2-2021

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Published in Journal of Corporate Finance, 2020 July 27, https://doi.org/10.1016/j.jcorpfin.2020.101700

Abstract

We assume executives managing corporate financial policy consider the firm's current and target leverage, investment plans, anticipated cash flows, and consequences of alternative sequences of financing transactions, operating within efficient markets. Our analysis yields time-series and cross-sectional predictions for management of investment spending and leverage; use of maturity, priority, and convertibility covenants; and management of dividends, share repurchases, cash balances, and credit lines. Our evidence from 8608 SEOs covering 1970–2015 is consistent with implications of our theory, helps to resolve an array of issues in corporate finance, and offers a step toward a more unified analysis of rational corporate financial management.

Keywords: Capital structure, Seasoned equity offerings, Financial management, Tradeoff, Pecking-order, Market-timing

1. Introduction

In corporate finance, our theories ideally would be coherent, transparent, inclusive, and empirically verified. To date, these goals have been realized only to a limited extent. This limited success is due, at least in part, to a publication strategy within the profession of writing articles on more narrowly focused questions. Three basic theories typically are offered to explain corporate financial management: the tradeoff, pecking-order, and market-timing hypotheses. However these explanations have been criticized widely.[2] Most analyses of financial policy treat investment policy as given or completely independent and hence focus little attention on the potential interaction of a firm's investment and financing decisions. The impact of large investment projects on financing transactions is overlooked or significantly underestimated. Many assume, either explicitly or implicitly, that firm characteristics are static and that senior corporate executives exhibit some degree of myopia in making these corporate decisions. They rarely incorporate other dimensions of corporate financial management such as the maturity structure of the firm's fixed claims or corporate payout policy.

☆ We thank James Brickley, Long Chen, Sudipto Dasgupta, Paul Ellickson, Vidhan Goyal, Laurie Krigman, Mark Leary, Mike Lemmon, Laura Liu, John Long, Paul Malatesta, Dave Mauer, David Mayers, Tom Noe, Jay Ritter, Toni Whited, Janice Willett, Jerry Zimmerman and seminar participants at the 2010 AFA meetings, 2009 FMA meetings, Federal Reserve Bank of Atlanta, Hong Kong University of Science and Technology, Singapore Management University, Southern Methodist University, University of California – Riverside; and University of Rochester for helpful comments. We also acknowledge the best paper award from the NTU IEFA meeting.

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[1] Michael was working on this paper when he was killed in a tragic airplane crash in 2007. He is absolved of the paper’s shortcomings.

[2] These extant models have been criticized for an array of reasons: See Alti (2006), Carlson et al. (2006, 2010), Chang and Dasgupta (2009), Chen and Zhao (2007), DeAngelo et al. (2010), DeAngelo et al. (2011) DeAngelo and Roll (2015), Denis and McKeon (2012), Fama and French (2005), Frank and Goyal (2003), Graham et al. (2015), Hennessy and Whited (2005), Hovakimian (2006), Huang and Ritter (2009), Kayhan and Titman (2007) and Leary and Roberts (2010).

To help focus our empirical analysis of over eight-thousand seasoned equity offerings spanning forty-six years, we offer a simple descriptive theory of rational financial management. Our analysis (1) assumes that people are rational and thus financial markets are efficient[3]; (2) provides an integrated analysis of the management of both the firm's economic balance sheet and income statement; (3) incorporates a number of financial-management components – leverage, dividend, share-repurchase, maturity, priority, convertibility, and liquidity policies as well as corporate investment decisions; (4) is consistent both with the existing empirical evidence as well as new evidence that we provide; (5) analyzes a substantially larger data set and thus has more power; (6) examines both time-series and cross-sectional evidence of policy choices around these events; and (7) helps to resolve material inconsistencies within standard models of financial management.

Our analysis explains: (1) Why leverage spends most of the time away from its target level. (2) Why a firm whose current leverage is below its long-run target level might issue equity, or above it frequently issues debt. (3) How target leverage is expected to vary systematically over time. (4) Why stock prices generally rise prior to SEOs. (5) Why this pre-SEO stock-price increase does not imply having a debt offering to move leverage closer to its target while raising external capital. (6) Why estimates of the speed of leverage adjustment are so low. (7) How investment spending, leverage, dividend payments, share repurchases, debt maturity, debt priority, use of convertible securities, and cash holdings change over the time periods surrounding SEOs. (8) How these policy choices differ across firms with different investment opportunities. (9) How these choices differ across firms that operate within different regulatory environments.

We document a robust interaction between the firm's investment projects and its financing decisions. Seasoned equity offerings typically are triggered by the development of large new investment opportunies; they are more than mere leverage-adjustment transactions. In financing such an investment project – one whose funding requires raising both debt and equity – the firm's first public security sale will be an equity offering. We document such equity sales even where the firm's current leverage is below its long-run leverage target and therefore its SEO drives leverage further below this target level.[4]

To illustrate our basic argument, consider a firm whose managers have developed a large, valuable investment project and whose current leverage is below its long-run leverage target. Further assume that if the required external financing of this project were to employ debt exclusively, then prior to project completion they expect the firm would exceed its target leverage by an unacceptable margin – it would exceed the firm's debt capacity. Such a firm's next public securities sale will be an equity offering.

There are material benefits of an early SEO in financing such a project: (1) Excessive leverage distorts investment incentives (Jensen and Meckling, 1976; Myers, 1977, 1984; Smith and Warner, 1979; Myers and Majluf, 1984). By lowering leverage, an SEO reduces these potential investment policy distortions. (2) The development of this growth option reduces benefits of debt in controlling free cash flow problems (Jensen, 1986), thereby making equity financing relatively more attractive. (3) By more closely tying the SEO to the initiation of the investment project, potential information asymmetry problems are better controlled. (4) An SEO can increase tax-related benefits of the project (Hennessy and Whited, 2005).

Following SEO's, firms have additional increases in investment spending; these expenditures are financed with substantial amounts of new debt. These debt issues both complete the financing of the project as well as return the firm to its long-term leverage target. For the typical SEO firm, leverage reverts to its pre-SEO level over the following eight quarters, exceeding that level thereafter. Following an SEO, the typical firm increases its payouts to stockholders, lengthens its debt maturity, reduces its reliance on high-priority fixed claims, draws down its cash balances, and increases its use of bank credit lines. These observations are consistent with SEO firms employing funds raised to undertake large investment projects, thereby converting growth options into assets-in-place following the SEO. Our evidence suggests that firms manage their corporate financial policies in a rational, dynamic, and materially more complicated manner than that assumed by many standard capital-structure models.

Our paper is organized as follows. In Section 2, we describe our data, examine the financial condition of SEO firms, and document patterns of investment spending and leverage over thirty-three quarters around SEOs. Our evidence is inconsistent with aspects of standard textbook models. For example, firms do not wait until their debt capacity is exhausted to have an SEO, as assumed within standard tradeoff and pecking-order models. In Section 3, we describe our simple theory of rational financial management that explains our Section 2 results. We then examine additional time-series and cross-sectional implications of our analysis for leverage and investment spending around SEOs in Section 4. In Section 5, we examine implications for dividend, share-repurchase, and liquidity-management policies as well as of covenants specifying priority, maturity and convertibility over periods surrounding SEOs. We provide our conclusions in Section 6. In the Appendix, we examine stock returns and provide additional robustness checks of our results.

2. Basic evidence from SEO firms

Within this section, we describe our data and examine firms' financial condition preceding their SEOs. We then examine changes in

[3] Some have argued that SEO evidence can only be explained assuming myopic, irrational behavior on the part of various individuals. We make this assumption only to demonstrate such assumptions are unnecessary for explaining the measures on which we focus.

[4] Although in some tradeoff models, SEOs will "overshoot" target leverage to economize on flotation costs, they generally do not consider SEOs when the firm's current leverage is below target. An exception is Sundaresan et al. (2015) who develop a model in which firms exercise growth options optimally over time and finance these investments by trading off the tax benefits of debt against both distress costs and the agency costs of debt. One prediction of their model is that when future growth options are anticipated, the firm optimally chooses its initial investment and leverage to mitigate the underinvestment problem. Our evidence thus provides support for this implication of their model.

as well as levels of leverage and investment spending around these offerings.

2.1. Data

Our data are from the Securities Data Company and cover the 46-year period, January 1970 to December 2015. To select our sample we apply the following criteria: (1) We begin with all non-IPO equity issues in the U.S. where the stock is listed on the Center for Research in Security Prices monthly file at the time of the offering (14,218 SEOs); (2) We drop SEOs if newly issued shares are less than 5% of shares outstanding (➔12,530 SEOs)[5]; (3) We eliminate offerings where the book value of either assets or equity are unavailable in the COMPUSTAT fundamentals annual file for the prior fiscal year (➔ 11,136 SEOs); (4) We exclude SEOs by financial institutions (SIC code 6000–6999) (➔8608 SEOs). There are 7039 offerings by industrials and 1569 by utilities that comprise our sample of 8608 SEOs.

Fig. 1 depicts the number of SEOs by calendar year. There is substantial variation in SEO volume by industrial firms, reflecting alternating "hot" and "cold" markets. SEOs by regulated utilities (SIC code 4900–4949) also vary, but generally are more frequent before 1985. The distribution is also uneven across industries. Within our industrial firms, those in pharmaceutical-products (1048), oil (615), electronic-equipment (519), retail (420), software (382), business-services (381), and medical-equipment (305) industries generate the greatest frequency of SEOs.

Some have suggested that SEOs are such rare transactions among mature firms that their analysis offers but limited insight into corporate financial management. For example, in his presidential address to the AFA, Myers (1984), p 581 quotes Donaldson (1961), p.70 who reports:

> *Though few companies would go so far as to rule out a sale of common under any circumstances, the large majority had not had such a sale in the past 20 years and did not anticipate one in the foreseeable future.*

We believe this argument is flawed for three basic reasons: (1) Donaldson's sample is neither exhaustive nor randomly selected. (2) We observe an average of 194 SEOs (159 industrial and 35 utility SEOs) per year – 5.74% of these firm-year observations. However, many firms are within our sample for relatively brief periods. If we require at least five years of data, this percentage rises to 8.09%; it is 11.87% for firms with at least ten years of data. (We examine SEO frequency in more detail in Section 5.1.) SEOs may not be frequent, but certainly are not rare. (3) SEOs are infrequent because they are expensive; to amortize these costs, SEOs will be large transactions. We thus would argue that it is important first to understand these large, albeit somewhat infrequent transactions before turning to more frequent, less expensive and smaller transactions like public debt issues or draws on existing bank credit lines. (This is somewhat like loading your car for a trip; start with the largest items, then fit in those that are smaller.)

In Table 1 we report summary statistics for both industrial and utility SEO firms. Our SEOs are substantial financial transactions for these corporations. For a typical industrial firm, the SEO increases shares outstanding by 20.8%, and by 12.8% for a typical utility. If we proxy a firm's enterprise value by the market value of equity plus the book value of other liability-side claims, then average SEO proceeds by industrial firms are 18.7% of the issuer's enterprise value at the end of the year preceding its offering. SEOs by utilities are smaller, averaging 5.0% of their prior-year enterprise values. These measures of SEO magnitude imply a material impact on the issuing firm's capital structure.

For industrials, in the year prior to the SEO the mean market-to-book ratio of assets is 3.89 (median 2.59), hence our typical industrial SEO firm's value reflects valuable growth options. With a mean of 1.19, this ratio is notably lower for utilities. Finally, employing the Fama and French 49 industry groups (from Ken French's online data library), SEO firms typically are larger than the median firm in their industry as measured by either sales or the market (or book) value of assets in the year prior to the SEO.

2.2. Financial condition of industrial SEO firms

In Table 2 we tabulate median financial statistics for our sample of 7039 industrial SEO firms over the three years preceding their offerings. (We postpone further empirical analysis of utilities until Section 4.2.) For our typical industrial firm, market leverage decreases prior to the offering. The interest-coverage ratio rises and is close to three (which generally is deemed strong – see Stickney and Weil, 2003, 274–275). The current ratio falls, but is still greater than two. The market-to-book ratio increases over this period and is substantially greater than one. Finally, Altman *Z*-score rises and offers little suggestion that the typical SEO firm is financially distressed before the offering (bankruptcy risk is considered negligible with Z-scores above 3.0).[6]

In Table 2, we also benchmark these financial ratios of SEO firms against their respective industry medians in the year before their offerings. SEO firms typically have lower leverage, similar interest-coverage ratios, higher current ratios, higher market-to-book ratios,

[5] We also examined SEOs where the newly issues shares were greater than 1% of shares outstanding. Our basic results are unaffected by their addition.

[6] Jostarndt (2009) examines equity issues by German firms – issues that occur within a different environment than that of U.S. firms. With no court-supervised reorganization provision within their bankruptcy laws, they often are used to resolve financial distress and avoid liquidation. Franks and Sanzhar (2006) study SEOs by U.K. firms. They assume that SEO firms with negative book equity are financially distressed. If we apply their definition of financial distress to our sample, only 4.25% of our industrial firms would be financially distressed. But for this subset of our SEO firms the average market-to-book *asset* ratio is 4.45. Rather than being financially distressed, their criterion appears to identify young growth firms that have yet to generate much in the way of accounting profits (see Fu, 2006). Although some SEO firms might be financially distressed, within our U.S. data, this subset is atypical.

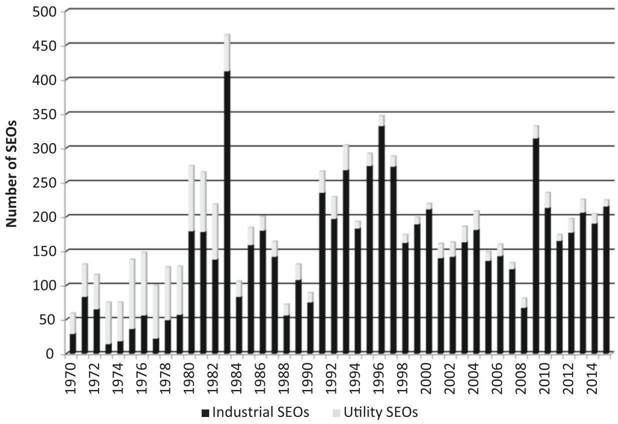

Fig. 1. The frequency of SEOs by calendar year: 1970–2015.
The base sample consists of 7039 industrial and 1569 regulated utility SEO observations in the period from January 1970 to December 2015. The raw sample is obtained from the SDC database. The following criteria are applied to select the sample: (1) the issue involves common stock only; (2) the stock is listed on the CRSP monthly stock file at the time of the offering; (3) the book value of assets and equity in the previous fiscal year are available in the COMPUSTAT fundamental annual file; (4) the company is not a financial institution (SIC code 6000–6999), and (5) newly issued shares are at least 5% of the existing shares outstanding. We plot SEOs by industrials separately from those by regulated utilities (SIC code 4900–4999).

and higher Z-scores than their industry peers; Wilcoxon tests indicate that, except for the interest-coverage ratio, these differences are statistically significant at the 1% level. Moreover, stock prices of SEO firms typically rise prior to their offerings. For example, over the six months preceding the SEOs, their buy-and-hold return exceeds the contemporaneous market return by 37%. (See Table A1 in the Appendix.)

Table 1
Summary statistics of SEO proceeds and firm characteristics.
$\Delta S/S$ is the number of new shares issued relative to the existing shares outstanding. SEO proceeds are measured by multiplying the number of new shares (ΔS) by the offer price (P). V_{-1} is the market value of assets in the fiscal year prior to the offering, as measured by the book value of asset (A) minus the book value of equity (BE) plus the market value of equity (ME). Book value of equity is COMPUSTAT's total assets, minus total liabilities, plus balance sheet deferred taxes and investment tax credit, minus liquidation, redemption, or carrying value of preferred stock if available in the order. Market value of equity (ME) is obtained from CRSP's monthly stock return file, computed as the product of share price and shares outstanding. A_{-1} is the book value of assets in the fiscal year prior to the offering. A_{ind} represents the industry median book value of assets where industry is classified into 49 groups as proposed by Fama and French. The sample has 7039 industrial SEOs and 1569 utility SEOs during 1970–2015.

Variables	Industrial SEOs			Utility SEOs		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
$\Delta S/S$	0.208	0.161	0.204	0.128	0.106	0.080
$P\Delta S/V_{-1}$	0.187	0.134	0.239	0.050	0.036	0.062
$P\Delta S/A_{-1}$	0.551	0.290	1.139	0.067	0.035	0.162
$(V/A)_{-1}$	2.752	1.824	2.456	1.067	0.954	0.609
$(ME/BE)_{-1}$	3.886	2.591	6.170	1.189	0.868	1.729
$(A/A_{ind})_{-1}$	3.524	1.024	7.882	2.923	1.409	5.225
$(V/V_{ind})_{-1}$	3.761	1.393	7.299	2.866	1.404	4.955

Table 2
The financial condition of industrial SEO firms prior to the offering.
The table reports median financial ratios of industrial SEO firms in three years preceding the SEO and Wilcoxon test results of the median differences in financial ratios between year −1 and year −3 and between the SEO firm and its associated industry median at year −1. Industry is classified into 49 groups as proposed by Fama and French.

Year relative to SEO	Market leverage	Interest coverage ratio	Current ratio	Market-to-book Assets	Altman *Z*-Score
−3	0.153	2.614	2.225	1.457	3.211
−2	0.148	2.493	2.196	1.543	3.244
−1	0.127	2.683	2.144	1.824	3.503
Diff (−1,−3)	−0.027	0.069	−0.081	0.368	0.292
(*p*-value)	(<0.001)	(0.5631)	(<0.001)	(<0.001)	(<0.001)
Diff (SEO, industry median) at −1	−0.001	−0.294	0.001	0.374	0.168
(*p*-value)	(<0.001)	(0.086)	(<0.001)	(<0.001)	(<0.001)
Number of SEOs	7039	6536	6871	7039	6848

In his discussion of the pecking order Myers (1984), p. 581 states:

> *If external finance is required, firms issue the safest security first. That is, they start with debt, then possibly hybrid securities such as convertible bonds, then perhaps equity as a last resort.*

But our evidence indicates the financial condition of our typical industrial SEO firm is reasonably robust, generally improving, and typically stronger than its industry peers. These statistics simply do not appear to describe a firm that is exercising its financing alternative of "last resort".

DeAngelo et al. (2010) observe that 62.6% of issuers in their SEO sample would run out of cash by the year after the SEO absent the offer proceeds; they conclude that a near-term cash requirement is the primary SEO motive. However we believe this causality should be reversed. The SEO process takes some time – engaging an investment banker, analyzing the firm's demands for external financing, preparing and filing a registration statement, waiting for SEC approval, conducting road shows, etc. If a firm is expecting a large cash inflow within a few months, its incentive to maintain a normal level of cash balances, and concerns about large draws against its line of credit, fall substantially. In other words, low cash balances do not prompt the SEO; it is the anticipation of the SEO that makes the (short-term) lower level of cash holdings and larger draws against credit lines optimal. Furthermore, they do not discuss the implication of substantial increases in investment following the SEO.

2.3. SEOs and investment spending

Comparing SEO firms with control firms — the COMPUSTAT firm within its industry matched on its market-to-book asset ratio in the fiscal year prior to the SEO — the magnitude of their post-SEO investment spending increases significantly during years 0 to 2. This increase is 4.0% of the market value of assets (7.5% of book assets). We measure investment as the sum of capital expenditure, acquisition expenses, and increases in long-term financial investments. (Our results are robust to excluding acquisition expenses and long-term financial investments or including research and development expense, advertising expense, and rental expense.) In Fig. 2 we depict the time series of investment to enterprise value for our industrial SEO firms over the 33 quarters around their SEOs – from 12 quarters before to 20 quarters after the SEO.

As depicted in the upper-right panel of Fig. 2, there is a substantial increase in average investment spending beginning in the SEO quarter. For our median firm, this represents a 70% increase in annual investment spending following the SEO. Primarily as a result of this large increase in investment spending, our median SEO firm increases the book value of its assets by 56.3% over the period from one year before to two years after the SEO. Moreover, the distribution of these ratios is positively skewed – the differences in means are even greater.[7] (In Appendix Table A2, we tabulate the post-SEO investments relative to control firms in the same industry with similar market-to-book asset ratios.)

Note that DeAngelo et al. (2011), p 56 also identify this substantial increase in investment spending:

> *We define an investment spike as an annual capital expenditure outlay (divided by beginning-of-year total assets) that is two or more standard deviations above the mean for the firm's two-digit* SIC *code industry.*

However, note two things: (1) Because they employ annual data, they are unable to recognize that for the typical industrial firm the quarter of the investment increase and that of the SEO coincide and (2) The level of investment spending continues to increase over at least the following twenty quarters. Our evidence suggests that the pattern of investment spending around SEOs might be more appropriately described as a "step" than a "spike".

To examine the role that merger and acquisition activity might play in this substantial increase in investment spending, first note two facts: (1) A cash merger or tender offer financed with the proceeds of an SEO would produce a spike in investment spending, not the sustained increase that we observe. (2) Firms that engage in stock mergers, in which the shareholders of the target firm receive shares in the bidding firm, are not classified as SEOs within our data.

To examine this issue explicitly, in Fig. 2 we depict investment spending both including and excluding SEO firms' acquisition expenses. Excluding them lowers the rate by 60 basis points in the SEO quarter and by 200 basis points over the 20 post-SEO quarters. (See also Appendix Table A3 in which we tabulate the number of M&A transactions where cash compensation exceeds 5% of the SEO firms' equity over the twenty quarters following the SEO.) We conclude that: (1) merger activity plays a small albeit significant role in this observed increase in investment spending that occurs in the SEO quarter and (2) SEO firms tend to be active in the M&A market thereafter.

2.3.1. Potential statistical problems

Within the SEO literature, frequently discussed motives include adjusting capital structure, resolving near-term liquidity problems, reducing bankruptcy risk, and timing the market. Surprisingly, this substantial and sustained increase in investment spending beginning in the SEO quarter has garnered little attention. We believe that this oversight has occurred, at least in part, because this

[7] Our findings that SEOs are associated with greater expected investment complement those of Fu (2006), Kim and Weisbach (2008) and Walker and Yost (2008). Fu examines four potential uses of SEO proceeds: retire debt, increase cash holding, increase non-cash working capital, and increase investment spending. He concludes that although some SEO firms might use part of the proceeds for the other three purposes, increasing investment spending appears to dominate in economic magnitude in explaining the use of SEO proceeds. Walker and Yost examine 438 SEOs and find that these firms substantially increase R&D and capital expenditures after the SEO. Kim and Weisbach examine the uses of proceeds from a large sample of IPOs and SEOs across 38 countries and conclude that financing investment spending is the primary motivation for equity offers.

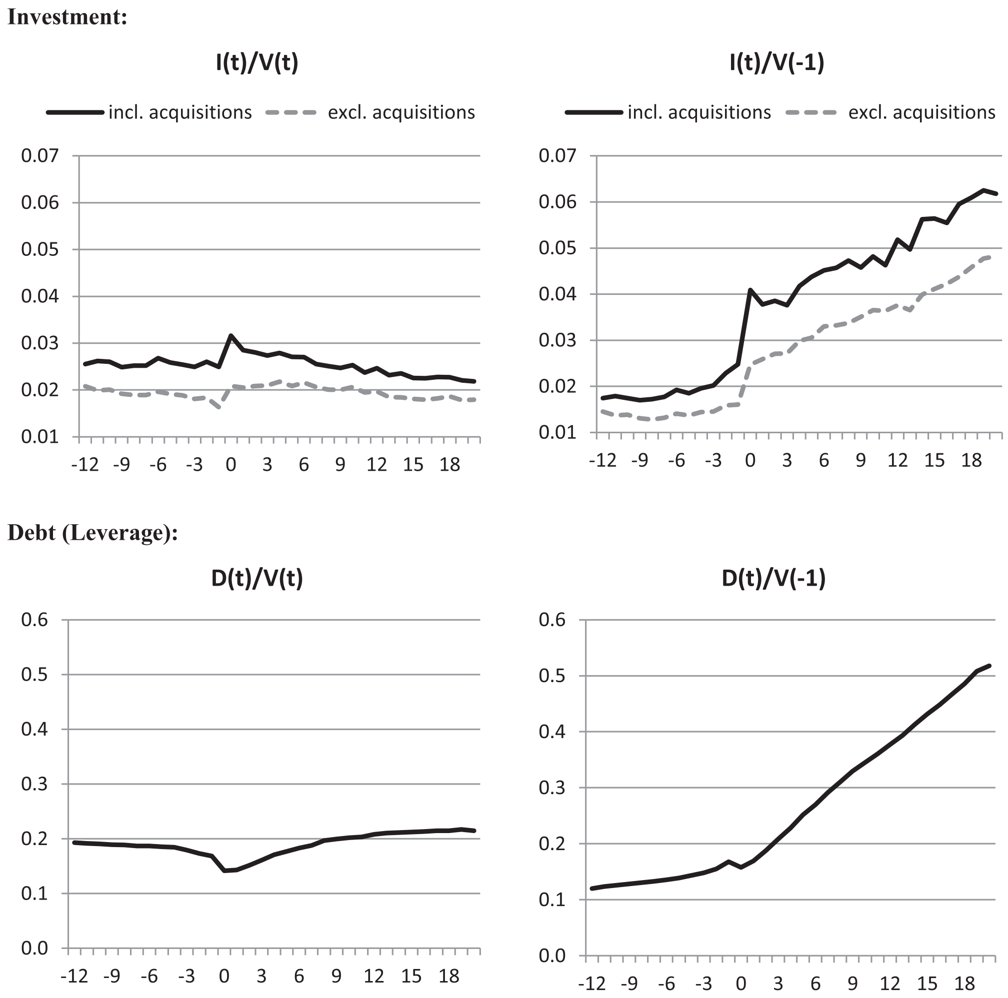

Fig. 2. Investment and leverage surrounding the SEO.
SEO firms' mean quarterly investment, I(t), and debt, D(t), respectively deflated by (1) the contemporaneous market value of assets, V(t), and (2) the market value of assets in the quarter prior to the SEO, V(−1). The time horizon is from 12 quarters before the SEO to 20 quarters after the SEO. Investments at quarter t, I(t), include capital expenditure, and if available, acquisitions and increase in investments. Debt, D(t), include both long-term debt and debt in current liabilities. The market value of assets is approximated as the sum of the book value of debt and the market value of equity.

increase is obscured using standard statistical methods. In empirical analyses of corporate financial policies, there are understandable concerns about heteroscedasticity – in our context, large firms generally have both large investment programs and large SEOs, while small firms have small investment programs and small SEOs. To deal with this potential statistical problem, researchers typically scale their observations employing some measure of firm value. But there are at least two ways that one might do so: (1) Divide by the contemporaneous market value of the firm's assets or (2) Divide by the market value of the firm's assets in a period prior to the SEO. The resulting graphs are depicted in the upper panels of Fig. 2. Although either normalization should control for heteroscedasticity, these resulting time series appear quite different.

When employing contemporaneous market values as a normalizing factor, that is, both numerator and denominator are changing, the large increase in investment spending is more difficult to identify (as in the upper-left panel of Fig. 2). But in the upper-right panel where the denominator, firm value is held fixed at its pre-SEO level, this material increase in investment spending starting from the SEO quarter becomes apparent.

2.4. SEOs and leverage changes

In the lower panels of Fig. 2, we depict leverage from 12 quarters before to 20 quarters after the offering. We measure leverage as debt divided by the firm's enterprise value discussed above. Debt is the sum of long-term debt and debt in current liabilities from

COMPUSTAT. We proxy the market value of debt by its book value; in our case, this proxy appears further justified by the generally robust financial condition of our SEO firms.

2.4.1. Leverage changes preceding SEOs

As depicted in the lower-left panel of Fig. 2, until three quarters before the offering, the mean market leverage of industrial SEO firms declines slowly from 19.3% to 18.4%. This decline then accelerates. These reductions are driven by an increase in the denominator — the economic value of the firm. This explanation is confirmed by comparing these two lower panels: In the right panel where we hold the denominator fixed, debt outstanding actually rises over this period (see also Appendix Table A4). Also note the typical industrial SEO firm's stock price increases by 37% over the six months prior to the SEO (see Appendix Table A1).

This relation between pre-SEO stock-price increases and SEOs is recognized by Myers (1984), p.586 who notes that when firms seek external finance:

> *[T]hey are more likely to issue stock (rather than debt) after stock prices have risen than after stock prices have fallen… This fact is embarrassing to static-tradeoff advocates. If firm value rises, the debt-to-value ratio falls, and firms ought to issue debt, not equity, to rebalance their capital structures. The fact is equally embarrassing to the pecking order hypothesis.*

Yet as McConnell and Muscarella (1985) report, large investment projects typically are preceded by news of their development; as a consequence, stock prices rise. This reduction in economic leverage prior to the SEO thus reflects the disclosure of information regarding the development of these firms' new investment opportunities (see also Carlson et al., 2006, 2010). Our analysis confirms that this pre-SEO reduction in economic leverage and the SEO itself are not separable observations – they both are driven by the development of this large, valuable growth opportunity.

Note that the market-timing hypothesis presumes that this pre-SEO increase in stock prices is evidence of mispricing. Baker and Wurgler (2002) assume that, as in insider trading, managers' informational advantage provides an opportunity to sell over-valued shares to less-informed investors. But this argument ignores the profound difference between insider trades and SEOs: Insider trades are disclosed only after the transaction. SEOs are announced before. As Akerlof's (1970) analysis implies, this prior announcement effectively undermines their assumed method of profiting from the information asymmetry.

2.4.2. Leverage changes at SEOs

Average market leverage falls from 16.8% in the quarter before the SEO to 14.1% at the end of the offering quarter. (For book leverage the comparable numbers are 26.3% and 20.2%.) This reduction should not be surprising since SEOs by industrial firms increase their equity materially - as we noted in Table 1, the number of new shares typically exceeds 20% of shares outstanding. This leverage reduction in quarter 0 thus is largely mechanical.[8]

2.4.3. Leverage changes following SEOs

As depicted in the lower-left panel of Fig. 2, this reduction in economic leverage is temporary. For our typical industrial SEO firm, leverage reverts to its pre-SEO level within eight quarters following the offering. In Appendix Table A4 we report that mean market leverage twelve quarters before the SEO is 19.3%; it is 19.7% at the end of quarter eight and continues to rise; it reaches 21.5% by quarter twenty.

Depicted in the lower-right panel of Fig. 2, our other leverage measure – debt divided by the market value of the firm's assets in the period prior to the SEO – highlights substantial increases in net debt issuance following the SEO. By twenty quarters following the SEO, the typical industrial SEO firm's outstanding debt is over three times its level at the end of quarter 0. In Table 3A we tabulate summary statistics on the change in total debt outstanding following SEOs. During each of the three post-SEO years, the average change in debt by SEO firms is 6.6% of V_0, cumulating to 21.1% of V_0 over these twelve quarters.

These observations have important implications for aspects of extant analyses of financial management: (1) The typical SEO firm is far from exhausting its available debt capacity as assumed within standard trade-off and pecking-order models. In fact, it has low leverage compared either to its historical leverage or that of other firms within its industry. (2) The stock-price increases preceding SEOs do not appear to cause the SEO as assumed in the market-timing hypothesis. Rather both appear to be a consequence of the development of a valuable growth opportunity. (3) Asquith and Mullins (1986) argue that the negative stock price reaction to the SEO announcement implies that "a substantial portion of the proceeds of an equity issue, in effect, comes out of the pockets of old shareholders." However, the development of this growth option produces not just the SEO and the pre-SEO stock price increase but an increase in the information-asymmetry between the firm and investors as well. It is difficult, therefore, to disentangle this potential cost of an SEO from the value of its motivating investment. (4) The typical firm systematically increases its leverage after its SEO, a fact inconsistent with the assumption within the market-timing model that firms have no leverage target and thus do not adjust leverage subsequently.

3. Rational financial management

We highlight the fundamental forces in explaining our reported empirical results. In our explanation, we assume: (1) Individuals

[8] Note that this fall in market leverage in the event quarter occurs despite the typically negative abnormal return at the announcement of the SEO; as we report in Appendix Table A1, our average announcement-period abnormal return is −2.20%.

Table 3
Debt changes and target leverage deviation after SEOs.

Panel A: Summary statistics. $(D_t - D_0)/V_0$ is the total change in debt outstanding in t quarters after the equity offering deflated by the market value of assets at the end of the SEO quarter. Proceeds/V_0 is the SEO proceeds deflated by the market value of the issuing firm at the end of the SEO quarter. TGT stands for the target leverage, computed as the mean market leverage from Quarter −12 to Quarter −3.

Variables	Mean	*t*-stat	Q1	Median	Q3	Std. Dev.	N
$(D_4 - D_0)/V_0$	0.066	26.06	−0.002	0.003	0.078	0.201	6316
$(D_8 - D_0)/V_0$	0.143	28.37	−0.001	0.028	0.173	0.381	5714
$(D_{12} - D_0)/V_0$	0.211	28.98	0.000	0.055	0.250	0.521	5121
Proceeds/V_0	0.123	96.12	0.063	0.099	0.154	0.104	6613
$D_0/V_0 - TGT$	−0.032	−22.96	−0.081	−0.013	0.006	0.109	6268

Panel B: Fama/MacBeth regressions of debt changes on leverage deviation and SEO proceeds.
The dependent variable is the change in debt during the t quarters following the SEO quarter deflated by the market value of assets at the end of the SEO quarter, $t =$ 4, 8, or 12. The explanatory variables are the difference between the leverage at the end of the SEO quarter and the mean leverage from Quarter −12 to Quarter −3, and the SEO proceeds deflated by firm value at the end of the SEO quarter. Cross-section regressions are run for each year during 1970–2015. The table reports the average intercepts and slopes (across years) of the regressions. The associated t-statistics for the means, computed as the time-series mean divided by its standard error, are reported in parentheses. N is the average number of SEO observations and R^2 is the average R-squared of the yearly regressions

Dep. Var.	$(D_4 - D_0)/V_0$			$(D_8 - D_0)/V_0$			$(D_{12} - D_0)/V_0$		
Intercept	0.060	0.029	0.028	0.131	0.051	0.051	0.195	0.077	0.076
	(13.79)	(4.08)	(3.99)	(14.26)	(4.92)	(5.19)	(13.44)	(5.15)	(4.86)
$D_0/V_0 - TGT$	−0.141		−0.096	−0.259		−0.202	−0.263		−0.210
	(−4.40)		(−3.35)	(−3.66)		(−3.37)	(−2.51)		(−2.43)
Proceeds/V_0		0.386	0.372		0.646	0.590		0.731	0.698
		(4.63)	(4.49)		(6.71)	(6.97)		(6.57)	(6.52)
N	155	155	155	145	145	145	134	134	134
R^2	3.29%	6.00%	8.57%	4.54%	11.12%	14.14%	4.41%	15.28%	18.23%

are rational and hence markets are efficient; (2) The corporate board of directors approves policy decisions that they expect will maximize long-run share value; (3) There are important information asymmetries both between corporate executives and outside investors; (3) The CFO evaluates the costs and benefits of debt in deriving a long-run target leverage. This leverage target takes into consideration factors such as the firm's investment opportunity set, tax circumstances, and regulatory status; (4) The CFO establishes both a leverage target and a debt capacity for the firm, policy parameters that require board ratification; and (5) Costs associated with public securities sales exhibit fixed costs and scale economies.

3.1. *The financial management objective*

The board delegates decision-management rights to corporate executives but retains decision-control rights.[9] Thus, even though corporate executives have policy-initiation rights with respect to corporate investment, financing, and payout policies, major decisions involving these policies require board ratification. We assume that the board ratifies decisions that they expect will maximize their estimate of the firm's long-run share value.[10]

3.2. *Target capital structure*

3.2.1. *The IOS and target leverage*

A major determinant of a firm's leverage target is the composition of its investment opportunity set (IOS). Myers (1977) argues that with more intangible growth options within its IOS, holders of a firm's outstanding risky debt potentially capture enough benefits from undertaking a positive net present value project that the cash flows left for stockholders fail to offer a normal return given the project's risk. Stockholders thus would choose not to invest in the project even if its NPV is positive. He labels this incentive problem between stockholders and debtholders the underinvestment problem; it is exacerbated by higher leverage. In addition, Jensen (1986) defines free cash flow as the firm's internally generated cash flow in excess of that required to fund available positive NPV projects. To

[9] Fama and Jensen (1983) divide the decision-making process into four steps: initiation, ratification, implementation, and monitoring. They characterize initiation and implementation as decision-management rights, ratification and monitoring as decision-control rights.

[10] Although the board undoubtedly lacks much of the detailed information that managers possess and hence this control by the board is certainly less than perfect, there are at least four aspects of this relationship that constrain management's ability to exploit their informational advantage: (1) The board has access to both public and non-public information as inputs in ratifying management proposals. (2) Executives and the board engage in repeated interactions. (3) The board's authority includes the rights to amend or reject management proposals as well as to postpone the ratification decision until additional information is provided. (4) The board has the authority to set compensation levels and fire corporate executives. Executives withholding critical information or recommending or undertaking actions that are self-serving invite what Fama (1980) terms "ex post settling up". Therefore, although CEOs and CFOs initiate investment and financing policy proposals – decision rights that obviously provide some latitude in their structuring – this discretion is bounded.

maximize value, the firm must disgorge free cash flow. But because some executives derive private benefits from managing larger firms, they may be reluctant to distribute all these funds. Jensen labels this incentive problem between the firm's managers and stockholders the free-cash-flow problem. Increasing target leverage, thereby committing managers to ongoing interest and principal payments, provides more effective control of this free-cash-flow problem.

For a firm whose value primarily reflects that of its long-lived tangible assets, target leverage will be high. This asset-intensive firm, which generates substantial cash flows but faces limited profitable investment opportunities, incurs low underinvestment costs but garners high free-cash-flow benefits of debt. In contrast, a firm whose value primarily reflects that of its intangible growth opportunities has little internally generated cash. Thus, free-cash-flow benefits of debt are low, underinvestment costs are high, and consequently its long-run target leverage is low.

Many discussions of a firm's target leverage however presume that it is constant. But even if some factors that determine target leverage, such as tax circumstances and regulatory status, were generally stable in the *long-run*, in the *short run*, the development of a firm's investment opportunities are more random, which also would affect the firm's target leverage and financing decisions.

3.2.2. *Capital-acquisition costs*

If accessing external capital markets were costless, the board would authorize the firm's CFO to engage in debt and equity offerings – or repurchases – to maintain the firm's leverage at its target level continuously. But accessing external capital markets is far from inexpensive. Therefore, the structure of these costs—encompassing agency, information, and out-of-pocket transactions costs—represents an important constraint on its financing decisions.[11]

Evidence on the cost structure for accessing capital markets suggests that there is a substantial fixed component as well as material scale economies.[12] However, the magnitude of these costs varies among different transactions as well as across different transaction sizes. In raising external capital, public equity offerings incur both the largest out-of-pocket fixed transactions costs as well as the largest information-asymmetry costs, but they also have the most pronounced scale economies. Long-term public debt issues have the next largest fixed costs. Short-term private debt, especially debt available through draws on an established line of credit, have the lowest fixed costs and the least pronounced scale economies. Therefore, a public securities offering, especially SEOs, generally will be large in order to amortize these costs.

3.2.3. *Corporate debt capacity*

Our discussion of target leverage and adjustment costs suggests a natural definition of a firm's debt capacity: The amount of debt a firm could issue before the opportunity cost of exceeding its long-run leverage target would exceed its cost of adjusting by having an SEO. Debt capacity is thus the upper limit of the set of optimal leverage choices for the firm, given its current circumstances and cost structures associated with its potential financial transactions.

3.3. *Sequencing capital-acquisition transactions*

Growth opportunities rarely arrive in a smooth, predictable flow; major corporate decisions, such as to produce and distribute a new product or enter a major new geographic market, frequently involve large, indivisible investments.[13] Moreover, these large projects generally involve investment spending occurring over a number of quarters. We assume the CFO will employ available information about the firm's anticipated investment opportunities, internally generated funds, and existing financial commitments to forecast its external funding requirements. For our purposes, it is convenient to define a "large" investment project as one that would cause the firm's aggregate financial deficit to exceed its available debt capacity over the period required to complete the project. (Recall that within our data, the median net increase in the market value of assets from the year prior to the SEO to two years following the SEO is 31.5%.) Therefore, to avoid breaching its debt capacity in financing such an investment project, this firm must raise both debt and equity. Its CFO thus faces a basic decision as to the sequence of financing transactions— whether equity followed by debt, or some other sequence.

In financing a large project, standard models of financial management generally assume that, unless the firm is near its debt capacity, it initially would issue debt. But in addition to being inconsistent with our evidence depicted in Fig. 2, we believe that this argument is flawed for several reasons: (1) A rational CFO should be equally interested in the firm-value implications of financing decisions and investment decisions. It is difficult to believe that managers can assess the present value of investment-project cash flows – decisions which are regularly initiated by lower-level managers – but are unable to assess those of its financing alternatives – decisions which are universally initiated by the firm's most senior, most experienced, and most highly compensated executives. (2) Using debt initially and issuing equity only when the firm's debt capacity has been exhausted increases expected underinvestment costs.

[11] Others also have noted the importance of these costs. For example, see Fischer et al. (1989), Barclay and Smith (2005), Leary and Roberts (2005), and Strebulaev (2007).

[12] For example, Smith (1977) reports that percentage flotation costs fall with SEO proceeds. Altinkilic and Hansen (2003) also show that SEO discounting falls with offer size, suggesting the existence of economies of scale. Blackwell and Kidwell (1988) report fixed costs and scale economies in public debt markets.

[13] Barclay and Smith (2005) argue that if a firm's growth opportunities were of a uniform size, were developed at a constant rate, and for simplicity, there were no uncertainty, this firm's investment spending would be financed with new debt until the firm reached its debt capacity. It then would have an SEO and the process would begin anew. In this simple case, the firm's leverage would trace a saw-tooth pattern over time.

Executives would be more likely to abandon this positive NPV project prior to its completion – or shift to a less valuable but less costly alternative – if there were a fall in either the market value of the firm or the forecasted value of the project (Myers, 1977). For this reason, an SEO at the beginning of spending on the project better controls potential underinvestment problems. (3) With the addition of growth options to the firm's investment opportunity set, free-cash-flow problems are less severe, thus lowering this benefit of leverage and making an SEO relatively more attractive (Jensen, 1986). (4) If firm value increases through the development of a material new growth opportunity, both target leverage and debt capacity fall in the short run (Barclay et al., 2006). As a consequence, in raising external capital to finance a large growth opportunity, the CFO has additional incentives to have an SEO first, thereby both reducing leverage and generating additional debt capacity. Subsequently, as the growth option is exercised, this intangible growth opportunity is transformed into tangible assets, increasing both the firm's short-run leverage target as well as restoring its debt capacity. (5) As both Myers (1984) and Baker and Wurgler (2002) argue, investors worry that a firm's managers will issue equity when their non-public information implies its equity is overvalued. By more closely tying the announcement of the SEO to that of the investment project, this adverse-selection problem arising from the information asymmetry between managers and investors is better controlled. (6) An SEO followed by debt issues increases potential tax-related benefits of the project and based on such tax considerations debt issues preceding equity offerings should be rare (Hennessy and Whited, 2005).

By initially having an SEO, the firm more creditably bonds these future investment expenditures. From the equityholders' perspective, better control of the underinvestment problem raises expected cash flows and as a result, equity values. From the lenders' perspective, the firm's leverage is lower, its default risk is lower, and hence its debt can be priced on more favorable terms. These lower borrowing rates further increase expected cash flows to equity holders.

3.4. Additional implications for target adjustment behavior

Shyam-Sunder and Myers (1999) conclude that:

> *If our sample firms did have well-defined optimal debt ratios, it seems that their managers were not much interested in getting there.*

Incorporating the structure of capital acquisition costs and events that change the firm's short-term leverage target appears to go a long way toward resolving this apparent tension between a firm having a long-term target leverage yet observing substantial deviations from that target. After all, the cost of a short-term deviation below the target is rather limited, especially when the cost is primarily loss of an interest tax shield for a not-yet-profitable growth firm and less effective control of free cash flow problems following the development of a large valuable growth option.

With a large investment project, a firm would issue equity even if its current leverage were below its long-run leverage target. The CFO would plan to follow this equity offering with debt issues sized to return the firm to its new long-run target leverage. Conversely, even if leverage were above target, a debt issue might well be a firm's best financing alternative, so long as the required debt financing would fail to exhaust the firm's available debt capacity. Our analysis thus helps resolve the reportedly anomalous result in Hovakimian (2004). He argues that basic tradeoff models imply that debt issues should move the firm toward its target but his empirical analysis suggests that: (1) Typical debt issues are not explained by deviations from target leverage. (2) They frequently result in leverage ratios above the target. Within our framework, these observations pose no anomaly so long as the debt issue fails to breach the firm's debt capacity (see also DeAngelo et al., 2011, and Denis and McKeon, 2012).

Because a CFO weighs capital-acquisition costs against the anticipated benefits of actively adjusting leverage, this fundamental tradeoff yields several implications: (1) Larger adjustment costs should lead to larger deviations from target leverage. As a result, seasoned equity offerings are relatively rare corporate financing transactions while draws on established credit lines are quite common. (2) With fixed costs and scale economies in public equity offerings, smaller firms should tolerate larger deviations from their leverage targets than larger but otherwise similar firms. (3) Between SEOs, firms will employ internally generated funds first, then draw on bank credit lines until its outstanding balance is large enough to justify the fixed costs of a public debt issue. Furthermore, part of the issue proceeds will be used both to replenish cash balances and pay down its outstanding credit-line balance. (4) Given the oversight and additional disclosure mandated within the regulatory process, both underinvestment and information-asymmetry costs are lower within regulated utilities. These lower costs imply that utilities should have smaller SEOs and consequently smaller deviations from their leverage targets than industrial firms. (5) In empirical examinations of a corporate financing decision, it is useful to aggregate the data across a large population of transactions to average out the discrete changes in capital structure driven by these fixed costs and scale economies associated with other financing decisions surrounding the event of interest.[14]

3.4.1. On the use of partial-adjustment models

Fama and French (2002), Flannery and Rangan (2006), and Huang and Ritter (2009) employ variants of the partial-adjustment model to examine the leverage adjustment process. Underlying these models is the assumption that in each period the firm adjusts leverage by some fraction of the distance between current leverage and a fixed leverage target. Coefficient estimates derived from employing these models generally have been small. For example, Fama and French (2002) p. 24 conclude that:

> *The mean reversion of leverage is, however, at a snail's pace, 7–10% per year for dividend payers, and 15–18% for non-payers.*

[14] For example, a CFO might draw on the firm's line of credit until its outstanding balance is large enough to justify incurring the fixed costs of a long-term public debt offering. If the proceeds from this public debt issue were used primarily to pay down its outstanding credit-line balance, this transaction would have a negligible impact on the firm's leverage, but would generate a discrete change in the maturity structure of its debt.

Our analysis implies that in this application the partial-adjustment model is mispecified for several reasons: (1) For a partial-adjustment strategy to be optimal, adjustment costs would exhibit insignificant fixed costs and material scale diseconomies. But evidence indicates the opposite – these costs have a substantial fixed component and exhibit scale economies. (2) We document SEOs where current leverage is below target and debt offerings where leverage is above (see also DeAngelo et al., 2011). (3) Target leverage is not constant; between SEOs the expected change in leverage is positive (see Section 5.1). Given this misspecification, caution must be exercised in interpreting coefficient estimates derived from employing a partial-adjustment model.

4. Leverage, investment spending and SEOs

In our discussion of Fig. 2 we document several facts about leverage and investment spending around SEOs: (1) There is a substantial increase in investment spending beginning in the SEO quarter. (2) This typically is followed by additional investment increases over at least the next five years. (3) Stock-price increases are the major driver of the fall in economic leverage prior to the SEO. (4) Primarily from the equity infusion at the SEO, leverage falls further. (5) Thereafter, leverage increases due to new debt issues. These observations are consistent with our model of rational financial management. We now examine other implications of our analysis.

4.1. Evidence from industrial firms

4.1.1. Size of subsequent debt issues

Because debt and equity are substitutes as sources of external capital, a CFO facing large capital requirements should adjust in both dimensions. This implies that the further the SEO pushes leverage below its target, the more debt the CFO should be planning to issue thereafter.[15] We use the mean market leverage of the issuing firm during quarters −12 to −3 as a proxy for its long-run target leverage. (Our results are robust to employing book leverage or the predicted leverage ratio based on the cross-sectional regression on firm size, the market-to-book asset ratio, the proportion of tangible assets, profitability, and an industry dummy as an instrument for target leverage – see Appendix Table A5). We exclude the two quarters immediately before the SEO to limit any effects of abnormal stock price changes on our estimated leverage target (although their inclusion changes none of our basic results). Statistics tabulated in Table 3A indicate that the typical industrial SEO firm is below our proxy for target leverage by 3.2 percentage points at the end of the offering quarter. (Repeating this process, but employing accounting measures, the average estimated deviation is 4.8 percentage points.)

To examine the relation between the firm's deviation from its leverage target at the end of the SEO quarter and the magnitude of post-SEO debt issuance, we run Fama and MacBeth (1973) regressions.[16] Our dependent variable ($(D_t - D_0)/V_0$) is the change in debt outstanding during the four, eight, and twelve quarters following the SEO, deflated by the market value of the firm's assets at the end of the SEO quarter. The explanatory variable is our proxy for the deviation between the observed market leverage and target leverage at the end of the SEO quarter [$(D_0/V_0) - TGT$]. Our results are tabulated in Table 3B. The estimated coefficients are negative and statistically significant for each regression; it is −0.141 for $(D_4 - D_0)/V_0$, -0.259 for $(D_8 - D_0)/V_0$, and − 0.263 for $(D_{12} - D_0)/V_0$. Our estimated coefficients imply that a $100 increase in the difference between actual and target debt at the end of the SEO quarter increases the size of the net debt issued over the next four quarters by $14.10. This increases to $25.90 and $26.30 if we extend our adjustment period to eight and twelve quarters, respectively.[17] (Alternatively, if we use the deviation from target book leverage as our explanatory variable, and also deflate our dependent variable — the change in total debt — by the book value of assets, the coefficient estimates for the deviation variable are −0.158, −0.298, and − 0.296, for four, eight and twelve quarters respectively – see Appendix Table A5A.) These estimates suggest that essentially all the leverage adjustment occurs in the eight quarters following the SEO.

In our Table 3 regressions we also examine SEO proceeds deflated by the firm's economic value at quarter 0. The coefficient estimate from this regression is 0.386 for the first four quarters and increases to 0.646 and 0.731 if we extend our interval to eight and twelve quarters, respectively – each statistically significant at the 1% level. Our estimates suggest that for every $100 of new equity raised, the typical SEO firm will raise an additional $38.60 of debt in the year following the SEO and an additional $73.10 over the three post-SEO years. (Using book values, the corresponding estimates are $14.00, $32.10, and $49.10 – see Appendix Table A5A.) Although including both variables raises multicollinearity concerns – *t*-statistics fall even though R^2 increases — each coefficient

[15] Note that this should be contrasted with the market timing theory that explicitly assumes that the firm has no leverage target and thus there should be no relation between the size of the SEO and that of subsequent debt issues.

[16] A number of prior studies of capital structure use either cross-sectional regressions or panel regressions and therefore ignore the correlation of regression residuals across firms. Cross-correlation causes the standard errors of average slopes to be understated and thereby significance is overstated. Since SEOs tend to cluster in certain periods, this cross-correlation is potentially a severe problem. The average slopes from Fama/MacBeth regressions are like the slopes from a pooled time-series cross-section regression that weights years equally and uses annual dummies to allow the average values of the variables to change over time. Fama/MacBeth standard errors account for the cross-correlation of residuals and thus are robust (see Fama and French, 2002).

[17] Our regression specification presumes that at the culmination of this project, leverage is expected to be at target. But since these projects will vary in their time both to implementation and between SEOs, this is unlikely to be correct. Therefore, using our proxy for target leverage introduces measurement error in our dependent variable. This would introduce an attenuation bias, which would cause our coefficient estimates to be understated. Nonetheless, they are still significant for each of our regressions.

remains statistically significant.

4.1.2. SEOs and investment opportunities

Other considerations might delay a CFO's decision to issue additional debt following an SEO. For example, growth SEO firms typically raise more capital through the equity offering than immediately required, holding a portion of these funds as cash to finance future expenditures (we examine this hypothesis in Section 4.5). Because such firms would have fewer immediate requirements for additional external capital, their incentives to issue debt following the SEO are lower.

To examine this hypothesis, we divide our sample of industrial SEO firms into three groups based on a measure of each firm's investment opportunity set. For its IOS classification, we use the firm's market-to-book asset ratio at the end of the fiscal year prior to the offering. We classify the firm as a growth firm if its market-to-book ratio falls within the highest third of COMPUSTAT firms (excluding utilities and financial firms) in that year, and an asset-intensive firm if it falls within the bottom third. On this basis, 62% of our industrial SEO firms are growth firms and only 10% are asset-intensive firms. In Table 4 we report the change in debt for the four, eight, and twelve quarters following the SEO for each IOS group. As we hypothesize, the increase in debt by our growth firms over the four, eight or twelve quarters after the SEO is lower than that for our asset-intensive SEO firms.

4.1.3. The IOS and investment spending

In the upper-left panel of Fig. 3 we reproduce our investment measure for our industrial SEO firms from the upper-right panel of Fig. 2. In the upper-right panel, we depict this data for our three subsamples of industrial firms based on their investment opportunity sets. For each group, there is a material increase in investment spending in the SEO quarter. This figure suggests that there is relatively modest variation in investment spending across these three IOS groups, although our asset-intensive SEO firms appear to increase their investment spending by more than our growth firms. We also find that asset-intensive SEO firms tend to have weaker financial ratios than their respective median industry peers prior to the SEO, but for growth SEO firms, they are stronger. Moreover as we report in Table 5, unlike the typical growth SEO firm, the financial condition of the typical asset-intensive SEO firm deteriorates prior to the offering. We confirm the pattern using diff-in-diff tests. Collectively, this evidence is consistent with the typical asset-intensive firm being nearer its debt capacity at the time of the SEO than the typical growth firm.

4.1.4. The IOS and leverage

In the lower-right panel of Fig. 3, we examine the relation between the firm's investment opportunity set and leverage. Our growth SEO firms have significantly lower leverage ratios than their asset-intensive peers – in the quarter prior to the SEO our growth firms' leverage averages 7.5% versus 35.2% for our asset-intensive firms. The leverage of our growth SEO firms traces a pattern that is similar to that for our entire sample of industrial SEO firms. (Of course, this similarity is unsurprising given that these firms are 62% of our population of industrial SEO firms.) Their economic leverage decreases over the 12 quarters prior to the SEO, mechanically drops further at the SEO, reverts to its pre-SEO level within six quarters, and thereafter exceeds its initial level.

The pattern of leverage for asset-intensive firms differs; leverage increases until three quarters before the SEO; it then begins a modest decline due to stock price increases. It drops substantially due to the equity infusion from the SEO, and thereafter exhibits but a small increase. This evidence suggests that the typical asset-intensive firm is closer to its debt capacity at the time of the SEO and thus using SEO to adjust leverage is relatively more important for such firms. Recall however, they are only 10% of our sample.

4.1.5. The IOS, size, and leverage volatility

To examine our hypothesis that small firms tolerate larger deviations from target leverage than larger firms, we use data from quarter −12 to +20 for each SEO firm to calculate the difference between our measures of its market leverage and its leverage target. We proxy target leverage as the mean leverage of the other firms in the industry for that calendar quarter. We next calculate the coefficient of variation of this time series for each firm. (Note that there is substantial heteroskedasticity in our data: the coefficient of variation helps to control for this potential statistical problem.) We then sort by investment opportunities and firm size. Because market-to-book and size vary over time, we use data from the year prior to the SEO for classification. Our results are tabulated in Table 6, Panel A. And because this hypothesis is not specific to SEO firms, in Panel B we report the comparable statistics for all COMPUSTAT firms. They are consistent with our hypothesis: leverage volatility for small firms is greater than that for large firms within each investment opportunity set group.

4.2. Evidence from regulated utilities

Although frequently excluded from empirical corporate finance analyses, we believe that in our case regulated utilities merit special attention for at least three reasons: (1) The market values of utilities primarily reflect that of their long-lived tangible assets and therefore underinvestment costs of debt should be lower than for industrials. (2) The regulatory process limits managerial discretion and hence free-cash-flow problems should be better controlled than within industrials. (3) The public hearings and mandated disclosures that are part of the regulatory process reduce informational disparities between investors and managers for utilities compared to that of industrials. These differences lower the costs of SEOs and thus should lead to observable differences in policy choices between utility and industrial SEO firms.

4.2.1. Size of utility SEOs

With lower total issuance costs, the optimal SEO size for a utility should be smaller than for an otherwise similar industrial firm.

Table 4
Debt change and target leverage deviation: Industrial SEO firms with different investment opportunity sets.
This table reports summary statistics of net debt changes and deviation from target leverage for industrial SEOs with high, medium and low investment opportunity sets. $(D_t - D_0)/V_0$ is the total change in debt outstanding in t quarters after the equity offering deflated by the market value of assets at the end of the SEO quarter. Proceeds/V_0 is the SEO proceeds deflated by the market value of the issuing firm at the end of the SEO quarter. TGT stands for the target leverage, computed as the mean market leverage from Quarter −12 to Quarter −3. The last two columns report the *p*-value for the differences between V/A high and V/A low groups. *t*-test is used for the difference in means and Wilcoxon test is used for the difference in medians.

	V/A high			V/A medium			V/A low			*p*-value for diff in means	*p*-value for diff in medians
	mean	*t*-stat	median	mean	*t*-stat	median	mean	*t*-stat	median		
$(D_4 - D_0)/V_0$	0.050	18.728	0.000	0.096	17.206	0.027	0.073	7.415	0.022	0.0166	0.0392
$(D_8 - D_0)/V_0$	0.118	19.548	0.012	0.193	18.994	0.071	0.149	8.776	0.044	0.0865	0.3170
$(D_{12} - D_0)/V_0$	0.171	21.205	0.026	0.273	19.566	0.124	0.270	8.161	0.092	0.1542	0.4895
Proceeds/V_0	0.133	84.636	0.111	0.108	46.605	0.083	0.104	21.768	0.076	<0.0001	<0.0001
$D_0/V_0 - TGT$	−0.023	−15.786	−0.005	−0.047	−16.110	−0.043	−0.035	−6.389	−0.038	<0.0001	<0.0001

Recall that our data in Table 1 indicate that utility SEOs are smaller as a fraction of shares outstanding with smaller proceeds as a fraction of the firms' market (or book) values. Specifically, proceeds of the typical utility SEO are 5.0% of its enterprise value, substantially less than the 18.7% for the typical industrial SEO. The typical utility SEO sells 12.8% of shares outstanding compared to 20.8% for the typical industrial. These observations are consistent with our hypothesis that because of their lower fixed costs, utility SEOs should be smaller than industrial SEOs. (We examine offering size further in Section 5.1.)

4.2.2. Regulation, leverage, and investment spending

In the upper-left panel of Fig. 3, the increase in investment spending around the SEO is larger for utilities than industrials. Because of its greater debt capacity, a larger investment project is required to induce an SEO by a utility. As depicted in the lower-left panel of Fig. 3, leverage is substantially higher for the typical utility SEO firm than for the typical industrial SEO firm – as well as for our typical asset-intensive industrial SEO firm. Although the general patterns of SEO-induced leverage changes are similar for industrials and utilities, the variability of leverage around utility SEOs is lower than that for industrials. As reported in Table 6 Panel A, the average coefficient of variation for regulated utilities is below 20 – less than half of magnitude of any of our industrial SEO groups.[18]

5. Payouts, debt covenants, liquidity, and SEOs

Our focus thus far has been on investment and financing policies, but our analysis also has implications for other corporate policy choices (see also Graham and Leary, 2011). We first extend our discussion of financing decisions to examine implications for payout policy. We next examine the use of contract provisions specifying priority, maturity, and conversion options (Smith and Warner, 1979). We then examine liquidity management.

Theory suggests these policy choices have effects on firm value of different magnitudes. Investment policy has a first-order effect – take positive NPV projects and firm value increases, take negative NPV projects and firm value falls. Leverage policy has a second-order impact on value – set leverage too high and underinvestment problems arise, too low and free cash flow problems become more pronounced. Use of maturity, priority and conversion covenants, management of dividends, share repurchases, cash and credit line management are third-order effects – careful management of these policies can make the firm's leverage policies, and hence investment policies, more robust. Theory also suggests that each of these policy choices depends on the firm's investment opportunity set. However the evidence in Fig. 2 identifies two potentially important effects: (1) Investment spending in the quarter of the SEO reflects the increase in the exercise of the firm's growth options thereby increasing the firm's assets in place. But (2) the increasing rates of investment spending over the succeeding quarters reflects the development of additional growth options. Which effect dominates is thus an empirical question.

5.1. SEOs and payout policy

5.1.1. The IOS, regulation and payouts: theory

Both Rozeff (1982) and Easterbrook (1984) argue that dividends should be set high enough so that the firm's debt capacity is expected to be exhausted periodically. Such a payout policy forces the firm to return to capital markets and have an underwritten SEO periodically. They argue that exposing management to the more intensive monitoring by investment bankers as part of the SEO due-diligence process aids in controlling potential stockholder-manager conflicts. In underwriting an SEO, an investment banker, after entering a confidentiality agreement, can access non-public as well as public information about the firm. Consequently, the announcement of an SEO underwritten by a major investment bank provides a form of certification for the firm and its management team (Booth and Smith, 1986). This implies that the firm's leverage target is not expected to be constant; between SEOs, leverage is

[18] In some jurisdictions, (accounting) leverage of regulated utilities is limited, although it is not clear how tightly these limits are enforced. Additionally, allowed product pricing potentially depends on capital structure in some states.

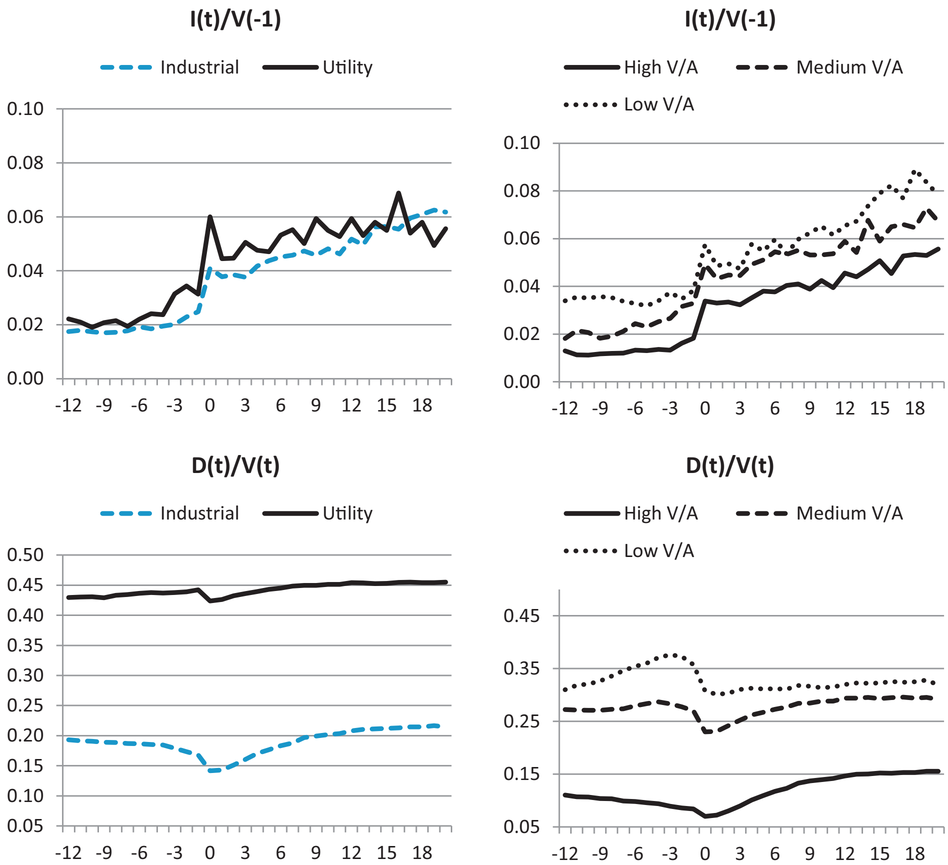

Fig. 3. Investment and leverage surrounding the SEO: industrial vs. utility SEOs and industrial SEOs with different investment opportunity sets. The left panels depict the mean ratio of investment, I(t), from 12 quarters before the SEO to 20 quarters after the SEO, to firm value in the quarter before the SEO (V(−1)). The SEO quarter is defined as quarter 0. The right panels depict the mean market leverage ratio, D(t)/V(t), from 12 quarters before the SEO to 20 quarters after the SEO. The upper panels are for industrial vs. utility SEOs and the lower panels are for industrial SEOs with different investment opportunity sets. We have 7039 non-financial industrial firms and 1569 regulated utility SEOs in the period of 1970–2015. Industrial SEO firms are divided into three groups based on their investment opportunity sets. Each year we sort all industrial firms in the COMPUSTAT universe into three groups based on their market-to-book ratio of assets (V/A) in the previous year. An SEO firm is classified into the low, medium, or high V/A group depending on where it belongs. We have 719 (10%), 1980 (28%), and 4340 (62%) industrial SEO observations respectively in the low, medium, and high V/A groups.

expected to increase. This implication of the Rozeff/Easterbrook analysis differs from the assumption employed within most financial-management models. These models typically assume that the firm's leverage target is constant between SEOs.

For growth firms, this should occur quite naturally: Growth firms have substantial profitable investment opportunities but little internally generated cash flow to finance these projects. However, for asset-intensive industrial firms and utilities, internally generated cash is high and growth opportunities are limited. For such firms corporate payouts, including both dividends and share repurchases, must be set high enough so that in periods without an equity offering, leverage is expected to increase. Moreover, between SEOs, if payouts by asset-intensive firms and utilities cumulate to more than the SEO proceeds, then the firm could have reduced payouts and still have the same financial resources.

We expect that payouts by utilities will be higher than those by industrial firms for at least three reasons: (1) With their higher fraction of tangible assets, higher payouts provide more effective control of the free-cash-flow problem (Jensen, 1986). (2) For regulated utilities, there is a potential conflict between shareholders and regulators. Shareholders worry that if funds were retained, there would be a greater risk of regulatory expropriation. To limit this risk, utilities have incentives to distribute cash flows as they are generated (Smith, 1986). (3) Some rate-regulation bodies employ a form of the Gordon (1959) dividend growth model for determining allowed rates: In such cases, higher dividends lead to higher allowed rates and hence higher corporate cash-flows (Smith and Watts, 1992). This third motive also implies that shareholder payouts by utilities would take the form of dividends, not share repurchases.

5.1.2. *The IOS, regulation and payouts: evidence*

In the left panel of Fig. 4, we depict shareholder payouts around SEOs. Unlike most prior studies of payout policy, we include both dividends and share repurchases. For industrial SEO firms, total payouts fall as a fraction of equity value from year −3 to 0 as these

Table 5
The financial condition of industrial SEO firms with different investment opportunity sets.
This table reports the median financial ratios of industrial SEO firms in three years before the offering and the Wilcoxon test results of the differences of median financial ratios between SEO firms in year −1 and year −3 and between SEO firms and their respective industry median in the year prior to the offering. Statistical significance at the 1%, 5%, and 10% is marked by ***, **, and * respectively. Industrial SEO firms are divided into three groups based on their market-to-book ratio of assets (V/A) in the fiscal year prior to the equity offering. In particular, every year we sort the universe of COMPUSTAT/CRSP industrial firms into three equal-size groups based on the firm's V/A ratio in the prior year. Depending on where the SEO firm belongs to, it is classified into one of the three groups.

	V/A low ($N = 719$)				
Fiscal Year relative to the SEO	Market Leverage	Interest Coverage	Current Ratio	Market-to-book Assets	Altman Z
−3	0.317	2.405	1.832	0.973	2.493
−2	0.345	1.955	1.747	0.922	2.245
−1	0.383	1.683	1.668	0.905	1.842
Diff (−1, −3)	0.066***	−0.722***	−0.164***	−0.068***	−0.651***
Diff (SEO, Industry median)	0.156***	−1.090***	−0.096	−0.263***	−0.781***
	V/A medium ($N = 1980$)				
Fiscal Year relative to the SEO	Market Leverage	Interest Coverage	Current Ratio	Market-to-book Assets	Altman Z
−3	0.263	2.684	1.885	1.192	2.685
−2	0.277	2.435	1.792	1.198	2.599
−1	0.280	2.452	1.727	1.249	2.432
Diff (−1, −3)	0.017**	−0.232***	−0.158***	0.057***	−0.253***
Diff (SEO, Industry median)	0.088***	−0.449***	−0.166***	0.001**	−0.554***
	V/A high ($N = 4340$)				
Fiscal Year relative to the SEO	Market Leverage	Interest Coverage	Current Ratio	Market-to-book Assets	Altman Z
−3	0.058	2.707	2.756	2.057	4.109
−2	0.047	3.043	2.695	2.266	4.361
−1	0.041	3.678	2.507	2.825	5.096
Diff (−1, −3)	−0.017***	0.970***	−0.249***	0.769***	0.987***
Diff (SEO, Industry median)	−0.015***	0.208*	0.178***	1.057***	1.577***

firms develop new growth options. Over this period the majority of this reduction in payout yields is driven by stock price increases – dividend payments are little changed and share repurchases fall but only modestly. After the SEO, as these growth options are exercised and transformed into tangible assets, payout yields rise. Both dividends and share repurchases increase substantially over this period. These results are broadly consistent with the Rozeff/Easterbrook hypothesis, except that most of the changes in shareholder payouts by industrial SEO firms occur primarily through changes in share repurchases, not dividends. This limited time-series variation in dividends should not be surprising; researchers since Lintner (1956) have noted that dividend policy tends to be "sticky."

To examine the hypothesis that asset-intensive firms have higher payouts to shareholders, we calculate the mean and median payout rates – including both dividends and share repurchases – of SEO firms in the year prior to their SEOs. In prior studies, more growth options are associated with lower dividends (see Smith and Watts, 1992; Barclay et al., 1995). Within this context, repurchases generally have been unexamined. We again divide SEO firms into three groups as above. Our results are depicted in the right panel of Fig. 4 (and are tabulated in Appendix Table A6). Consistent with prior findings, the average payout rate for growth firms is lower (0.6%) than that for asset-intensive firms (3.3%).

In the center panel of Fig. 4, in addition to total payouts by industrials, we also depict total payouts by regulated utilities. As hypothesized, average payouts by utilities are higher than those by industrials – 8.3% vs. 1.5% in the year prior to the SEO. Furthermore, utility shareholders receive over 90% of their payouts in the form of dividends; over our 33-quarter event window, utility dividend yields average 8.1% and share repurchases, 0.6%. Like industrials, utility payouts fall in the quarters preceding an SEO. Unlike industrials, they exhibit little increase thereafter.

5.1.3. Payouts and expected leverage changes: evidence

To examine the Rozeff/Easterbrook hypothesis that payouts are set high enough so that between SEOs the expected change in the firm's leverage is positive, we examine two measures: (1) The average change in leverage ratios: ($Debt_t/Value_t - Debt_{t-1}/Value_{t-1}$) and (2) The change in debt amount from year t-1 to year t divided by the market value of the firm in year t-1. After excluding those firms that have an SEO in that year, we average each measure across the remaining firms within our sample.

In Table 7 Panel A we report that for each of our groups of industrial SEO firms, our first measure is positive, ranging from 0.85% for our asset-intensive firms to 0.77% for our growth firms. Each of these estimates is statistically significant. Using this measure, the effect is smallest for utilities, averaging 0.05%. This is consistent with the regulatory process for utilities providing additional control of stockholder-management conflicts. Our second measure of the change in debt is a statistically significant 3.35% for industrial SEO firms. It is also significantly positive for each investment opportunity set group, ranging from 2.51% to 4.37% – t-statistics range from 26.9 to 45.2. They also are remarkably similar across groups. For example, the t-statistic on the difference between the average leverage change for growth firms versus asset-intensive firms is insignificant ($t = 1.20$). Evidence from our regulated utilities also is consistent with this hypothesis – the average change is 3.63% ($t = 91.4$). If we employ these averages as proxies for the expected change in leverage, payout policy is set so that between SEOs its expected change is positive.

Table 6
Coefficient of variation of market leverage ratios.
This table reports the coefficient of variation of the market leverage ratios for SEO firms (in Panel A) and for all COMPUSTAT firms in 1970–2015 (in Panel B). Firms are divided into utility and industrial firms with three different sizes, where industrial firms are also sorted into three groups based on their investment opportunity set. In Panel A, for each SEO firm, we classify each SEO firm into a cell based on its pre-SEO V/A and the market value of total assets. We then calculate the coefficient of variation of each SEO firm's quarterly market leverage ratios from 12 quarters before to 20 quarters after the SEO, and average across firms in each cell. In Panel B, every COMPUSTAT firm with longer than 20 quarters' leverage data is classified into 3*3 V/A and size (market value of assets) cells based on the firm's most frequent cross-sectional standing in these cells. For example, if an industrial firm starts with a small size-high V/A category in our data but then in most of the later years it stays as a medium size-low V/A firm, then this firm enters the medium size-low V/A cell. The coefficient of variation of its time-series market leverage ratios during the whole period is used to compute the average in the cell for medium size-low V/A firms. In the last row of Panel A, we report the p-value of the *t*-test for the difference in means between the small and large size groups.

Panel A: SEO firms

	V/A high	V/A medium	V/A low	Utility SEOs	All
Small	112.46	68.24	67.35	27.18	94.17
(N)	(1774)	(583)	(203)	(154)	(2714)
Medium	109.85	53.18	42.19	14.00	77.05
(N)	(1511)	(584)	(196)	(423)	(2714)
Large	76.25	32.15	29.33	12.02	36.37
(N)	(736)	(733)	(303)	(942)	(2714)
All	104.87	49.61	43.81	14.15	69.03
(N)	(4021)	(1900)	(702)	(1519)	(7782)
p-value for difference between small and large	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Panel B: All COMPUSTAT firms in 1970–2015

	V/A high	V/A medium	V/A low	Utility firms	All
Small	143.35	88.15	82.37	40.90	108.10
(N)	(2125)	(1173)	(1890)	(20)	(5208)
Medium	132.45	62.38	54.54	35.09	81.57
(N)	(1528)	(1368)	(1730)	(57)	(4683)
Large	89.12	43.55	40.55	21.40	52.96
(N)	(1013)	(1356)	(1353)	(217)	(3939)
All	127.74	63.48	61.10	24.70	83.16
(N)	(4666)	(3897)	(4973)	(294)	(13830)

Finally, in Table 7 Panel B, we report the cumulative payouts to shareholders between equity offerings as a fraction of SEO proceeds. This ratio averages 1.14 for asset-intensive firms, but below one for the other two groups of industrial firms. Moreover, for our sample of regulated utilities, this ratio at 1.77 is higher. Statistical tests on the mean and median differences between the high and low V/A groups and between the industrial and utility groups are all statistically significant at the 1% level. Therefore, as suggested by Rozeff/Easterbrook, our typical asset-intensive firm as well as our typical utility could have financed all their investment spending through retained earnings by reducing shareholder payouts. Although such a policy would avoid the out-of-pocket costs of having an SEO, it also would eliminate the bonding and certification benefits associated with an investment banker's due-diligence activities.

5.1.4. *Payouts, SEO size and frequency: theory*

Our analysis of corporate payout policy also has implications for the size and frequency of SEOs. Both of these aspects of SEOs should be driven by several factors: (1) The size of corporate payouts to shareholders, (2) The level of the firm's investment spending, (3) The variation in the size of investment projects, (4) SEO costs, and (5) The difference between debt capacity and target leverage. The first two factors should increase both the size and frequency of SEOs. Greater variation in the size of investment projects should increase the frequency but lower the size of SEOs. The last two factors should increase the size but reduce the frequency of SEOs. The relations between investment opportunities or regulation and SEO size or frequency are thus empirical questions. Note also that even if the expected change in leverage were the same between growth and asset-intensive firms, with their smaller debt capacities, the expected time span between equity offerings should be shorter for the growth firms than asset-intensive firms.[19]

5.1.5. *Payouts, SEO size and frequency: evidence*

To examine whether growth firms have more frequent equity offerings than asset-intensive firms, we first identify SEOs within our sample that have at least one prior equity offering in order to calculate the time span. (Note that for an SEO firm whose initial public offering is within our sample period, we employ its IPO as a prior equity offering.) For each pair of offerings we then calculate the firm's market-to-book ratio one year prior to the later offering and use that ratio to classify the SEO firm into three groups as above. We

[19] Because between SEOs the expected change in leverage is positive, expected leverage at the completion of an investment project depends on both the expected time to implementation, the expected rate of change of leverage, and the expected time between SEOs.

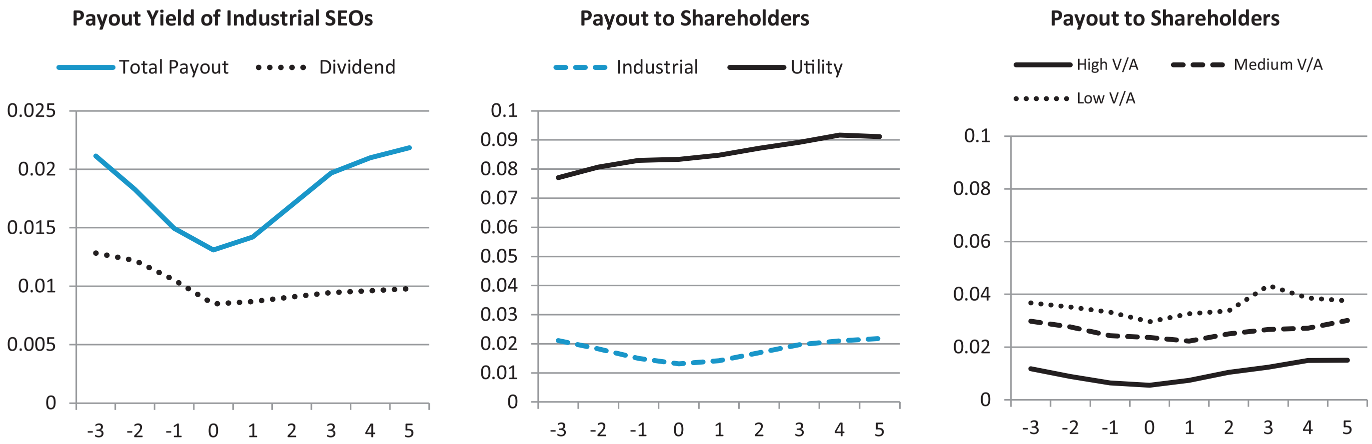

Fig. 4. SEO firms' total payout to shareholders.
The following three graphs present SEO firms' payout deflated by the contemporaneous market value of equity, E(t), from three years before the SEO to five years after the SEO. The left panel is for industrial SEOs, dividend yield and total payout yield (dividends plus repurchases) respectively. The middle panel is the total payout yield, respectively for industrial and utility SEOs. The right panel is the total payout yield for industrial SEOs with high, medium, and low investment opportunity sets.

Table 7
Time span and payout between subsequent equity offerings.

Panel A: The average change in total debt and cash holding in year t divided by the market value of firm assets in year t-1 for SEO firms in non-SEO years (the firm has no SEO in year t)

	V/A high	V/A medium	V/A low	Industrial Firms	Utility Firms
$\frac{D_t}{V_t} - \frac{D_{t-1}}{V_{t-1}}$	0.77%	0.78%	0.85%	0.79%	0.05%
t-statistics	(21.14)	(14.95)	(10.37)	(27.79)	(2.24)
$\frac{D_t - D_{t-1}}{V_{t-1}}$	2.51%	4.34%	4.37%	3.35%	3.63%
t-statistics	(39.29)	(45.18)	(26.92)	(65.16)	(91.36)
N (firm-years)	65,215	38,438	15,402	119,055	54,206

Panel B: The mean and median time span (in years) between the SEO and the firm's previous equity offering. If the SEO is the firm's first, we report the time span between the SEO and the firm's IPO. For that we require our sample of SEO firms to be publicly listed since 1970. We also calculate the total dollar payout (dividends plus repurchases) relative to the SEO proceeds

		V/A high	V/A medium	V/A low	Industrial Firms	Utility Firms
Time span since the prior equity offering	Mean	3.39	4.99	5.79	4.02	3.89
	Median	1.92	2.84	3.66	2.19	2.02
Cumulative payout since the prior equity offering relative to SEO proceeds	Mean	0.184	0.636	1.136	0.396	1.765
	Median	0.000	0.072	0.235	0.001	1.100
Number of SEOs		4064	1670	547	6281	544

report the mean and median time span between equity offerings in Table 7 Panel B. The typical span is shorter for growth firms than asset-intensive firms - 3.39 versus 5.79 years using means (1.92 versus 3.66 years using medians). The typical span also is shorter for utilities than industrials - 3.89 versus 4.02 years using means (2.02 versus 2.19 years using medians). Statistical tests on the mean and median differences between the high and low V/A groups and between the industrial and utility groups are statistically significant at the 5% level.

We offer a somewhat different perspective in Fig. 5A; we depict the cumulative density function of the time between equity offerings for each investment opportunity set group. The CDF for growth firms lies to the left of that for asset-intensive firms. This is also consistent with the hypothesis that growth firms return to external equity markets more rapidly than asset-intensive firms.

Our evidence on the frequency by SEOs by utilities versus industrials is ambiguous. The CDF of the time span between SEOs for utilities appears to be quite different from that for our asset-intensive industrial firms and virtually coincident with the CDF for our sample of growth firms. This is consistent with the hypothesis that, because total SEO costs are lower for utilities than industrials, they will have more frequent SEOs than otherwise similar unregulated industrials. However only 35% of our utility SEO firms have multiple equity offerings within our 46 year time window, suggesting utility SEOs are less frequent.

In Fig. 5B we examine SEO size. Again, the CDFs for growth firms and for regulated utilities lie to the left of those for other groups of industrial SEO firms, indicating that they have smaller SEOs than other unregulated industrial firms.

5.2. *SEOs and the priority structure of corporate liabilities*

5.2.1. *The IOS, regulation and priority: theory*

Within a court-supervised reorganization under Chapter 11 of the U.S. bankruptcy code, there can be material disagreements among the firm's fixed claimholders. Concentrating fixed claims in higher priority classes – secured debt and capital leases – limits disagreement among fixed claimholders. Thereafter, if the firm does file under Chapter 11, the likelihood of a more rapid, successful reorganization increases (Barclay and Smith, 1995b). This logic suggests that: (1) As growth options are developed prior to the SEO, the use of higher priority fixed claims should increase. (2) After the SEO, as these growth options are exercised and firm value reflects that of more tangible assets, this benefit of concentrating fixed claims within higher-priority classes should fall and thus their use should decrease. (3) In the cross-section, growth firms should concentrate more of their fixed claims within higher priority classes. (4) Utilities should have the lowest concentration of higher priority fixed claims.

5.2.2. *The IOS, regulation and priority: evidence*

In the left panel of Fig. 6, we depict the use of fixed claims of different priorities. We find that, over the eight years around the SEO: (1) Our industrial firms use more secured debt and capital leases before the SEO but reduce their use thereafter, (2) They use less ordinary debt before the SEO but more afterward, and (3) Their use of our other two classes of fixed claims – subordinated debt and preferred stock – change very little.

In the center panel of Fig. 6 we depict the use of higher priority claims – capital leases plus secured debt – as a fraction of total fixed claims. For industrial firms this fraction rises prior to the SEO as they develop new growth opportunities and thereafter, as these real growth options are exercised and transformed into tangible assets, this ratio falls. Utilities concentrate fewer fixed claims within higher priority classes than industrials. Also, there is little change in priority structures around utility SEOs.

In the right panel, growth firms increase their use of higher priority claims only modestly more than that of asset-intensive firms prior to the SEO. Each group of industrial firms reduces their reliance on higher priority claims after the SEO.

5.3. SEOs and debt maturity

5.3.1. The IOS, regulation and maturity: theory

Underinvestment problems arise because the firm faces investment decisions while previously issued risky debt is still outstanding. By shortening debt maturity, fewer investment decisions are affected by an outstanding risky debt issue (Myers, 1977); hence growth firms should employ less long-term debt. Because of the regulatory oversight of utilities, underinvestment problems should be better controlled, and thus the costs of employing long-term debt are lower. Utilities therefore should employ more long-term debt.

Myers' analysis also has time-series implications: For an SEO triggered by the development of a valuable new growth opportunity, target maturity should shorten. After the SEO, this growth option is exercised and thereby transformed into tangible assets, which reduces the underinvestment costs of long-term debt and thus its use should increase. But the ongoing high rate of investment spending suggests the development of new growth options which would suggest maintaining shorter debt maturity.

5.3.2. The IOS, regulation, and maturity: evidenc

Following Barclay and Smith (1995a), we employ debt with a stated maturity greater than three years as a fraction of total debt as a proxy for the firm's debt-maturity decision. This information is tabulated in Table 8 and depicted in Fig. 7. From the upper-right panel of Fig. 7, growth firms employ less long-term debt than asset-intensive firms. From the upper-left panel of Fig. 7, utilities employ substantially more long-term debt than industrials. The differences in each year are all statistically significant at the 1% level.

Prior to the SEO, our measure of maturity for our industrial SEO firms falls modestly. It increases from the year before to the SEO year as a portion of SEO proceeds is used to pay down its outstanding credit-line balance. After the SEO, much of the observed increase reflects the issuance of long-term debt. With SEO proceeds employed to exercise its growth options, there is a modest increase in the use of long-term debt after SEOs by growth firms. Comparing maturity structure from three years before the SEO to five years after, there is little change by asset-intensive SEO firms. Examining a long horizon, diff-in-diff tests confirm significantly different impacts on debt maturity between growth and asset-intensive SEO firms, as well as between industrial and utility SEO firms. This pattern is consistent with Myers (1977) hypothesis linking the firm's investment opportunities and the maturity structure of its debt.

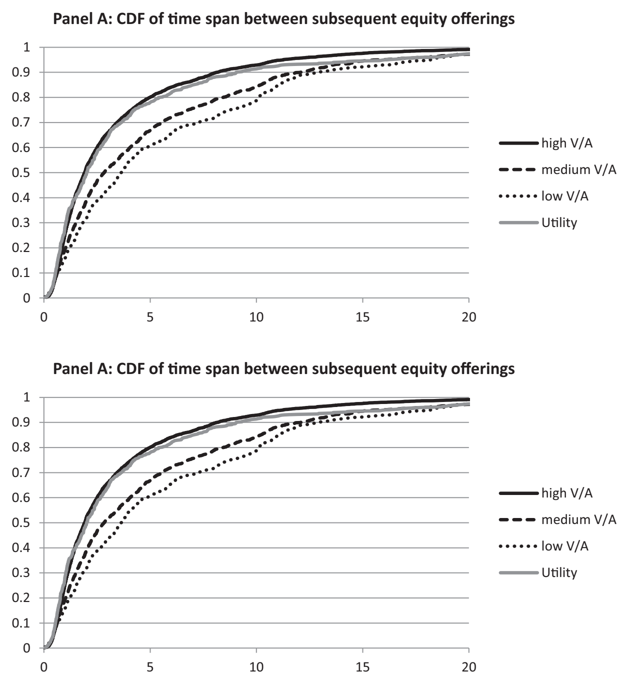

Fig. 5. CDF of time span between subsequent equity offerings and SEO proceeds.
Panel A of the following graphs presents the cumulative distribution function (CDF) of time span between subsequent equity offerings, respectively for high, medium, and low V/A SEO firms and utility SEO firms. Time span is computed between the SEO and the firm's previous equity offering, in which the previous equity offering could be an SEO or an IPO but is conducted only since 1970 for the purpose of identification (we do not have comprehensive SEO data prior to 1970). We have 4064 SEOs with high V/A, 1670 SEOs with medium V/A, 547 SEOs with low V/A, and 544 utility SEOs which we are able to identify the date of its previous equity offering. They are 93.6%, 84.3%, 76.1%, and 34.7% of their respective sample. Time span is first calculated in days and then converted into years as reported in the horizontal axis. Panel B presents the cumulative distribution function (CDF) of SEO proceeds. Due to the skewness, SEO proceeds (in millions) are presented in the horizontal axis in log scale.

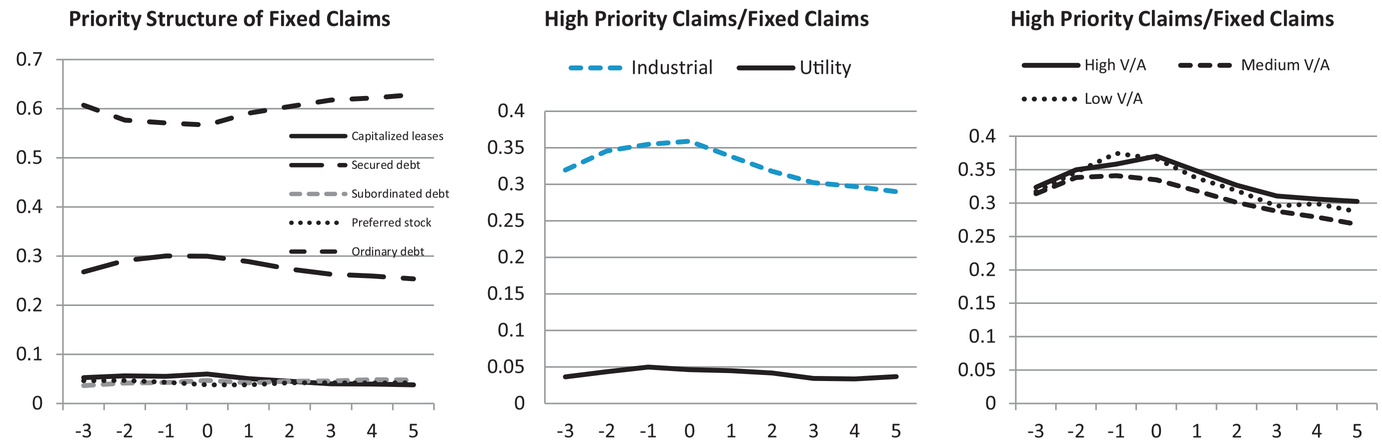

Fig. 6. The priority structure of debt.

The left panel depicts the percentage of fixed claims of different priority relative to total fixed claims. We depict capital leases, secured debt, ordinary debt, subordinated debt, and preferred stock as a fraction of total fixed claims from three years before to five years after the SEO. The other two panels depict the percentage of high priority claims relative to total fixed claims, where high priority claims include Capitalized Leases and Secured Debt. The middle panel is for industrial vs. utility SEOs and the right panel is for industrial SEOs with high, medium, and low proportion of growth options in their investment opportunity sets.

5.4. SEOs and convertibles

5.4.1. The IOS, regulation and convertibles: theory

With potentially valuable growth opportunities, a CFO would like to assure investors that the firm has the requisite resources to exercise these growth options appropriately. Mayers (1998) argues that this can be accomplished by including conversion options in the firm's capital structure. If the value of the firm's growth opportunities increases, its stock price rises, the conversion option becomes in the money, and the call provision within the convertible security gives management the ability to force conversion. Conversion simultaneously preserves capital and reduces the firm's leverage.

Mayers' analysis implies that as the likelihood of a firm developing valuable growth options increases, its use of convertibles should increase. This incentive to employ convertibles should be most pronounced among growth firms and least among utilities. The implication for post-SEO convertible use is unclear. Changes in convertible use should reflect at least three effects: (1) As convertibles become in the money, they are called and converted into equity, thereby reducing convertibles within the firm's capital structure. (2) As the firm's growth options are exercised and transformed into tangible assets, the benefits of convertibles in terms of providing a form of staged financing decline. But (3) the firm's on-going high rates of investment spending observed in Fig. 2 implies that the firm has incentives to issue new convertibles to control the exercise and timing of its remaining growth options. Which of these effects dominate is thus an empirical question.

5.4.2. The IOS, regulation and convertibles: evidence

In the lower-left panel of Fig. 7 the use of convertible bonds plus convertible preferred stock as a fraction of total fixed claims is greater for industrials than utilities. It rises modestly prior to the SEO for industrial firms. This is consistent with Mayers (1998) hypothesis that convertibles offer a form of staged financing for firms that expect to develop potentially valuable growth opportunities. Following the SEO, the use of convertibles increases further, implying that for the typical industrial SEO firm, the effect of the on-going higher investment spending in increasing the firm's incentive to employ convertibles more than offsets the combined effects of its convertible calls plus its increase in tangible assets from the exercise of its growth options. As depicted in the lower-right panel of Fig. 7, this increase is most pronounced for growth firms. Finally, there is little change in the use of convertibles by utilities around SEOs.

5.5. Liquidity management and SEOs

5.5.1. SEOs and liquidity: theory

Opler et al. (1999) argue that a firm with more growth options incurs higher underinvestment costs and hence should rely more on cash holdings to satisfy its liquidity demands. Utilities and asset-intensive industrial firms have greater debt capacities and thus for these firms bank credit lines should be a more important source of liquidity. Their logic also yields time-series implications. Private lenders such as banks regularly enter confidentiality agreements with their corporate loan customers. Therefore, a firm that develops a valuable new growth option would be able to negotiate a larger credit limit by sharing non-public information with its banker prior to

Table 8

Debt maturity of SEO firms around the offerings.

The table presents the mean debt maturity of SEO firms from three years before to three years after the equity offerings. Debt maturity is defined as the proportion of debt that matures in more than three years relative to total debt (long-term debt plus debt in current liabilities). The results are based on 7039 industrial and 1569 utility SEO firms with data available in COMPUSTAT to compute debt maturity. The last row reports the difference in mean debt maturity between the year immediately after and before the SEO. The difference in means before and after SEO is tested using the two-sample t-test and the associated *t*-statistics are reported in parentheses. The last two columns report the *p*-value for the differences in means between the V/A high and low groups, and between the industrial and utility SEO groups.

	Mean debt maturity						
Fiscal year relative to the SEO	V/A high	V/A medium	V/A low	Industrial SEOs	Utility SEOs	*p*-value for diff between V/A high and low	*p*-value for diff between Industrial and Utility SEOs
−3	0.488	0.618	0.661	0.559	0.830	<0.0001	<0.0001
−2	0.494	0.627	0.640	0.559	0.817	<0.0001	<0.0001
−1	0.480	0.640	0.640	0.550	0.804	<0.0001	<0.0001
0	0.514	0.656	0.663	0.577	0.816	<0.0001	<0.0001
1	0.534	0.657	0.664	0.588	0.818	<0.0001	<0.0001
2	0.549	0.650	0.690	0.597	0.816	<0.0001	<0.0001
3	0.559	0.645	0.675	0.600	0.813	<0.0001	<0.0001
4	0.555	0.651	0.659	0.598	0.817	<0.0001	<0.0001
5	0.552	0.661	0.655	0.599	0.816	<0.0001	<0.0001
Diff(+1, −1)	0.055	0.016	0.024	0.039	0.014	0.1676	0.0491
	(6.34)	(1.83)	(1.50)	(6.29)	(2.26)		
Diff (+3, −1)	0.079	0.005	0.034	0.050	0.010	<0.0001	<0.0001
	(8.77)	(0.41)	(2.01)	(7.62)	(1.57)		
Diff (+5, −1)	0.072	0.020	0.015	0.049	0.012	0.0011	<0.0001
	(7.40)	(1.98)	(0.92)	(7.12)	(1.92)		

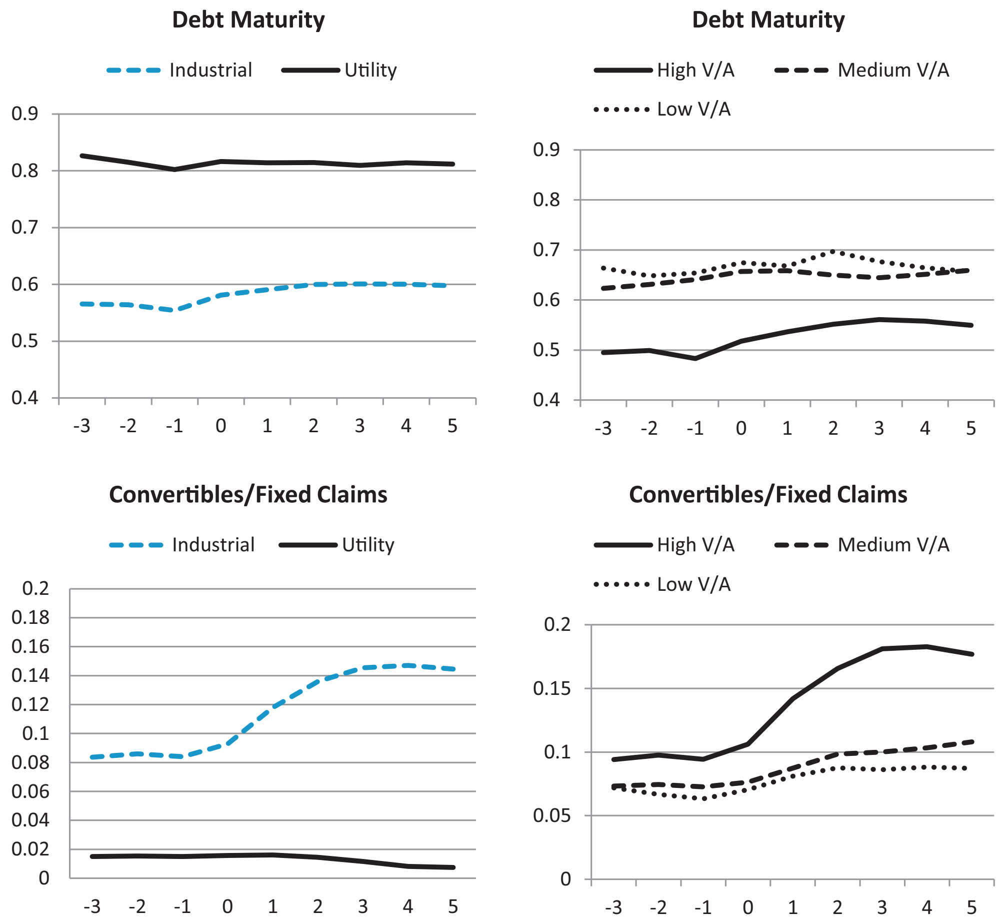

Fig. 7. Debt maturity and the use of convertibles.
The upper panels depict the average debt maturity for SEO firms from three years prior to the SEO to five years following the SEO. Debt maturity is measured as the debt that matures beyond three years as a fraction of total debt. The lower panels depict the percentage of Convertible Debt and Convertible Preferred Stock relative to total fixed claims. The left panels are for industrial vs. utility SEOs and the right panels are for industrial SEOs with high, medium, and low investment opportunity sets.

its public disclosure.

Part of the SEO proceeds will be used to replenish cash balances and pay down outstanding credit-line balances. Additionally, bankers can make a negotiated increase in the corporation's credit limit temporary; contractually requiring the firm to use a portion of its SEO proceeds to pay down the outstanding balance on its credit line. After the SEO, as the firm's growth options are exercised, increasing the firm's tangible assets, cash holdings should be less important, and its use of credit lines should increase. This effect should be most pronounced for growth firms and least for regulated utilities.

5.5.2. SEOs and cash holdings: evidence

In the upper-left panel of Fig. 8, the typical industrial SEO firm draws down its cash holdings as the SEO approaches and uses part of the offering proceeds to restore its cash balances. And, as depicted in the upper right panel of Fig. 8, in the quarters preceding the SEO, growth firms initially hold higher average cash balances, but draw them down by more than do asset-intensive firms. Growth firms also use more of their SEO proceeds to rebuild their cash holdings. Compared to industrial SEO firms, utility SEO firms have smaller cash holdings, draw down their cash balances by less prior to the SEO and use less of their SEO proceeds to replenish those balances. This evidence is consistent with the Opler, Pinkowitz, Stulz, and Williamson hypothesis that growth firms obtain more of their liquidity from the asset side of their balance sheets.

5.5.3. SEOs and credit-line use: evidence

Our data do not identify bank credit lines separately; we employ debt in current liabilities as a fraction of the firm's economic value as a proxy for this source of liquidity. In the lower-right panel of Fig. 8, asset-intensive firms have higher credit line balances. They also increase this short-term debt by more than do growth firms prior to the SEO. Firms in each of these groups use part of their SEO proceeds to pay down their outstanding balance on their credit lines. Following their SEOs, as our typical growth firm increases its tangible assets, its use of credit lines increases above their pre-SEO levels after quarter six.

In the lower-left panel of Fig. 8, utilities have more debt in current liabilities than do industrials. The increased credit-line draws prior to their SEOs are similar for industrials and utilities, both appear to use part of their SEO proceeds to pay down their outstanding credit-line balances. Following their SEOs industrials again increase their use of credit lines but utilities do not.

6. Conclusions

Modern corporate financial theory goes back to Modigliani and Miller (1958) and hence has been accumulating over the past six decades. In this research, theory generally has raced well ahead of its empirical testing. As a result, consensus as to the determinants of firms' specific financing choices is limited.

We argue that the analysis of seasoned equity offerings permits powerful tests of our financial management theories. We examine both time-series and cross-sectional implications for corporate investment and financing policies as well as management of corporate liquidity, payout policy, debt maturity, priority structure, and its use of conversion options. This is noteworthy in part because prior research examining these policy choices have focused primarily either on cross-sectional or time-series analyses of but a subset of these policies. By focusing on an important corporate financing event and forming portfolios and aggregating information about firm characteristics and financing choices by event quarter, important patterns emerge within our data. Although some aspects of our empirical results are suggested by prior papers, we believe that it is useful to examine this array of interrelated issues employing a large, common data set. Our analysis of 8608 seasoned equity offerings by industrial and utility firms in U.S. markets over the forty-six-year period between 1970 and 2015 documents the following empirical observations:

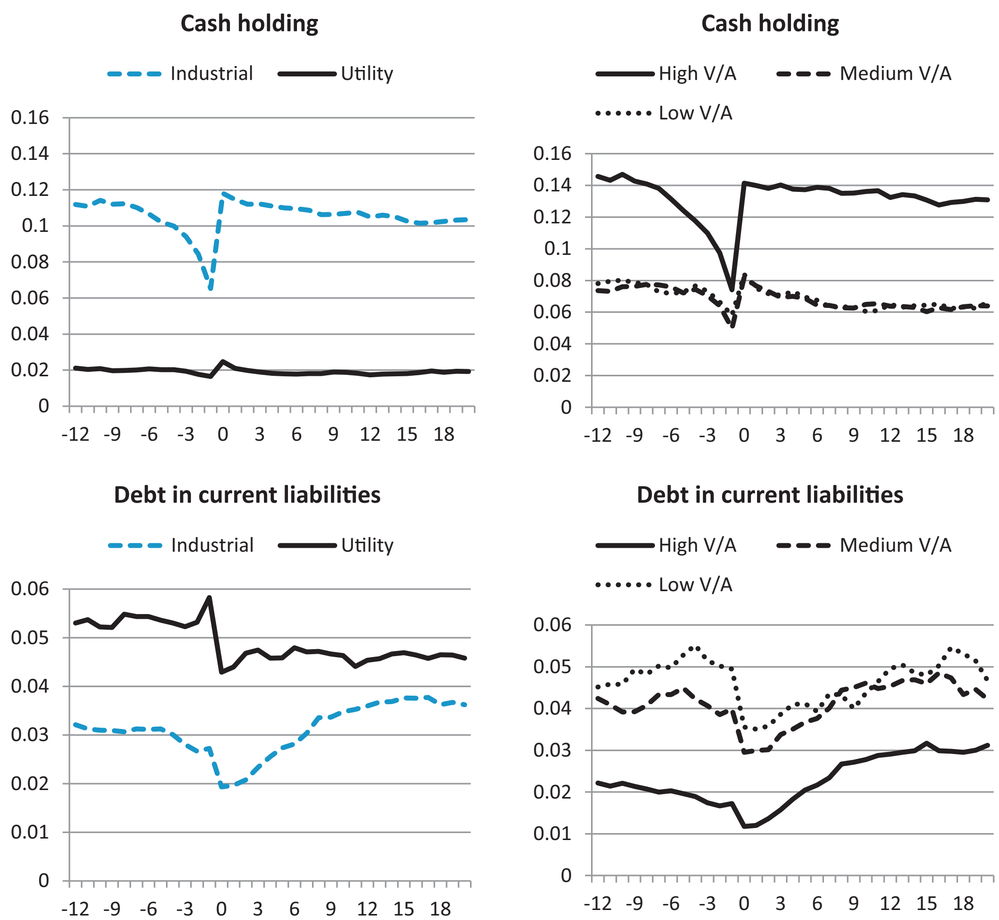

Fig. 8. Cash holding and debt in current liabilities.
The upper panels present SEO firms' mean cash holding, Cash(t) deflated by its contemporaneous market value of assets, V(t). The lower panels present the mean debt in current liabilities relative to contemporaneous market value of assets, V(t). The left panels are for industrial vs. utility SEOs and the right panels are for industrial SEOs with high, medium, and low investment opportunity sets.

- In the period prior to an SEO, the typical firm's economic leverage is low compared to either its historical average leverage or that of other firms in its industry; despite its additional borrowing, its economic leverage is falling due to increases in its stock price.

- In the quarter of the SEO, leverage falls further as a consequence of this infusion of new equity capital.

- Investment spending increases materially in the SEO quarter and continues to increase following the SEO; the majority of this increase is from organic growth, not M&A transactions.

- Additional investment spending over the twelve quarters following the SEO exceeds SEO proceeds for the typical SEO firm. This result is important because standard methods for controlling for heteroscedasticity obscure the substantial increases in investment spending following SEOs.

- The typical SEO firm issues substantial amounts of debt following the SEO; by twenty quarters after the SEO, debt outstanding is over three times its level in the SEO quarters. These subsequent debt issues typically cumulate to increase leverage above pre-SEO levels within eight quarters.

- Firms for which the SEO leaves leverage further below its pre-SEO average undertake larger post-SEO debt issuance.

- Total payouts to stockholders, including both dividends and share repurchases, fall prior to the SEO and rise thereafter. These changes are driven largely by changes in repurchase activity; dividend changes are modest.

- Payouts to shareholders by asset-intensive and utility SEO firms are set high enough so that between SEOs the expected change in leverage is positive.

- For the typical industrial firm in the period before an SEO, debt maturity shortens, use of high-priority fixed claims increases, cash holdings fall, and the use of convertibles increases. With the exception of convertibles, these changes are reversed following the SEO.

- There are systematic differences between growth and asset-intensive SEO firms — the former have lower leverage targets, lower payouts to shareholders, less long-term debt, greater concentration of fixed claims in higher priority classes, greater use of convertibles, larger cash balances, and more frequent SEOs than asset-intensive firms.

- There are systematic differences between utility and industrial SEO firms – utilities have smaller SEOs, higher but more stable leverage, higher dividend yields, lower share repurchases, more long-term debt, more dispersion in the priority structure of their fixed claims, less use of convertibles, and lower but more stable cash balances.

- Stock prices rise before SEOs. This increase is larger for growth firms, and smaller for regulated utility SEO firms; it also is larger for SEO firms that undertake larger post-SEO investment programs.

- Announcement period returns are more negative for growth firms, higher (less negative) for regulated utilities, and higher (less negative) the greater the increase in investment spending following the SEO.

Many of these results are not predicted by textbook financial-management models. Our analysis also helps to resolve a set of contentious issues within the literature:

- The robust financial condition of the typical firm prior to its SEO is inconsistent both with Myers (1984) argument that SEOs are the financing alternative of last resort and the Jostarndt (2009) and Franks and Sanzhar (2006) argument that they are undertaken by financially distressed firms to forestall bankruptcy.

- The pre-SEO stock price increase and the SEO both appear motivated by the development of a valuable new growth option and thus this price increase does not imply that a firm should have a debt offering to rebalance its capital structure as suggested by Myers (1984).

- The pre-SEO stock price increase appears to be driven by the development of new growth options and therefore provides no compelling evidence of mispricing, as assumed within the market-timing model.

- Both the variation in leverage across firms with different investment opportunities as well as the active debt issuance and systematic increase in leverage following an SEO is inconsistent with the market-timing model assumption that there is no capital structure target.

- The abnormal negative stock price reaction to an SEO announcement does not imply that a "substantial portion of the proceeds of an equity issue comes out of the pockets of old stockholders" as argued by Asquith and Mullins (1986).

- Contrary to Hovakimian (2004), debt issues by firms with leverage above target – or equity issues by firms whose leverage is below target – are quite rational given the cost structure of public security offerings.

- Investment spending increases associated with SEOs tend to be permanent – not investment spikes as described by DDW (2011).

- Partial-adjustment models employed by Fama and French (2002), Flannery and Rangan (2006), and Huang and Ritter (2009) are mispecified and consequently their coefficient estimates offer little insight into what is a much more nuanced leverage-adjustment process.

- The time-series changes in shareholder payouts around SEOs occur primarily through changes in repurchases, not dividends as assumed by Rozeff (1982) and Easterbrook (1984).

- The reduction in cash balances preceding the SEO appear to be in anticipation of the SEO, and thus the SEO is not caused by cash demands, as suggested by DeAngelo et al. (2010).

Our analysis provides a more integrated framework – one generally consistent with the documented cross-sectional and time-series evidence of corporate financial management – while resolving a number of reported anomalies that arise within the testing of our current complement of financial-management models. A key element of our analysis is that in deciding the firm's optimal financial policies corporate managers are rational, rather than myopic. These choices must be evaluated together with firms' investment policy and various aspects of firm characteristics. Our analysis therefore represents an important step in developing a better integrated, more transparent understanding of corporate financial management.

Appendix A. SEOs and stock returns

Theory

The literature on SEOs and shareholder returns yields several hypotheses (see Smith, 1986): (1) The combination of the information asymmetry between managers and investors coupled with managers' flexibility in timing the offering announcement implies negative abnormal returns associated with SEO announcements. (2) Firms with greater information asymmetries should have more negative announcement period stock-price reactions. (3) Firms with larger post-SEO increases in investment spending should have larger pre-announcement cumulative average residuals and larger (less negative) announcement period abnormal returns. (4) The stock price reaction is higher (less negative) for SEO announcements stating that SEO proceeds will be used to fund investment spending than for other stated uses (Mikkelson and Partch, 1986; Walker and Yost, 2008).

Evidence

In Table A1, we tabulate the cumulative average residuals for the six months preceding the announcement of the SEO, the three-day announcement period, and 36 months following the SEO announcement. In Panel A we again divide industrial firms into three groups based on their market-to-book ratios. We also tabulate CARs for regulated utilities. And in Panel B we sort firms into high, medium and low investment groups based on their cumulative investment expenditures over the three years following the SEO as a fraction of their enterprise value the year before the SEO.

Pre-SEO Stock Returns. As expected, stock prices increase substantially for the typical industrial SEO firm over the six months before the announcement of the SEO; in Panel A their CAR is 36.99%. From Panel B, firms with a higher level of post-SEO investment as a fraction of their enterprise value have larger pre-SEO CARs (40.45% versus 33.11%). Growth firms have a larger average CARs than asset-intensive firms (41.54% versus 27.9%). Because of the required public disclosures within the regulatory process, information about a regulated utility's investment program is released over an extended period and hence CARs for regulated utilities are smallest (9.05%).

Announcement-Period Returns. Our evidence in Table A1A shows that over the three-day SEO announcement period, the typical industrial firm's stock price falls by 2.16% (also see Smith, 1986). Because growth firms have greater information asymmetries than asset-intensive firms, growth firms have announcement period CARs that are more negative than that of asset-intensive firms (−2.43% versus −1.39%). And as expected, announcement CARs for utilities again are least negative (−1.12%). As reported in Panel B, industrial firms that undertake larger investment projects after the SEO have higher (less negative) announcement period CARs, −1.74% versus −2.14% and − 2.65% (see also Jung et al., 1996).

Both Mikkelson and Partch (1986) and Walker and Yost (2008) report that the stock price reaction is higher (less negative) for an SEO announcement that states that SEO proceeds will be used to fund investment spending than for other stated purposes. Yet in the documents filed with the SEC, over 75% of our SEOs simply state that the primary use of the funds raised will be for general corporate purposes. Within our data, explicitly linking the primary use of SEO proceeds with specific projects is done in less than 6% of SEOs. Moreover, we cannot reproduce the Mikkelson and Partch finding using our data; we find no significant difference in announcement-period returns based on the stated uses of funds despite having a sample of SEO firms that is over seventy times larger than those employed in prior studies of this issue. However note two things: (1) Our data is from COMPUSTAT, which reports the primary use of funds stated in the SEC filings. Mikkelson and Partch use data from *Wall Street Journal* articles. It is possible that the *WSJ* reporters access more information than just the primary use of funds stated within the filings. (2) Firms with larger post-SEO investment spending have higher (less negative) announcement-period returns.[20]

Post-SEO Returns. The large negative abnormal returns following SEOs that we report in Table A1 also have been noted in prior studies. These negative returns represent an apparent violation of market efficiency and (with the possible exception of the market-timing model) are not an implication of any of the extant financial-management theories.

Several explanations have been offered for this post-SEO negative drift. These explanations basically focus on two potential issues, statistical power and the potential mis-specification of normal expected returns: (1) Estimating abnormal returns over long time periods is difficult and these tests have low power (Kothari and Warner, 2007). (2) There are potentially serious specification problems. Specifically SEOs are likely to be associated with variance increases, which reduce power (Kothari and Warner, 1997). (3) The estimated negative abnormal returns cluster; they are concentrated in small firms with substantial growth options in their investment opportunity sets (Brav et al., 2000). (4) Risk is mis-estimated because the firm's investment opportunity set changes materially around this event as growth options are developed before the SEO and then transformed into tangible assets following the SEO. For this reason, models that assume normal expected returns are constant are too simple (Carlson et al., 2006). (5) Adding an investment factor into standard regressions reduces the estimated under-performance substantially (Lyandres et al., 2007). These problems result in an overstatement of either estimated precision or normal expected returns.

We have little to add except to note that leverage falls prior to an SEO and increases thereafter; reaching its pre-SEO level only after eight quarters. These leverage changes also lower the risk of the firm's equity, lowering its required return from three years before the offering to two years afterward.

Table A1

Stock returns surrounding SEOs

The tables present the mean market-adjusted buy and hold abnormal returns (BHARs) for the six months preceding the SEO, the mean announcement period cumulative abnormal returns (CARs) from event day −1 to +1 and the 36 months BHARs following the SEO. All abnormal returns are in percentages, the associated *t*-statistics are in parentheses. BHAR is benchmarked by the contemporaneous CRSP value-weighted market returns. The three-day CAR is computed based on the two parameter market model in which the market return is the CRSP value-weighted market return.

Panel A: Industrial SEO firms are classified into high, medium, and low V/A groups based on their prior year ranking of the V/A ratio in the COMPUSTAT population.

	V/A high	V/A medium	V/A low	Industrial SEOs	Utility SEOs
Pre-SEO BHAR	41.54	31.13	27.97	36.99	9.05
	(32.71)	(25.12)	(11.11)	(41.69)	(8.11)
CAR[−1, +1]	−2.43	−2.02	−1.39	−2.20	−1.12
	(−18.72)	(−13.70)	(−4.56)	(23.16)	(−8.09)
Post-SEO BHAR	−21.83	−11.68	−1.44	−16.86	2.54
	(−14.87)	(−6.53)	(−0.46)	(−15.52)	(2.59)

Panel B: Industrial SEOs are sorted into three equal-size groups based on their post-SEO three year cumulative investment relative to the firm value in the year prior to the SEO.

	I/V high	I/V medium	I/V low	Utility SEOs
Pre-SEO BHAR	40.45	38.21	33.11	9.05
	(28.19)	(26.92)	(19.42)	(8.11)
CAR[−1, +1]	−1.74	−2.14	−2.65	−1.12
	(−11.68)	(−13.85)	(−14.54)	(−8.09)
Post-SEO BHAR	−5.87	−17.85	−29.50	2.54
	(−3.03)	(−10.86)	(−14.35)	(2.59)

Table A2

The post-issue investment by SEO firms.

The table presents the median post-issue investment of SEO firms. Investment (I_t) is the total investment at fiscal year t, which includes capital expenditure (CAPX), and if available, acquisition expense (AQC) and increase in investments (IVCH). In each year, we divide all COMPUSTAT firms into three equal-size groups based on the V/A ratio in the previous fiscal year. Control firms are non-SEO firms in the same V/A group of the same year. The median investment ratios of the control firms are used as the benchmark for the SEO firm's investment ratios. In first two rows, average post-issue investment is deflated, respectively, by the book value of assets (A_{-1}) and the market value of the firm (V_{-1}) at the pre-issue year-end. The third row presents the net average investment growth rate. The fourth and fifth rows present the net growth in total assets and market value during the

[20] Walker et al. (2016) find that firms that state their intention to invest and those that invest in positive NPV projects but make no statement have higher (less negative) announcement period returns associated with subsequent SEOs.

three-year window. The last column presents the median excess investment of SEO firms relative to their contemporaneous V/A-matched control firms.

Variables	V/A low		V/A medium		V/A high		Excess Investment (SEO – Control)
	Control firms	SEO Firms	Control firms	SEO Firms	Control firms	SEO Firms	
$(1/3)\sum_{t=0}^{2} I_t/A_{-1}$	0.069	0.125	0.086	0.168	0.109	0.214	0.075 ($p < .001$)
$(1/3)\sum_{t=0}^{2} I_t/V_{-1}$	0.086	0.138	0.071	0.133	0.046	0.083	0.040 ($p < .001$)
$\left((1/3)\sum_{t=0}^{2} I_t - I_{-1}\right)\Big/ I_{-1}$	0.086	0.373	0.157	0.649	0.357	1.156	0.563 ($p < .001$)
$(A_2 - A_{-1})/A_{-1}$	0.127	0.401	0.221	0.688	0.415	1.173	0.516 ($p < .001$)
$(V_2 - V_{-1})/V_{-1}$	0.224	0.609	0.225	0.699	0.190	0.478	0.315 ($p < .001$)
Proceeds/ $\sum_{t=0}^{2} I_t$		0.242		0.270		0.638	

Table A3
Cash acquisitions conducted by post-SEO firms.
The follow table reports the number of cash acquisitions conducted by post-SEO firms, in quarterly interval. There are 7039 industrial and 1569 regulated utility SEO firms. Cash acquisitions include all acquisitions with cash payment amounting to at least 5% of the acquirer's market capitalization in the previous month. Tender offers are acquisitions with the value of tender offer being at least 5% of the acquirer's market capitalization in the previous month (they are a subset of cash acquisitions).

Post-SEO Quarter	Cash acquisition count		Tender offer count	
	Industrial	Utility	Industrial	Utility
1	255	23	9	3
2	155	17	8	0
3	158	18	10	1
4	158	10	12	0
5	137	11	10	2
6	136	17	12	1
7	101	9	10	1
8	124	13	13	0
9	114	7	12	0
10	100	9	6	1
11	110	5	18	0
12	112	8	12	3
13	114	8	19	0
14	99	10	11	0
15	99	7	12	0
16	80	6	10	1
17	85	10	18	2
18	80	7	14	1
19	91	3	15	1
20	93	7	9	1

Table A4
Leverage ratios surrounding SEOs in quarterly frequency.
The table presents the mean and median market and book leverage ratios of issuing firms from 12 quarters before the offering to 20 quarters after the equity offering. The quarter of equity offering is defined as quarter 0. The data is obtained from COMPUSTAT's fundamental quarterly file.

Quarter relative to the SEO	Market leverage			Book leverage			N
	Mean	Median	Skew	Mean	Median	Skew	
−12	0.193	0.143	0.854	0.242	0.220	0.599	4050
−11	0.191	0.143	0.868	0.242	0.218	0.634	4184
−10	0.191	0.147	0.869	0.244	0.223	0.635	4337
−9	0.189	0.141	0.861	0.245	0.223	0.616	4503
−8	0.188	0.140	0.871	0.246	0.220	0.656	4778
−7	0.187	0.140	0.915	0.244	0.223	0.648	4987
−6	0.187	0.140	0.895	0.246	0.226	0.633	5270
−5	0.185	0.137	0.922	0.248	0.223	0.648	5535
−4	0.184	0.136	0.927	0.251	0.231	0.621	5918
−3	0.179	0.129	0.971	0.249	0.228	0.634	6118
−2	0.173	0.121	1.005	0.254	0.231	0.607	6326
−1	0.168	0.114	1.010	0.263	0.248	0.568	6364
0	0.141	0.079	1.247	0.202	0.156	0.902	6566

(*continued on next page*)

Table A4 (*continued*)

Quarter relative to the SEO	Market leverage			Book leverage			N
	Mean	Median	Skew	Mean	Median	Skew	
1	0.143	0.078	1.248	0.202	0.156	0.883	6440
2	0.151	0.092	1.193	0.212	0.170	0.841	6408
3	0.161	0.105	1.137	0.221	0.184	0.760	6322
4	0.171	0.116	1.093	0.228	0.195	0.736	6310
5	0.177	0.126	1.059	0.234	0.202	0.716	6044
6	0.183	0.134	1.029	0.241	0.213	0.696	5893
7	0.188	0.141	1.016	0.245	0.219	0.701	5776
8	0.197	0.151	0.970	0.251	0.227	0.680	5704
9	0.199	0.153	0.950	0.253	0.231	0.674	5494
10	0.202	0.155	0.937	0.255	0.230	0.657	5350
11	0.203	0.160	0.928	0.256	0.236	0.609	5215
12	0.208	0.168	0.904	0.259	0.241	0.593	5090
16	0.213	0.173	0.900	0.263	0.245	0.625	4581
20	0.215	0.178	0.870	0.264	0.246	0.634	4132

Table A5

Robustness check of Fama-MacBeth regression results.

Panel A: deflated by book value and using book leverage ratios. This table reports the Fama-MacBeth regression results, in which the dependent variable net debt issues are deflated by the book value of assets at the end of SEO quarter and the independent variables are book leverage deviation at quarter 0 and equity financing proceeds deflated by book value of assets at quarter 0.

Dep. Var.	$(D_4 - D_0)/A_0$			$(D_8 - D_0)/A_0$			$(D_{12} - D_0)/A_0$		
Intercept	0.086	0.080	0.077	0.188	0.143	0.134	0.279	0.179	0.167
	(12.88)	(9.50)	(8.81)	(14.26)	(11.50)	(10.57)	(15.46)	(8.80)	(8.06)
$D_0/A_0 - TGT$	−0.158		−0.129	−0.298		−0.231	−0.296		−0.230
	(−4.02)		(−3.32)	(−3.50)		(−2.95)	(−2.21)		(−1.94)
Proceeds/A_0		0.140	0.125		0.321	0.313		0.491	0.489
		(2.76)	(2.46)		(4.14)	(4.18)		(5.50)	(5.45)
N	161	161	161	151	151	151	141	141	141
R^2	2.54%	3.27%	5.24%	2.94%	6.14%	8.40%	2.73%	11.53%	13.86%

Panel B: Using alternative proxy for target leverage. In this table, we use an alternative proxy for target market leverage, in which target leverage is the fitted value of the cross-sectional regression of leverage on total assets, the market-to-book assets ratio, the proportion of tangible assets, profitability, and an industry dummy at the year of SEO.

Dep. Var.	$(D_4 - D_0)/V_0$			$(D_8 - D_0)/V_0$			$(D_{12} - D_0)/V_0$		
Intercept	0.080	0.032	0.030	0.136	0.054	0.055	0.204	0.081	0.082
	(4.43)	(5.19)	(4.40)	(13.53)	(5.53)	(5.12)	(14.30)	(6.43)	(5.85)
$D_0/V_0 - TGT$	−0.176		−0.029	−0.117		−0.037	−0.073		0.010
	(−1.68)		(−0.91)	(−2.20)		(−0.83)	(−1.09)		(0.19)
Proceeds/V_0		0.397	0.403		0.605	0.600		0.696	0.692
		(4.50)	(4.31)		(7.06)	(7.29)		(8.38)	(8.42)
N	156	156	156	152	152	152	141	141	141
R^2	2.85%	6.56%	8.70%	2.72%	10.21%	12.60%	2.09%	14.66%	16.55%

Table A6

Payout policy of SEO firms.

The table reports the mean and median total payout yield (dividends+repurchases) of the SEO firms in the year prior to the SEO. SEOs are divided into Industrial SEOs and Utility SEOs. The industrial SEOs are divided into low, medium and high market-to-book firms based on their market-to-book ratios in the COMPUSTAT/CRSP universe in the year prior to the SEO.

	V/A high	V/A medium	V/A low	Industrial firms	Utility firms
Mean	0.64%	2.43%	3.32%	1.50%	8.30%
Median	0.00%	0.08%	0.79%	0.00%	8.28%
Number of SEOs	3374	1765	669	5808	1521

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