driven by the negative association between capital investment and expected returns. We develop this hypothesis in two steps based on recent asset pricing theories. First, the empirical association between capital investment and future stock returns should be negative. Second, if investment is financed by issuing new equity, then issuers should have lower expected returns than nonissuers.

Figure 1 plots the negative relation between real investment and expected returns. Intuitively, investment demand increases with the net present value of capital (e.g., Brealey and Myers (2003, Chapter 2)), and given expected cash flows, the net present value is inversely related to the cost of capital. If the cost of capital is high, then the net present value is low, giving rise to a low investment-to-asset ratio. And if the cost of capital is low, then the net present value is high, giving rise to a high investment-to-asset ratio.

The negative investment-return relation is the central prediction in recent theoretical literature on investment-based asset pricing. There are two different but equivalent lines of attack. The first line is based on the real options approach. In Berk, Green, and Naik (1999), firms invest more when they have many low risk projects, giving rise to lower risk and expected returns. In Carlson, Fisher, and Giammarino (2004, 2005), expansion options are riskier than assets in place. When firms invest, they extinguish the riskier expansion options and replace them with less risky assets in place, thus reducing risk and expected returns.

The second line is based on the Q-theoretical approach. Cochrane (1991, 1996) first derive the negative investment-return relation from the Q-theory. In his model, firms invest more when their marginal q is high. And marginal q is the net present value of future cash flows generated with an additional unit of capital. Given expected cash flows, high marginal q is in turn associated with lower discount rates or expected stock returns. Subsequent studies have built on this intuition to explain the value premium. Examples include Kogan (2004), Cooper (2005), and Zhang (2005a, 2005b). More important, the basic mechanisms driving the negative investment-return relation in the real options and the Q-theory models are similar because they are mathematically equivalent approaches to capital investment (e.g., Abel, Dixit, Eberly, and Pindyck (1996)).

Figure 1 also shows that there are disproportionately more issuing firms on the right end of the curve where expected returns are low, and disproportionately less issuing firms on the left end of the curve where expected returns are high. Intuitively, because of firms' balance-sheet constraints, firms' uses of funds must sum up to the sources of funds. Carlson, Fisher, Giammarino (2005) and Zhang (2005b) hence argue that firms that issue seasoned equity are likely to invest more than firms that do not issue seasoned equity. The net effect is that issuing firms invest more and have lower expected returns than nonissuing firms.

The investment hypothesis applies to calendar-time underperformance following SEOs, but Schultz's (2003) pseudo market-timing hypothesis does not. Schultz argues that using event studies is likely to find negative ex-post abnormal performance, even though there is no ex-ante abnormal underperformance. If early in a sample period, SEOs underperform, there will be few SEOs in the future because investors are less interested in them. The average performance will be weighted more towards the early SEOs that underperformed. If early SEOs outperform, there will be many more SEOs in the future. The early performance will be weighted less in the average performance. Weighting each period equally as in calendar-time regressions solves this problem. The investment hypothesis is different because it applies to both event-time and calendar-time underperformance.

3 Data

We obtain our sample of SEO firms from Thomson Financial's SDC database and monthly returns from the Center for Research in Security Prices (CRSP). The sample period is from 1970 to 2003. The monthly returns of the Fama and French (1993) factors, the returns of the momentum factor, and the risk-free rate are from Kenneth French's website. And we obtain accounting information from the Compustat Annual Industrial Files.

Our sample selection criteria follow those of Brav, Geczy, and Gompers (2000) and Eckbo, Masulis, and Norli (2000). To be included, a SEO must be performed by a U.S. firm, which must also have returns on CRSP at some point in the five-year period after its offering. We exclude unit offerings and secondary offerings in which new shares are not issued. We also exclude SEOs of firms that trade on exchanges other than NYSE, AMEX, and NASDAQ. Similar to Brav et al. and Eckbo et al., but different from Loughran and Ritter (1995), we include SEOs of utilities in our sample. Exclusion of utilities from the sample does not change our results materially because the proportion of utilities is relatively small, about 13%. Following Loughran and Ritter, we define utilities as firms with SIC codes ranging between 4,910 and 4,949. The results are also robust to the exclusion of mixed offerings from the sample. A mixed offering is a combination of a primary offering, in which new shares are issued, and a secondary offering, in which shares change ownership but no new equity is issued.

Table 1 reports the number of SEOs for each year in the sample, the number of SEOs matched with CRSP using CUSIPs and historical CUSIPs, the numbers of equity issues for NYSE/AMEX/NASDAQ firms, the number of primary and mixed offerings, and the number of offerings by non-utilities and non-financial firms. From the last row of Table 1, our sample includes 11,092 SEOs with 8,126 SEOs having stock price data. Because of the long sample period of 34 years, our sample is the largest in the literature. For comparison, Eckbo, Masulis, and Norli's (2000) sample includes 4,766 SEOs, Loughran and Ritter's (1995) contains 3,702 SEOs, and the sample of Brav, Geczy, and Gompers's (2000) includes 4,622 SEOs.

The second column of Table 1 contains the number of SEOs for each year in the sample, and the fourth column shows the number of SEOs obtained by matching SDC and CRSP firms based on their CUSIP numbers. Comparing these two columns reveals that matching both current and historical CUSIPs increases the number of SEOs by more than 28%. This increase is especially pronounced during the earlier years in the sample, and it often exceeds 60%. The sample of SEOs is heavily tilted towards NYSE firms in the 1970's, but NASDAQ firms dominate the latter part of the sample.

Panel A of Figure 2 presents the frequency distribution of equity issuers across quintiles of size and book-to-market. The quintile breakpoints are from Kenneth French's website. Consistent with Brav, Geczy, and Gompers (2000) and Eckbo, Masulis, and Norli (2000), we find that issuers tend to be small-growth firms. In particular, firms in the smallest size quintile and the lowest book-to-market quintile issue seasoned equity about six times more frequently than firms in the largest size and the highest book-to-market quintiles.

Going one-step further, we report in Panel B of Figure 2 the median the new equity-to-asset ratio among issuers by size and book-to-market quintiles. We measure this ratio as the market value of new equity from SDC divided by the book assets at the fiscal year-end preceding the SEOs. The distribution of the median new equity-to-asset across size and book-to-market quintiles is very similar to the frequency distribution reported in Panel A. Small-growth firms issue equity not only more frequently, they also issue more as a percentage of their assets value. For example, the median new equity-to-asset of issuers that belong to the small-growth quintile is about 55 times higher than that of issuers that belong to the big-value quintile. We are not aware of previous studies that document this pattern.

In generating the above results, we merge CRSP returns (matched with SDC data) from July of year t to June of year $t+1$ with Compustat accounting data at fiscal yearend in calendar year $t-1$. We measure the market size as the price by the end of June times shares outstanding. Book equity is the stockholder's equity (item 216), minus preferred stock, plus balance sheet deferred taxes and investment tax credit (item 35) if available, minus post-retirement benefit asset (item 330) if available. If stockholder's equity is missing, we use common equity (item 60) plus preferred stock par value (item 130). If these variables are missing, we use book assets (item 6) less liabilities (item 181). Preferred stock is preferred stock liquidating value (item 10), or preferred stock redemption value (item 56), or preferred stock par value (item 130) in that order of availability. To compute the book-to-market ratio, we use December closing price times number of shares outstanding.

4 Empirical Results

This section starts with our main results that, once controlling for capital investment, long-term underperformance following seasoned equity offerings largely disappears. To shed some light on the driving force of our main results, we then examine the investment behavior of issuers relative to that of nonissuers. Finally, we also examine two alternative explanations of the underperformance, the leverage hypothesis and the market-timing hypothesis.

4.1 Factor Regressions

We follow Brav, Geczy, and Gompers (2000) and Eckbo, Masulis, and Norli (2000) to measure the SEO underperformance as Jensen's alphas from factor regressions. We use factor regressions because recent literature has discussed in depth the difficulty in obtaining unbiased inferences using cumulative abnormal returns and using buy-and-hold returns.[1]

Evidence of SEO Underperformance

The factor models we use include the CAPM, the Fama and French (1993) three-factor model, and the Carhart (1997) four-factor model. The dependent variable in the factor regressions is the portfolio excess return of SEO firms relative to the one-month Treasury bill rate. The portfolio consists of all the firms that have issued seasoned equity in the past 36 months; for robustness, we also use an alternative period of 60 months. We obtain the factor returns, MKT, SMB, HML, and the momentum factor WML from Kenneth French's website.

Panel A of Table 2 reports factor regressions using portfolios of firms with prior 36-month SEOs. The panel shows that the alpha from the CAPM regression of the equally-weighted SEO portfolio is -0.28% per month with a marginally significant t-statistic of -1.86. The alpha of the value-weighted SEO portfolio in the CAPM regression is -0.36% per month with a significant t-statistic of -3.76. The results from the Fama-French model are similar. The alpha of the equally-weighted SEO portfolio in the Fama-French model is -0.29% per month with a significant t-statistic of -3.00, and the alpha of the value-weighted portfolio is -0.28% with a significant t-statistic of -2.92. Brav, Geczy, and Gompers (2000) do not report the CAPM regressions, and our alpha estimates from the Fama-French model are similar to theirs. But both sets of alpha estimates are much lower than the estimate of -0.52% per month from the CAPM and the Fama-French model reported by Ritter (2003).

Panel A of Table 2 also shows that the loadings of the SEO portfolios on SMB are positive and highly significant when returns are equally-weighted, but are insignificant when returns are value-weighted. This evidence implies that SEO firms tend to be small firms. And the

[1] Barber and Lyon (1997), Kothari and Warner (1997), and Fama (1998), among others, discuss the difficulty of computing unbiased significance levels using buy-and-hold returns. And Schultz (2003) and Butler, Grullon, and Weston (2005) discuss the difficulty with cumulative abnormal returns.

loadings on HML are generally negative and significant, suggesting that SEO firms tend to be growth firms. Moreover, the underperformance of SEO firms is no longer significant in the Carhart (1997) four-factor regressions. The loadings of SEO firms on the momentum factor are significantly negative, suggesting that SEO firms are momentum losers after equity issuance. All these patterns are broadly consistent with Brav, Geczy, and Gompers (2000).

Factor Regressions with the Investment Factor

As a direct test of the investment hypothesis outlined in Section 2, we augment the factor regressions with an investment factor. The investment factor is the zero-cost portfolio that longs the stocks with the lowest 30% investment-to-asset ratios and sells the stocks with the highest 30% investment-to-asset ratios, controlling for size and book-to-market.

Specifically, we construct the investment factor from a $3 \times 3 \times 3$ sort on size, book-to-market, and investment-to-asset. We measure investment-to-asset as the annual change in gross property, plant and equipment (item 7) divided by the lagged book value of assets (item 6). In June of each year, we sort stocks in ascending order independently on size, book-to-market, and investment-to-asset into three groups, the top 30%, the medium 40%, and the bottom 30%. By taking intersections of these nine portfolios, we classify all firms into 27 portfolios. Let p_{ijk}, where $i, j, k = 1, 2, 3$, denote the value-weighted portfolio returns of firms that are in the i^{th} group of size, the j^{th} group of book-to-market, and the k^{th} group of investment-to-asset. We define the investment return, denoted INV, as the average low-investment portfolio returns minus the average high-investment portfolio returns, i.e., $\text{INV} \equiv \frac{1}{9}\sum_{i=1}^{3}\sum_{j=1}^{3} p_{ij1} - \frac{1}{9}\sum_{i=1}^{3}\sum_{j=1}^{3} p_{ij3}$.

Following Fama and French (1993, 1996), we interpret the investment factor as a common factor related to real investment in the cross-sectional variations of returns. Over the sample from January 1970 to December 2003, the average return of the investment factor is 0.37% per month or 4.4% per annum with a significant heteroscedasticity and autocorrelation-adjusted t-statistic of 4.35. This premium of the investment factor is both economically and statistically meaningful. For comparison, the average return of MKT is 0.47% per month or 5.69% per annum with a t-statistic of 2.00 and the average return of HML is 0.49% per month or 5.83% per annum with a t-statistic of 2.65 in the same sample.

More important, standard factor-pricing models cannot capture much of the variation in the investment factor. Regressing the monthly returns of the investment factor onto the market excess returns yields a low R^2 of only 1.07%. The R^2 increases to 9.49% in the Fama-French three-factor model, and it increases to only 15.35% in the Carhart four-factor model. This evidence suggests that the investment factor captures sources of cross-sectional variations of returns that are independent of those captured by standard factor returns.

Panel B of Table 2 reports the key result of our paper. Augmenting the investment factor to standard factor regressions reduces the magnitudes of SEO underperformance measured as Jensen's alpha by a range from 37% to 46%, depending on empirical specifications. Except for the case with the value-weighted SEO portfolio used in the CAPM regression, the alphas become insignificant in factor regressions augmented with the investment factor.

For example, the alpha of the equally-weighted SEO portfolio from the CAPM regression decreases by 46%, from -0.28% to -0.15% per month, and its t-statistic drops from -1.86 to -0.99. And the alpha of the equally-weighted SEO portfolio from the Fama-French model decreases from -0.29% to -0.17% per month, a reduction of 43%, and the t-statistic drops from -3.00 to -1.82, and is no longer significant. We obtain similar results using the value-weighted SEO portfolio. The alpha from the CAPM regression decreases from -0.36% without the investment factor to -0.20% per month with the investment factor, a reduction of 45%, and the t-statistic drops from -3.76 to -2.13. And the alpha from the Fama-French model decreases from -0.28% to -0.18%, a reduction of 37%, and its t-statistic drops from -2.92 to -1.91. Finally, the alphas from the Carhart (1997) four-factor model are all insignificant, and adding the investment factor again helps shrink the magnitude of SEO underperformance.

Also from Panel B of Table 2, the loadings of the SEO portfolios on the investment factor are negative and highly significant in all specifications. And the magnitudes of these loadings, ranging from -0.28 to -0.47, are economically meaningful. Given the average return of 0.37% per month for the investment factor reported above, these loadings can explain from 12 to 17 basis points per month of the SEO underperformance.

An Alternative Definition of the SEO Portfolio

We have so far constructed the SEO portfolio as consisting of firms that have issued seasoned equity in the three years prior to the portfolio formation, as in Ritter (2003). But the current literature has also used the SEO portfolio as consisting of firms that have issued seasoned equity in the prior five years (e.g., Loughran and Ritter (1995) and Brav, Geczy, and Gompers (2000)). It is thus interesting to study whether our key results presented in Table 2 are robust to this alternative definition of the SEO portfolio. The answer is affirmative.

Table 3 reports the factor regressions using portfolios of firms with SEOs in the prior 60 months. Comparing Panel A in Table 3 with that in Table 2 shows that the magnitudes of SEO underperformance are somewhat lower using prior 60-month SEOs. But the alphas of the equally-weighted and value-weighted SEO portfolios from the Fama-French model and the alpha of the value-weighted SEO portfolio from the CAPM regression are still significant. And their magnitudes ranging from -0.21% to -0.25% per month are economically meaningful.

From Panel B of Table 3, our key results continue to hold with prior 60-month SEO portfolios. First, once we augment the factor models with the investment factor, the magnitudes of the SEO underperformance measured as alphas reduce by 36% to 45%, depending on empirical specifications. And all the alphas become insignificant. Second, the loadings of SEO portfolios on the investment factor are universally negative and highly significant except for the case in which we regress the equally-weighted SEO portfolio returns onto the market and the investment factors. The loadings are also economically meaningful. Their magnitudes range from -0.12 to -0.32. Given the average return of -0.37% for the investment factor, these loadings can explain from 0.07% to 0.12% per month of the SEO underperformance.

Event-Time Factor Regressions

To study how the magnitudes of SEO underperformance evolve over the years after the SEO event, we perform event-time factor regressions (e.g., Ball and Kothari (1989)). The difference between event-time regressions and calendar-time regressions is that we have three separate portfolios of SEO firms in the left-hand side of event-time regressions. The first portfolio consists of firms that have issued equity in the prior 12 months, the second portfolio consists of firms that have issued equity between 13 and 24 months ago, and the third portfolio consists of firms that have issued equity between 25 and 36 months ago. We have also used SEO portfolios that consist of firms with seasoned equity between 37 and 48 months and between 49 and 60 months ago. But the underperformance mostly concentrates in the first three post-SEO years. To save space, we thus only present event-time regressions for the first three years after SEO.

Tables 4 and 5 report event-time factor regressions, with and without the investment factor, using the equally-weighted and the value-weighted SEO portfolio returns, respectively. The first important result from these two tables is that SEO underperformance appears mostly in the first two post-event years, especially in year two. For example, from Panel A of Table 4, the alpha of the equally-weighted SEO portfolio in the first post-event year is only -0.15% per month with an insignificant t-statistic of -0.95, it increases to -0.63% with a highly significant t-statistic of -3.68 in year two, and subsequently drops to an insignificant level of -0.023% in year three. A similar pattern applies to the alpha estimates from the Fama-French three-factor model and the Carhart four-factor model. In particular, the alpha from the Fama-French model starts with an insignificant level of -0.06% per month in year one, increases drastically to a highly significant -0.65% in year two, and drops back to an insignificant level of -0.22% in year three. Panel A of Table 5 reports similar results using the value-weighted SEO portfolio returns. The only difference is that the value-weighted alphas in the first post-event year from the CAPM and the Fama-French model are -0.30% and -0.24%, and both are significant with t-statistics of -2.58 and -2.05, respectively.

The second important result is that adding the investment factor into the factor regressions explains from 28% to 75% of the underperformance of the equally-weighted SEO portfolio and from 23% to 50% of the underperformance of the value-weighted SEO portfolio, depending on specific factor models and post-event horizons. For example, Panel B of Table 4 shows that the eqaully-weighted alpha from the Carhart model in post-event year two decreases from a significant -0.21% with a t-statistic of -2.02 to an insignificant -0.14% with a t-statistic of -1.41. And from Panel B of Table 5, the value-weighted alphas from the CAPM and the Fama-French models decrease from -0.30% (t-statistic = -2.58) and -0.24% (t-statistic = -2.05) to -0.15% (t-statistic = -1.30) and -0.14% (t-statistic = -1.21), respectively. However, although the investment factor explains a fair amount of underperformance, both the equally-weighted and the value-weighted alphas from the CAPM and the Fama-French models remain economically and statistically significant in the second post-event year.

Lastly, the event-time regressions also reveal some interesting patterns on time-varying factor loadings. The market betas of the SEO portfolios tend to remain largely constant throughout the post-event years. But the HML loadings tend to increase over time. For example, SEO firms start in the first post-event year as growth firms with a negative HML loading of -0.15 in the case of the equally-weighted returns and -0.02 in the case of the value-weighted returns. But these firms end up being value firms in year three with significantly positive HML loadings of 0.32 for the equally-weighted returns and 0.12 for the value-weighted returns. More important, the loadings of SEO portfolios on the investment factor are all negative and are highly significant in 17 out of 18 specifications. Furthermore, the magnitudes of the investment-factor loadings display an inverted V-shape across the three post-event years, with the loadings in year two being the highest. This inverted V-shape in the investment-factor loadings is similar to the inverted V-shape observed in the magnitude of the underperformance across the post-event years.

4.2 Why Does Investment Help Explain SEO Underperformance?

To dig deeper into the driving forces behind our key results presented in Tables 2–5, we now ask why the investment factor can help explain the underperformance following SEOs. To this end, we examine the investment behavior of equity issuers relative to nonissuers with similar size and book-to-market. Our basic result is that issuers invest much more than matching nonissuers at the time of issuance, and the dispersion in investment-to-asset between these two types of firms does not converge until 60 months after portfolio formation. Because low-investing firms earn higher average returns than high-investing firms — the average return of the investment factor is 0.37% per month, it is not surprising that the investment factor helps explain the underperformance following SEOs.

Each month, we independently sort all firms that have not issued equity within the prior 60 months into quintiles of size and book-to-market using the breakpoints from Kenneth French's website. As a result, we have 25 size and book-to-market portfolios of nonissuers. For each issuer, we use these breakpoints to identify its matching portfolio. We then compare the median characteristics of the matching portfolio with those of the issuer's. We choose to match issuers with nonissuers by size and book-to-market because these two characteristics are primary determinants in the cross-section of returns (e.g., Fama and French (1992, 1993)). Matching firms to individual nonissuers as in Loughran and Ritter (1995, 1997), instead of size and book-to-market portfolios, produces results quantitatively similar to those reported below. Details are available upon request.

Figure 3 reports SEO firms and matching firms' median investment-to-asset and profitability in the 60 months after equity issuance. To measure statistical significance of the differences in characteristics, we also report Z-statistics associated with Wilcoxon matched-pairs signed-rank tests, as in Loughran and Ritter (1997). The null hypothesis is that the distributions of issuers' and nonissuers' characteristics are identical. Z-statistics between -2 and 2 indicate failure to reject the null hypothesis.[2]

Panel A of Figure 3 documents a large dispersion in investment-to-asset between issuers and matching nonissuers for most of the post-event window. In the first years after issuance, issuers' investment-to-asset is around 0.09, about 39% higher than nonissuers' investment-to-asset, around 0.055. This magnitude of dispersion remains stable for almost two years

[2] Denote the difference in the characteristic between issuer i and its matching portfolio by d_i. We rank the absolute values of d_i's from 1 to n, where n is the number of SEOs. We next sum the ranks of the positive values of d_i and denote the sum by D. The Z-statistic is then $Z \equiv \left[D - \frac{n(n+1)}{4}\right] / \sqrt{\frac{n(n+1)(2n+1)}{24}}$. Under the null, Z follows a standard normal distribution. Importantly, in rare cases the sign of the Z-statistic can be inconsistent with the sign of the difference between issuing firms' and matching portfolios' median characteristics. The reason is that the Wilcoxon test is concerned with the whole distribution of characteristics, and not just with the medians.

after issuance and then starts to converge. And the dispersion converges fully towards the end of the 60-month post-event window. Further, Panel B shows that the dispersion in investment-to-asset is highly significant, especially in the first years after issuance. Finally, from Panels C and D, issuers are more profitable than matching nonissuers in the first two years after equity issuance, but become less profitable than nonissuers thereafter.

Complementing the event-time evidence in Figure 3, Table 6 reports issuers and matching nonissuers' investment-to-asset and profitability in the year preceding SEOs. From Panel A, issuers invest more than nonissuers, and the difference in investment-to-asset is significant for every year from 1970 to 2003. The sample average investment-to-asset of issuers is 0.095, and is 70% higher than that of nonissuers, 0.056. The Z-statistic is highly significant, suggesting that issuers have a different distribution of investment-to-asset than nonissuers. Further, Panel B shows that issuers have somewhat higher profitability than nonissuers in the year prior to issuance. But the magnitude of this dispersion is small, only 0.006 on average.

Although broadly consistent with the evidence in Loughran and Ritter (1997), our results shed additional light on the drivers of SEO underperformance. Loughran and Ritter document that issuers have higher ratios of capital investment plus R&D expense relative to assets than nonissuers for four years after issuance. In particular, their Figure 1 reports that this ratio is about 10.5% for issuers and 6% for nonissuers at the time of issuance. A comparison with Panel A of our Figure 3 thus reveals that this dispersion is mostly due to capital investment, not R&D expense. In other words, the R&D-to-asset ratios of issuers are similar to those of nonissuers.

This evidence is important for two reasons. First, unlike the negative association between investment-to-asset and future returns, the empirical association between R&D-to-asset and future returns is positive (e.g., Chan, Lakonishok and Sougiannis (2001) and Chambers, Jennings and Thompson (2002)). Second, Carlson, Fisher, and Giammarino (2005) and Zhang (2005), the two theoretical papers that motivate our empirical analysis, model directly the behavior of capital investment, not R&D.

Finally, Figure 4 presents the number of SEO firms across investment-to-asset deciles. Issuers tend to be firms with high investment-to-asset ratios. Firms in the highest 10% investment-to-asset decile issue equity about three and a half times more frequently than firms in the lowest 10% investment-to-asset decile.

In all, we have presented clear evidence that equity issuers invest much more than matching firms both before and after issuance. This evidence, combined with the fact that the low-minus-high investment-to-asset factor earns a significant 0.37% per month, explains why capital investment can explain the underperformance following seasoned equity issuance.

4.3 Exploring Alternative Explanations of SEO Underperformance

In this subsection, we present some simple, descriptive tests to examine the leverage hypothesis and the market-timing hypothesis of SEO underperformance.

The Leverage Hypothesis

In an influential paper, Eckbo, Masulis, and Norli (2000) document that equity issuers have lower exposure to risk factors such as unexpected inflation, default spread, and changes in the slope of the term structure. And a multifactor model using these macroeconomic variables can reduce the SEO underperformance to insignificant levels. Eckbo et al. argue that issuing firms are less risky than nonissuers because issuing seasoned equity lowers their leverage ratios and thus reduces their expected returns relative to those matching nonissuers.

A natural implication of this explanation is that after SEOs, issuers should have lower leverage ratios than matching nonissuers. We test this implication in the sequel by examining the market and book leverage ratios of issuers and matching nonissers with similar size and book-to-market. The matching procedure is the same as that used to generate Table 6. Our basic finding is that, contrary to the leverage hypothesis, issuers have higher leverage than nonissuers even after SEOs.

We measure book leverage as the sum of debt in current liabilities (item 9) and long-term debt (item 34) divided by the lagged book value of assets. The denominator of the market leverage ratio is the market value of the firm, which is the sum of the market value of equity (December closing price times number of shares outstanding) and the book value of debt (item 9 plus item 34). Our results below are robust to changes in the definition of leverage, such as classifying preferred equity as debt.

Table 7 reports that, from 1970 to 2003, both market and book leverage ratios of issuers (measured at the fiscal yearend following issuance) are usually higher than those of nonissuers. The market leverage of issuers is on average 0.29, higher than the market leverage of nonissuers which is on average 0.21. The Z-statistic from the Wilcoxon equal-distribution test is a significant 4.12. Expect for the year 2000, issuers have higher market leverage than nonissuers in all the other years in the sample, and the dispersion is mostly significant. Similarly, the book leverage of issuers is on average 0.37, higher than the book leverage of nonissuers which is on average 0.23, and the Z-statistic is highly significant, 6.33. Issuers have higher book leverage than nonissuers during every year in the sample, and the Z-statistics are all significant.

Figure 5 reports the event-time evolution of leverage for issuers and matching nonissuers for 60 months after issuance. From Panels A and B, although issuing equity lowers somewhat the leverage ratios of issuers during the first two post-event years, their leverage ratios are still higher than those of matching nonissuers. The Z-statistics reported in Panels C and D suggest that the dispersions in leverage ratios between issuers and nonissuers are significant throughout the 60-month post-event window. This evidence forms an interesting contrast with the evidence of Eckbo and Norli (2004), who document that IPO firms typically have lower leverage than matching firms. In sum, our direct evidence seems inconsistent with the leverage hypothesis of SEO underperformance.

We have also conducted Fama-MacBeth (1973) monthly cross-sectional regressions of future returns onto market and book leverage. There exists a strong negative relation between book leverage and future returns and a positive, but somewhat weaker relation between market leverage and future returns. Moreover, when these leverage ratios are used jointly with size and book-to-market, their slopes are both negative and, in the case of market leverage, significant. This evidence is consistent with that reported in Fama and French (1992). The negative relations between leverage ratios and future returns casts additional doubt on the leverage explanation of SEO underperformance.

Specifically, when book leverage is used alone in cross-sectional regressions, it has a monthly slope of -0.31% with a significant t-statistic of -4.19. The market leverage has a monthly slope of 0.38% with a t-statistic of 1.45, when used alone. When market and book leverage are used jointly, their slopes are 0.91% (t-statistic = 3.00) and -0.78% (t-statistic = -6.11), respectively. The pattern that the two leverage ratios are related to future returns but with opposite signs is consistent with the evidence in Fama and French (1992). Fama and French provide a simple interpretation of this result. Because the two slopes are opposite in sign but relatively close in magnitudes, they argue that it is the difference between market and book leverage, i.e., book-to-market equity, that helps explain average returns.

We offer an alternative interpretation. The positive slope of market leverage is likely to reflect the value effect commonly captured by other market valuation ratios such as book-to-market, earnings-to-market, and dividend-to-market. But because debt offerings raise book leverage, the negative slope of book leverage can be a manifestation of the underperformance following debt offerings. Spiess and Affleck-Graves (1999) document substantial long-run post-issue underperformance by firms making straight and convertible debt offerings.

The Market Timing Hypothesis

Another popular explanation of SEO underperformance is based on behavioral market timing (e.g., Ritter (2003)). According to this explanation, managers can create value for existing shareholders by timing their external financing decisions to exploit systematic mispricing in capital markets. Managers could issue equity when their stock prices are overvalued, and use internal funds or debt in other times. In an important contribution, Baker and Wurgler (2000) find that the proportion of new equity in the total funds raised is a strong negative predictor of future stock market returns. And they interpret this evidence as market timing.[3]

We test the behavioral market-timing hypothesis by examining the cross-sectional association between new equity shares and future stock returns. The idea is simple. If managers can detect and respond to their firm-specific mispricing, then their firm-level new equity shares should correlate negatively with their firm-level future stock returns. More importantly, if managers can successfully time the whole market, then firm-level new equity shares should perhaps be even stronger predictors of firm-level returns. The reason is that, because of their relative informational advantage, managers are likely to know more about future performance of their own firms than outside investors. However, it is not obvious that managers

[3]The market-timing hypothesis has recently been challenged by Butler, Grullon and Weston (2004), who demonstrate a spurious relation between equity issuances and stock market returns. The authors interpret the evidence as consistent with Schultz's (2003) pseudo market-timing argument. However, Baker, Taliaferro, and Wurgler (2004) use simulations to estimate the size of the aggregate pseudo market-timing bias, and argue that the bias explains less than two percent of the predictive power of the equity share in new issues.

should have such an advantage over outside investors regarding the aggregate economy.

We use three measures of new equity shares. The first two are from Baker and Wurgler (2002). New equity share 1 is the annual change in book equity divided by the change in book assets, Compustat item 6, where the book equity is calculated as the book value of assets minus the sum of debt in current liabilities, item 9, and long-term debt, item 34, plus the change in balance sheet retained earnings, item 36. New equity share 2 is the sale of common and preferred stock, item 108, minus the purchase of common and preferred stock, item 115, divided by the sum of the sale of debt, item 111 plus the change in current debt, item 9, plus the sale of common and preferred stock, minus the purchase of common and preferred stock. The third measure, new equity share 3, is from Welch (2004), and is the ratio of total equity issue and the sum of total debt and equity issues. Total equity issue in year t is the market value of equity in year t minus the market value of equity in year $t-1$ times the stock return in year t. Total debt issue in year t is the difference between the book value of debt in year t and that in year $t-1$. We only include observations with non-negative equity shares.

Table 8 reports monthly cross-sectional regressions of future stock returns onto the new equity shares and other firm characteristics. The basic result is that, although some new equity shares have significantly negative slopes when used alone, their explanatory power diminishes to insignificant levels when we control for size and book-to-market. For example, new equity share 1 has a significant slope of -0.41% per month with a t-statistic of -2.26. But this slope reduces to -0.26 (t-statistic = -1.70) when we control for size and book-to-market, and it reduces further to -0.22 (t-statistic = -1.47) when we also control for investment-to-asset besides size and book-to-market. New equity share 2 does not correlate negatively with future stock returns. Its slopes are all insignificantly positive. New equity share 3 shows some weak explanatory power. Its slope is -0.04% per month (t-statistic = -1.21) when used alone, but the slope becomes insignificantly positive when we control for size and book-to-market with and without investment-to-asset. In contrast, the explanatory power of investment-to-asset persists in the presence of size and book-to-market. The slope of investment-to-asset is -0.57% with a t-statistic of -5.41 in univariate regression, it reduces to -0.36% that is still highly significant with a t-statistic of -4.42 when we control for size and book-to-market. More important, the magnitudes of both the slope and its t-statistic of investment-to-asset are comparable to those of book-to-market.

In sum, our evidence does not support the market-timing hypothesis. Our cross-sectional regressions show that, in contrast to the aggregate evidence of Baker and Wurgler (2000), the explanatory power of new equity shares largely vanishes in the presence of other well-known determinants of the cross-section of returns.

5 Conclusion

We study investment-related sources of long-term underperformance following seasoned equity offerings. A return factor from buying stocks with the lowest 30% investment-to-asset ratios and selling stocks with the highest 30% investment-to-asset ratios, while controlling for size and book-to-market, earns on average 0.37% per month (t-statistic = 4.35). Most important, adding this investment factor into standard factor regressions makes the SEO underperformance largely insignificant and reduces its magnitude by 37–46%. The reason is that equity issuers invest much more than matching nonissuers. In the year preceding issuance, the average investment-to-asset of issuers is 0.095, 70% higher than that of nonissuers, 0.056, and the dispersion is highly significant.

We interpret the evidence as consistent with the investment-based explanation of SEO underperformance proposed by Carlson, Fisher, and Giammarino (2005) and Zhang (2005b).

Cochrane (1991, 1996) and Berk, Green, and Naik (1999), among others, have predicted a negative relation between real investment and expected returns. Carlson et al. and Zhang argue that this negative relation can potentially explain SEO underperformance, i.e., issuers invest more and are expected to earn lower average returns than nonissuers.

We also find that, even in the fiscal yearend following issuance, issuers have market and book leverage ratios higher than those of nonissuers matched on size and book-to-market by 39% and 61%, respectively. This evidence seems inconsistent with the leverage explanation of SEO underperformance (e.g., Eckbo, Masulis, and Norli (2000)). Moreover, the slopes of new equity shares in cross-sectional regressions become insignificant when controlling for size and book-to-market. This evidence seems inconsistent with the market-timing explanation of the underperformance (e.g., Loughran and Ritter (1995) and Baker and Wurgler (2000)).

The relation between investment-to-asset and future stock returns also has potential implications to the abnormal performance following initial public offerings (e.g., Ritter (1991)) and debt offerings (e.g., Spiess and Affleck-Graves (1999)). Intuitively, IPO firms and debt-issuing firms should invest more than matching nonissuers. If so, adding the investment factor into standard factor regressions should reduce the magnitude of long-term underperformance following these events. We plan to pursue these lines of research in the future.

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Table 1 : The Number of Seasoned Equity Offerings

This table reports the total number of SDC's SEO sample by year (column 1), the number of SEOs that can be matched with CRSP by NCUSIP (column 2), by CUSIP (column 3), the number of SEO firms on NYSE (column 4), AMEX (column 5), and NASDAQ (column 6), the number of primary offerings (column 7), mixed offerings (column 8), the number of SEOs by non-utilities (column 9), non-financial (column 10), the number of SEOs by U.S. firms with common stocks trading on NYSE, AMEX, and NASDAQ (column 11), and the number of firms from column 11 with valid market size, book-to-market, and investment data (column 12).

	1	2	3	4	5	6	7	8	9	10	11	12
Year	All	NCUSIP	CUSIP	NYSE	AMEX	NASD	Prim	Mix	Non-Util	Non-Fin	US	SEO-Inv
1970	92	91	55	66	26	0	54	38	58	88	72	62
1971	232	230	138	142	90	0	94	138	177	209	164	138
1972	218	217	141	135	69	14	87	131	164	200	165	144
1973	140	139	68	85	3	51	92	48	76	129	101	85
1974	82	81	33	62	2	17	65	17	30	81	68	63
1975	178	178	87	136	5	37	130	48	78	174	135	129
1976	190	187	112	123	17	50	130	60	101	183	150	137
1977	134	133	71	87	7	40	94	40	63	131	100	98
1978	179	178	101	104	14	61	127	52	105	166	143	128
1979	160	159	96	84	19	56	117	43	92	155	118	109
1980	319	317	208	158	41	120	227	92	229	308	244	223
1981	337	336	212	168	32	136	231	106	253	309	258	208
1982	361	360	232	235	27	99	194	167	267	328	279	234
1983	661	657	505	296	80	285	348	313	587	591	510	436
1984	202	201	139	92	18	92	118	84	172	155	140	106
1985	323	322	243	99	38	186	189	134	297	231	217	147
1986	414	413	300	106	48	260	248	166	390	275	278	195
1987	236	234	185	89	31	116	157	79	224	183	168	111
1988	114	111	92	39	20	55	70	44	101	90	88	64
1989	193	191	146	50	29	114	116	77	172	152	153	111
1990	148	148	114	54	21	73	82	66	135	122	117	86
1991	416	410	323	154	43	219	260	156	384	349	339	244
1992	421	420	334	173	49	199	261	160	387	316	330	216
1993	622	618	495	241	45	334	362	260	577	455	469	309
1994	389	387	327	176	23	189	224	165	372	299	263	190
1995	538	535	444	188	22	328	277	261	517	428	394	275
1996	674	671	552	246	27	401	337	337	660	527	493	335
1997	655	651	557	272	36	346	362	293	642	459	436	299
1998	498	496	435	252	25	221	301	197	477	319	312	215
1999	403	402	364	126	11	265	191	212	396	356	319	201
2000	355	355	328	87	10	258	176	179	344	332	306	208
2001	374	374	361	194	20	160	220	154	355	246	249	197
2002	385	385	370	225	13	147	267	118	356	275	255	194
2003	449	449	442	252	19	178	314	135	423	308	293	225
Total	11092	11036	8610	4996	980	5107	6522	4570	9661	8929	8126	6122

Table 2 : Calendar-Time Factor Regressions, January 1970 to December 2003, Portfolios of Firms with SEOs in the Prior 36 Months

This table reports calendar-time factor regressions of portfolios consisting of firms that have conducted SEOs in the 36 months prior to the month of portfolio formation. Panel A uses factor models including the CAPM, the Fama and French (1993) three-factor model, and the Carhart (1997) four-factor model. We obtain the factor returns, MKT, SMB, HML, and WML (momentum) from Kenneth French's website. Panel B augments the factor models in Panel A with the investment factor, INV. We construct this factor as the returns of the bottom three investment-to-asset deciles minus the returns of the top three investment-to-asset deciles, while controlling for size and book-to-market. The t-statistics adjusted for heteroscedasticity and autocorrelations of up to six lags are in parentheses. The adjusted R^2s are in percentage.

	Panel A: Factor regressions without the investment factor					
	Equally-weighted			Value-weighted		
	CAPM	FF	Carhart	CAPM	FF	Carhart
α	-0.279	-0.291	-0.041	-0.356	-0.280	-0.076
	(-1.86)	(-3.00)	(-0.48)	(-3.76)	(-2.92)	(-0.86)
MKT	1.282	1.131	1.094	1.124	1.084	1.054
	(40.18)	(49.63)	(55.53)	(55.84)	(48.09)	(51.11)
SMB		0.714	0.702		0.015	0.005
		(24.06)	(27.69)		(0.51)	(0.20)
HML		-0.049	-0.113		-0.121	-0.172
		(-1.43)	(-3.78)		(-3.55)	(-5.53)
WML			-0.233			-0.190
			(-12.28)			(-9.58)
Adj R^2	79.86	92.05	94.20	88.45	88.79	90.85

	Panel B: Factor regressions with the investment factor					
	Equally-weighted			Value-weighted		
	CAPM	FF	Carhart	CAPM	FF	Carhart
α	-0.151	-0.166	0.019	-0.195	-0.177	-0.026
	(-0.99)	(-1.82)	(0.23)	(-2.13)	(-1.91)	(-0.30)
MKT	1.270	1.134	1.101	1.108	1.087	1.060
	(40.06)	(53.53)	(58.47)	(58.13)	(50.70)	(52.85)
SMB		0.749	0.729		0.044	0.028
		(26.83)	(29.69)		(1.57)	(1.06)
HML		0.043	-0.039		-0.044	-0.111
		(1.26)	(-1.28)		(-1.28)	(-3.39)
WML			-0.206			-0.167
			(-11.06)			(-8.44)
INV	-0.323	-0.465	-0.332	-0.405	-0.388	-0.280
	(-3.53)	(-8.05)	(-6.39)	(-7.35)	(-6.64)	(-5.06)
Adj R^2	80.41	93.13	94.72	89.79	89.87	91.37

Table 3 : Calendar-Time Factor Regressions, January 1970 to December 2003, Portfolios of Firms with SEOs in the Prior 60 Months

This table reports calendar-time factor regressions of equally-weighted and value-weighted portfolios of SEO firms that have conducted SEOs in the 60 months prior to the month of portfolio formation. Panel A uses factor models including the CAPM, the Fama and French (1993) three-factor model, and the Carhart (1997) four-factor model. We obtain the factor returns, MKT, SMB, HML, and WML (momentum) from Kenneth French's website. Panel B augments the factor models in Panel A with the investment factor, INV. We construct this factor as the returns of the bottom three investment-to-asset deciles minus the returns of the top three investment-to-asset deciles, while controlling for size and book-to-market. The t-statistics (adjusted for heteroscedasticity and autocorrelations of up to six lags) are in parentheses. The adjusted R^2s are in percentage.

	Panel A: Factor regressions without the investment factor					
	Equally-weighted			Value-weighted		
	CAPM	FF	Carhart	CAPM	FF	Carhart
α	-0.114	-0.208	0.019	-0.249	-0.205	-0.028
	(-0.76)	(-2.36)	(0.25)	(-3.14)	(-2.54)	(-0.38)
MKT	1.259	1.134	1.100	1.116	1.090	1.064
	(39.38)	(54.51)	(61.14)	(66.39)	(57.48)	(61.78)
SMB		0.776	0.765		0.023	0.014
		(28.63)	(33.01)		(0.92)	(0.65)
HML		0.076	0.018		-0.071	-0.116
		(2.43)	(0.68)		(-2.48)	(-4.45)
WML			-0.212			-0.165
			(-12.25)			(-9.95)
Adj. R^2	79.20	93.18	95.02	91.54	91.68	93.30

	Panel B: Factor regressions with the investment factor					
	Equally-weighted			Value-weighted		
	CAPM	FF	Carhart	CAPM	FF	Carhart
α	-0.066	-0.122	0.054	-0.137	-0.131	0.004
	(-0.43)	(-1.42)	(0.71)	(-1.76)	(-1.66)	(0.06)
MKT	1.254	1.136	1.104	1.105	1.092	1.067
	(39.00)	(56.85)	(62.39)	(68.00)	(59.67)	(62.97)
SMB		0.800	0.781		0.044	0.029
		(30.36)	(33.81)		(1.81)	(1.30)
HML		0.140	0.062		-0.016	-0.076
		(4.37)	(2.14)		(-0.54)	(-2.75)
WML			-0.196			-0.150
			(-11.22)			(-8.96)
INV	-0.120	-0.322	-0.196	-0.280	-0.278	-0.181
	(-1.29)	(-5.91)	(-4.00)	(-5.96)	(-5.57)	(-3.87)
Adj. R^2	79.23	93.71	95.20	92.21	92.25	93.53

Table 4 : Event-Time Factor Regressions, Equally-Weighted SEO Portfolios

This table reports event-time factor regressions of equally-weighted portfolios consisting of SEO firms for three years after the event. Panel A uses factor models including the CAPM, the Fama and French (1993) three-factor model, and the Carhart (1997) four-factor model. We obtain the factor returns MKT, SMB, HML, and WML (momentum) from Kenneth French's website. Panel B augments the factor models in Panel A with the investment factor, INV. We construct this factor as the average returns of the bottom three investment-to-asset deciles minus the average returns of the top three investment-to-asset deciles, while controlling for size and book-to-market. The t-statistics adjusted for heteroscedasticity and autocorrelations of up to six lags are in parentheses. The adjusted R^2s are in percentage.

	Panel A: Factor regressions without the investment factor								
	Year 1			Year 2			Year 3		
	CAPM	FF	Carhart	CAPM	FF	Carhart	CAPM	FF	Carhart
α	-0.150	-0.057	-0.080	-0.631	-0.653	-0.206	-0.023	-0.220	0.258
	(-0.95)	(-0.55)	(-0.74)	(-3.68)	(-4.92)	(-2.02)	(-0.12)	(-1.49)	(2.21)
MKT	1.280	1.086	1.089	1.285	1.140	1.076	1.233	1.150	1.081
	(38.39)	(44.15)	(43.75)	(34.88)	(36.02)	(45.22)	(29.46)	(32.77)	(39.76)
SMB		0.679	0.680		0.679	0.670		0.817	0.812
		(21.21)	(21.22)		(16.60)	(22.03)		(18.11)	(23.50)
HML		-0.211	-0.205		-0.064	-0.174		0.198	0.082
		(-5.69)	(-5.45)		(-1.36)	(-4.90)		(3.80)	(2.02)
WML			0.021			-0.407			-0.423
			(0.89)			(-17.85)			(-16.39)
Adj. R^2	78.35	90.88	90.88	75.48	86.00	92.27	69.35	83.46	90.30

	Panel B: Factor regressions with the investment factor								
	Year 1			Year 2			Year 3		
	CAPM	FF	Carhart	CAPM	FF	Carhart	CAPM	FF	Carhart
α	-0.037	0.027	-0.018	-0.455	-0.494	-0.138	0.085	-0.067	0.320
	(-0.23)	(0.26)	(-0.17)	(-2.64)	(-3.93)	(-1.41)	(0.43)	(-0.47)	(2.81)
MKT	1.269	1.088	1.096	1.270	1.148	1.086	1.222	1.156	1.090
	(38.16)	(45.42)	(45.34)	(35.09)	(38.87)	(47.66)	(29.20)	(34.77)	(41.23)
SMB		0.703	0.708		0.727	0.701		0.863	0.840
		(22.27)	(22.45)		(18.80)	(23.79)		(19.94)	(24.73)
HML		-0.149	-0.129		0.059	-0.088		0.315	0.160
		(-3.88)	(-3.28)		(1.27)	(-2.41)		(6.01)	(3.78)
WML			0.050			-0.377			-0.396
			(2.08)			(-16.90)			(-15.44)
INV	-0.283	-0.314	-0.346	-0.454	-0.612	-0.385	-0.275	-0.590	-0.356
	(-2.95)	(-4.80)	(-5.17)	(-4.40)	(-7.70)	(-6.22)	(-2.32)	(-6.66)	(-5.00)
Adj. R^2	78.75	91.35	91.43	76.57	87.82	92.95	69.70	85.16	90.87

Table 5 : Event-Time Factor Regressions, Value-Weighted SEO Portfolios

This table reports event-time factor regressions of value-weighted portfolios consisting of SEO firms for three years after the event. Panel A uses factor models including the CAPM, the Fama and French (1993) three-factor model, and the Carhart (1997) four-factor model. We obtain the factor returns MKT, SMB, HML, and WML (momentum) from Kenneth French's website. Panel B augments the factor models in Panel A with the investment factor, INV. We construct this factor as the average returns of the bottom three investment-to-asset deciles minus the average returns of the top three investment-to-asset deciles, while controlling for size and book-to-market. The t-statistics adjusted for heteroscedasticity and autocorrelations of up to six lags are in parentheses. The adjusted R^2s are in percentage.

	Panel A: Factor regressions without the investment factor								
	Year 1			Year 2			Year 3		
	CAPM	FF	Carhart	CAPM	FF	Carhart	CAPM	FF	Carhart
α	-0.298	-0.240	-0.176	-0.602	-0.500	-0.162	-0.141	-0.185	0.150
	(-2.58)	(-2.05)	(-1.47)	(-4.44)	(-3.66)	(-1.32)	(-1.09)	(-1.39)	(1.26)
MKT	1.099	1.055	1.046	1.141	1.084	1.035	1.127	1.151	1.103
	(44.76)	(38.28)	(37.67)	(39.26)	(33.31)	(36.11)	(40.69)	(36.45)	(39.83)
SMB		0.072	0.069		0.021	0.014		-0.011	-0.014
		(2.00)	(1.92)		(0.50)	(0.39)		(-0.26)	(-0.39)
HML		-0.098	-0.114		-0.171	-0.255		0.070	-0.011
		(-2.36)	(-2.72)		(-3.54)	(-5.95)		(1.50)	(-0.27)
WML			-0.060			-0.308			-0.296
			(-2.22)			(-11.20)			(-11.27)
Adj. R^2	83.11	83.52	83.68	79.59	80.20	84.97	81.20	81.23	85.91
	Panel B: Factor regressions with the investment factor								
	Year 1			Year 2			Year 3		
	CAPM	FF	Carhart	CAPM	FF	Carhart	CAPM	FF	Carhart
α	-0.150	-0.140	-0.112	-0.414	-0.384	-0.113	-0.074	-0.124	0.160
	(-1.30)	(-1.21)	(-0.95)	(-3.10)	(-2.86)	(-0.93)	(-0.56)	(-0.93)	(1.34)
MKT	1.084	1.058	1.053	1.125	1.090	1.043	1.120	1.154	1.105
	(45.35)	(39.55)	(38.86)	(40.21)	(34.61)	(36.81)	(40.41)	(36.84)	(39.79)
SMB		0.100	0.097		0.056	0.036		0.008	-0.009
		(2.84)	(2.75)		(1.37)	(0.99)		(0.20)	(-0.25)
HML		-0.024	-0.036		-0.081	-0.193		0.117	0.002
		(-0.56)	(-0.82)		(-1.63)	(-4.25)		(2.36)	(0.05)
WML			-0.030			-0.286			-0.292
			(-1.13)			(-10.32)			(-10.83)
INV	-0.372	-0.375	-0.355	-0.483	-0.448	-0.276	-0.171	-0.234	-0.061
	(-5.39)	(-5.14)	(-4.75)	(-6.06)	(-5.29)	(-3.58)	(-2.17)	(-2.80)	(-0.82)
Adj. R^2	84.20	84.50	84.51	81.29	81.47	85.41	81.38	81.57	85.90

Table 6 : Equity Issuers and Matching Nonissuers' Investment-to-Asset and Profitability in Calendar Time, 1970 to 2003

This table reports equity issuers and matching nonissuers' investment-to-asset and profitability in calendar time from 1970 to 2003. We report the median values of these two characteristics for the issuers and matching nonissuer portfolios in the fiscal year end prior to SEO. We also report the Z-statistics associated with the Wilcoxon test for differences in distributions. The null hypothesis is that the characteristics of issuers and nonissuers are both drawn from the same distribution. We measure profitability as net income before extraordinary items (Compustat item 18) divided by lagged book value of assets (item 6). We measure investment-to-asset as the change in gross property, plant, and equipment (item 7) divided by book assets.

Year	Panel B: Investment-to-Asset			Panel A: Profitability		
	issuers	non-issuers	Z	issuers	non-issuers	Z
1970	0.130	0.086	4.71	0.138	0.136	2.14
1971	0.111	0.074	5.39	0.158	0.142	2.78
1972	0.097	0.053	7.54	0.134	0.126	2.84
1973	0.131	0.047	7.65	0.137	0.112	3.33
1974	0.140	0.054	6.27	0.139	0.122	2.97
1975	0.124	0.062	8.03	0.140	0.145	1.20
1976	0.100	0.056	7.63	0.133	0.146	1.18
1977	0.107	0.049	7.06	0.129	0.129	1.00
1978	0.116	0.052	8.14	0.153	0.146	2.52
1979	0.139	0.063	7.78	0.144	0.142	0.63
1980	0.131	0.071	9.08	0.158	0.181	1.62
1981	0.123	0.068	8.62	0.143	0.167	0.45
1982	0.103	0.072	5.71	0.144	0.147	2.84
1983	0.078	0.066	5.40	0.136	0.135	1.90
1984	0.079	0.052	4.28	0.129	0.103	2.35
1985	0.109	0.071	6.72	0.172	0.117	5.22
1986	0.081	0.060	4.61	0.154	0.104	4.10
1987	0.089	0.057	3.88	0.119	0.087	0.10
1988	0.089	0.054	3.81	0.130	0.088	2.13
1989	0.103	0.050	6.10	0.126	0.088	3.26
1990	0.078	0.050	3.29	0.130	0.096	1.31
1991	0.084	0.050	5.88	0.112	0.106	-0.35
1992	0.069	0.042	5.09	0.093	0.089	0.63
1993	0.058	0.043	6.16	0.102	0.090	1.57
1994	0.059	0.047	4.46	0.103	0.107	-1.04
1995	0.078	0.054	6.29	0.118	0.110	-0.43
1996	0.074	0.055	5.65	0.094	0.105	-2.04
1997	0.106	0.061	7.82	0.132	0.121	0.74
1998	0.077	0.057	5.11	0.117	0.109	-0.09
1999	0.104	0.052	6.96	0.110	0.139	-2.49
2000	0.105	0.054	7.29	0.066	0.130	-3.37
2001	0.058	0.055	3.72	0.102	0.139	-2.37
2002	0.062	0.042	5.13	0.110	0.093	2.32
2003	0.027	0.024	3.76	0.047	0.059	-3.18
Average	0.095	0.056	6.03	0.125	0.119	1.05

Table 7 : SEOs and Matching Firms' Market Leverage and Book Leverage in Calendar Time, 1970 to 2003

This table reports SEOs and matching firms' market leverage and book leverage in calendar time from 1970 to 2003. We report the median values of these two characteristics for the issuers and matching nonissuer portfolios, as well as the Z-statistics associated with the Wilcoxon test for differences in distributions. The null hypothesis is that the characteristics of issuers and nonissuers are both drawn from the same distribution. We measure market leverage as the sum of debt in current liabilities (item 9) and long-term debt (item 34) divided by the sum of the market value of equity at the calendar year end and the book value of debt (item 9 plus item 34). And we measure book leverage as the sum of item 9 plus item 34 divided by item 6.

Year	Panel A: Market Leverage			Panel B: Book Leverage		
	issuers	non-issuers	Z	issuers	non-issuers	Z
1970	0.441	0.291	3.97	0.562	0.318	5.35
1971	0.266	0.264	4.58	0.429	0.295	5.84
1972	0.270	0.231	4.16	0.402	0.273	6.54
1973	0.540	0.267	6.07	0.533	0.273	6.95
1974	0.683	0.471	6.32	0.575	0.297	6.77
1975	0.637	0.376	8.21	0.530	0.262	9.06
1976	0.511	0.301	5.99	0.473	0.255	7.58
1977	0.582	0.312	7.29	0.501	0.262	7.90
1978	0.538	0.304	7.74	0.484	0.264	8.37
1979	0.535	0.308	7.31	0.482	0.273	8.23
1980	0.270	0.204	6.42	0.451	0.262	8.80
1981	0.342	0.231	7.01	0.444	0.260	8.64
1982	0.342	0.318	5.55	0.379	0.235	8.27
1983	0.230	0.193	4.79	0.303	0.233	8.52
1984	0.243	0.258	2.26	0.313	0.236	4.09
1985	0.187	0.159	2.59	0.326	0.248	4.76
1986	0.187	0.143	3.09	0.297	0.242	4.25
1987	0.244	0.199	3.05	0.314	0.253	3.99
1988	0.272	0.178	2.47	0.384	0.256	3.77
1989	0.200	0.217	1.30	0.385	0.252	4.10
1990	0.186	0.197	0.45	0.341	0.239	2.95
1991	0.183	0.182	1.43	0.322	0.222	5.09
1992	0.240	0.176	4.02	0.343	0.211	6.90
1993	0.178	0.156	4.85	0.295	0.195	7.56
1994	0.106	0.106	1.63	0.235	0.182	4.05
1995	0.083	0.116	0.94	0.240	0.191	4.76
1996	0.096	0.119	2.62	0.276	0.192	7.09
1997	0.114	0.078	4.28	0.309	0.174	8.05
1998	0.180	0.129	6.26	0.385	0.181	8.64
1999	0.103	0.065	2.47	0.295	0.201	6.50
2000	0.029	0.074	-2.47	0.164	0.186	3.44
2001	0.135	0.107	3.94	0.288	0.180	6.70
2002	0.299	0.177	6.86	0.365	0.186	8.19
2003	0.250	0.060	2.66	0.273	0.083	3.47
Average	0.285	0.205	4.12	0.373	0.231	6.33

Table 8 : Monthly Cross-Sectional Regressions of Returns onto New Equity Shares and Investment-to-Asset

This table reports monthly Fama-MacBeth cross-sectional regressions of future stock returns onto firm-specific variables: log(ME) is the logarithm of market capitalization at the end of the most recent June. log(BE/ME) is the logarithm of book-to-market ratio where book equity is from the most recent fiscal year ending. Investment-to-asset is the change in gross property, plant, and equipment (item 7) divided by book assets. We use three market-timing measures related to new equity shares. The first two are from Baker and Wurgler (2002). New equity share 1 is the annual change in book equity minus the change in balance sheet retained earnings (item 36) divided by the change in book assets. New equity share 2 is the sale of common and preferred stock minus the purchase of common and preferred stock, divided by the sum of the sale of debt, the change in current debt, the sale of common and preferred stock, net of the purchase of common and preferred stock. The third measure, new equity share 3 is the ratio of new equity issues and the sum of total debt and equity issues, but we define new equity and debt issues as in Welch (2004). New equity issue in year t is the market value of equity in year t minus the market value of equity in year $t-1$ times the stock return in year t. Total debt issues in year t is the difference between the book value of debt in year t and that in year $t-1$. To reduce the impact of outliers, we truncate the bottom and top 0.5% of the observations for new equity share 3. Truncating the observations of new equity shares 1 and 2 yields quantitatively similar results to those reported. The adjusted R-squares are the time series averages of the adjusted R-squares from the monthly cross-sectional regressions.

No.	log(ME)	log(BE/ME)	New Equity Share 1	New Equity Share 2	New Equity Share 3	Investment-to-Asset	Adj. R^2
1			-0.406				0.21%
			(-2.26)				
2				0.010			0.81%
				(0.05)			
3					-0.041		0.05%
					(-1.21)		
4	-0.046	0.367	-0.262				2.48%
	(-0.90)	(4.16)	(-1.70)				
5	-0.050	0.345	-0.223			-0.261	2.63%
	(-0.99)	(3.94)	(-1.47)			(-2.86)	
6	-0.151	0.430		0.289			4.12%
	(-2.47)	(2.55)		(1.77)			
7	-0.152	0.379		0.280		-0.721	4.36%
	(-2.49)	(2.24)		(1.72)		(-2.05)	
8	-0.129	0.352			0.017		2.19%
	(-2.24)	(4.10)			(0.73)		
9	-0.128	0.333			0.016	-0.551	2.27%
	(-2.22)	(3.91)			(0.68)	(-5.32)	
10						-0.571	0.12%
						(-5.41)	
11	-0.128	0.346				-0.355	2.21%
	(-2.23)	(4.02)				(-4.42)	

Figure 1. The Downward-Sloping Investment-Demand Function

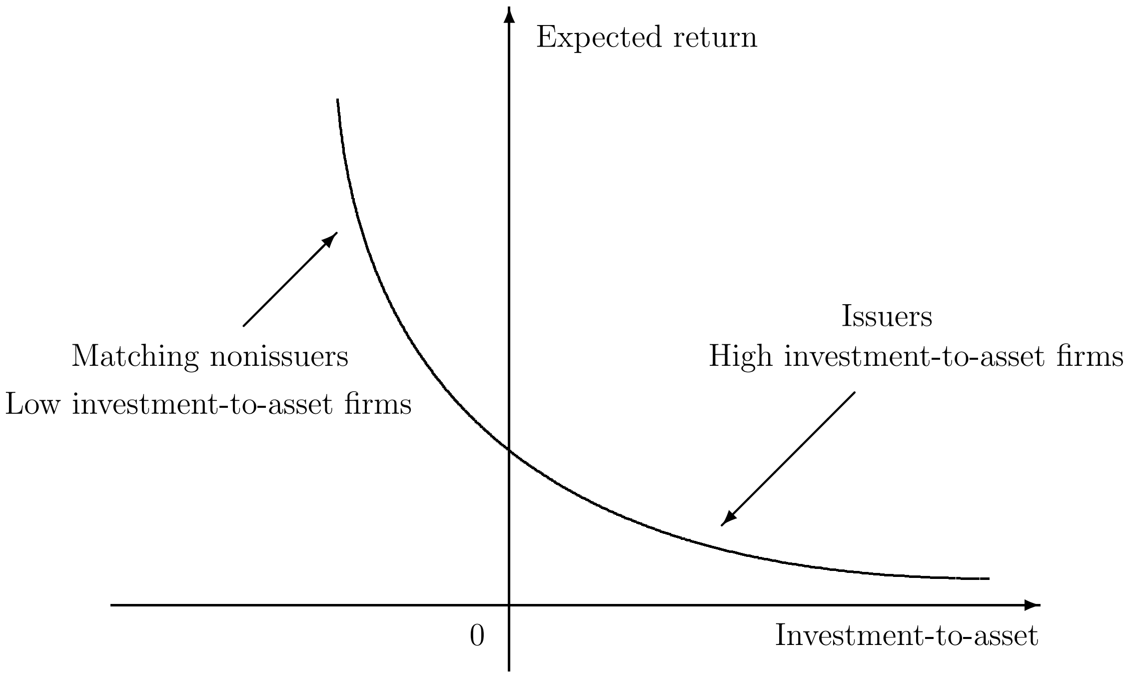
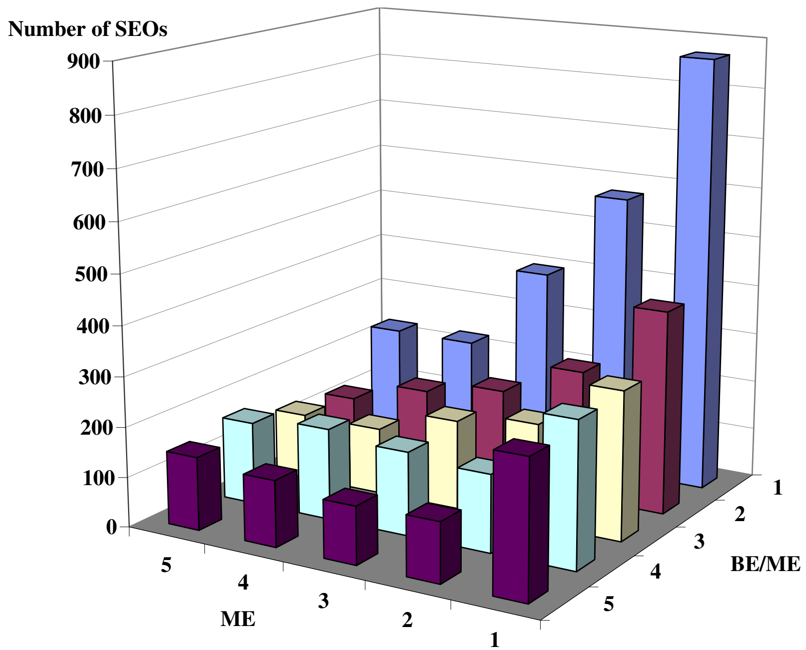


Figure 2 : The Frequency Distribution and New Equity-to-Asset of SEO Firms Across Size and Book-to-Market Quintiles

Panel A of this figure plots the number of SEO firms in each of the 25 size and book-to-market portfolios. Panel B reports the median new equity-to-asset ratio among equity issuers by size and book-to-market quintiles. We measure book assets as Compustat annual item 6 and capital investment as the change in item 7 (gross property, plant, and equipment). We calculate size as the price by the end of June times the number of shares outstanding. We defined book equity as stockholder's equity (item 216), minus preferred stock, plus balance sheet deferred taxes and investment tax credit (item 35) if available, minus post-retirement benefit asset (item 330) if available. If stockholder's equity is missing, we use common equity (item 60) plus preferred stock par value (item 130). If these variables are missing, we use book assets (item 6) less liabilities (item 181). We measure preferred stock as preferred stock liquidating value (item 10), or preferred stock redemption value (item 56), or preferred stock par value (item 130), in that order of availability. To calculate the book-to-market ratio, we use the market size at the end of the fiscal year, which is December closing price times the number of shares outstanding. We obtain the size and book-to-market quintile breakpoints from Kenneth French's website. We measure new equity-to-asset as the market value of new equity (obtained from SDC) divided by the book value of assets at the end of the fiscal year preceding the equity issue.

Panel A: Number of SEOs by ME and BE/ME Quintiles



Panel B: New Equity-to-Asset by ME and BE/ME Quintiles

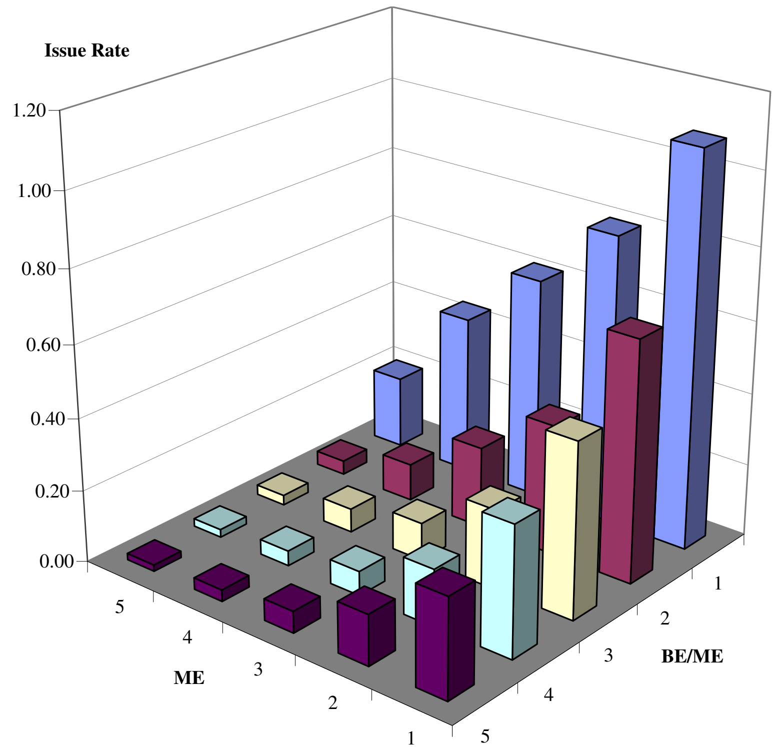


Figure 3 : Equity Issuers and Matching nonissuers' Investment-to-Asset and Profitability During 60 Months After Equity Issuance, 1970 to 2003

This figure plots SEO firms' and matching nonissuers' median investment-to-asset and profitability during 60 months after equity issuance in Panels A and C as well as their corresponding Z-statistics from the Wilcoxon test for testing distributional differences in Panels B and D, respectively. Z statistics between -2 and 2 indicate failure to reject the null hypothesis of equal distribution of characteristics between SEOs and their matching firms. Month 0 is the month of equity issuance. We measure real investment as the change in Compustat annual item 7 (gross property, plant, and equipment). We measure book assets as item 6 and profitability as net income before extraordinary items (item 18) divided by lagged book value of assets (item 6). The solid lines are for issuers and the broken lines are for matching nonissuers. We use the following matching procedure. At the end of June every year, all firms that have not issued equity within the prior 36 months are sorted by their size and book-to-market equity to form 25 size and book-to-market portfolios of nonissuers. For each issuer, we use the breakpoints of size and book-to-market sort to identify its matching portfolio. The matching portfolio's median characteristics are then compared with the issuer's.

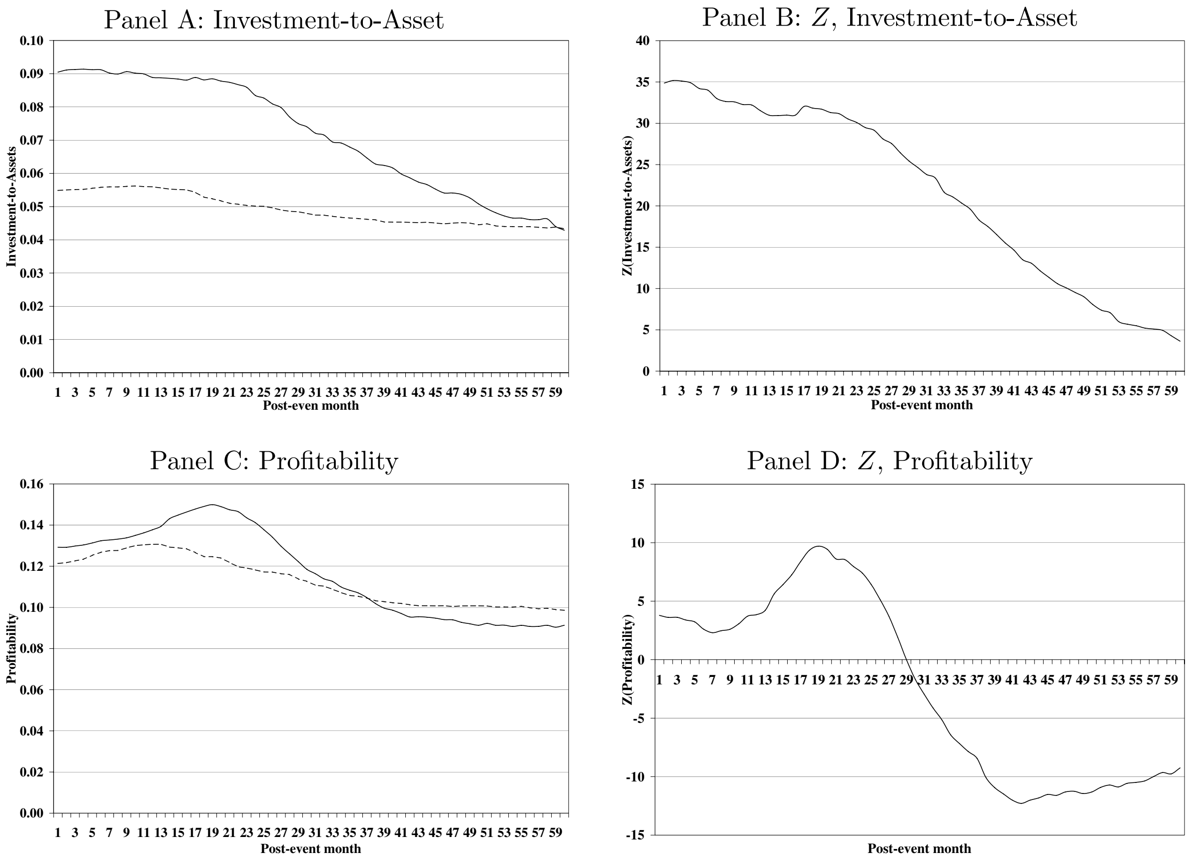


Figure 4 : The Frequency Distribution of SEOs and the New Equity-to-Asset Ratio Across Investment-to-Asset Deciles

Panel A of this figure plots the number of SEO firms in each of the investment-to-asset deciles. We measure book assets as Compustat annual item 6, and we measure capital investment as the change in item 7 (gross property, plant, and equipment). We sort nonissuing firms each year by their investment-to-asset ratios to obtain the deciles breakpoints. We then assign each SEO firm to one of the investment-to-asset deciles. Panel B reports the median new equity-to-asset ratio among issuers by investment-to-asset deciles. We measure new equity-to-asset as the market value of new equity (obtained from SDC) divided by book assets at the end of the fiscal year preceding the equity issue.

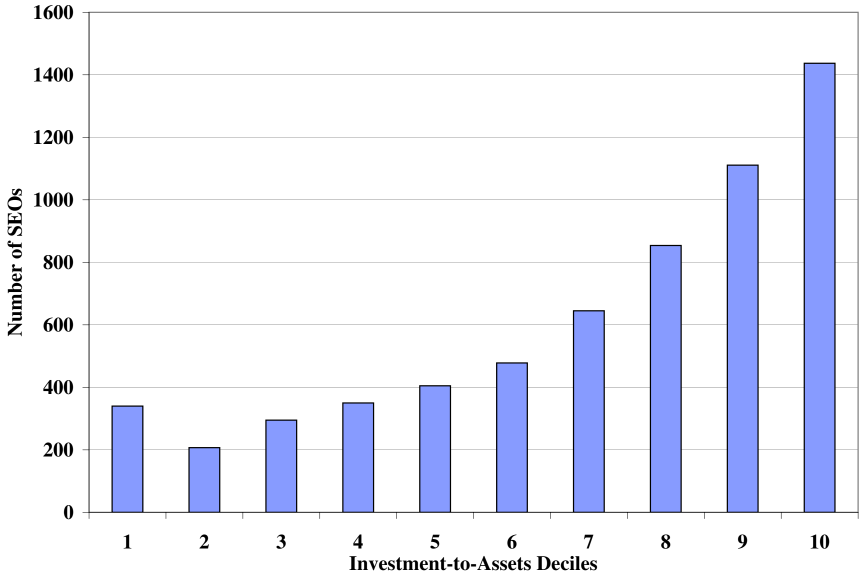


Figure 5 : SEO Firms' and Matching Firms' Market Leverage and Book Leverage During 60 Months After Equity Issuance, 1970 to 2003

This figure plots SEO firms' and matching firms' median market leverage and book leverage during 60 months after equity issuance in Panels A and B, respectively, and their corresponding Z-statistics from the Wilcoxon test for testing distributional differences in Panels C and D. Z statistics between -2 and 2 indicate failure to reject the null hypothesis of equal distribution of characteristics between SEOs and their matching firms. Month 0 is the month of equity issuance. We define book leverage as the sum of debt in current liabilities (Compustat annual item 9) and long-term debt (item 34) divided by the lagged book value of assets. The denominator of the market leverage ratio is the market value of the firm, calculated as the sum of the market value of equity (December closing price times number of shares outstanding) and the book value of debt (item 9 plus item 34). The solid lines are for issuers and the broken lines are for matching nonissuers. We use the following matching procedure. At the end of June every year, all firms that have not issued equity within the prior 36 months are sorted by their size and book-to-market equity to form 25 size and book-to-market portfolios of nonissuers. For each issuer, we use the breakpoints of size and book-to-market sort to identify its matching portfolio. The matching portfolio's median characteristics are then compared with the issuer's.