Explanation for market response to seasoned equity offerings*

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Abstract This paper uses a multivariate framework to extend the recent univariate seasoned equity offering (SEO) research by Hull, Kwak and Walker (2010) that investigates the valuation impact of inside ownership. Our multivariate findings add to the univariate findings as we show that the inside ownership level is a consistent factor in accounting for short-run and long-run returns around SEOs, while the decrease in inside ownership has no impact on short-run returns but influences long-run returns in a manner inconsistent with signaling theory. Compared to prior research, our regression tests do a much better job of accounting for returns associated with SEO announcements. For short-run regression tests, the four major factors associated with superior stock returns are: lower underpricing; greater profitability prior to SEO; lower inside ownership level; and, less stock price variability prior to SEO. For long-run regression tests, the four major conditions linked to superior returns are: greater profitability prior to SEO; smaller inside ownership level; relative size of the offering; and, greater decrease in inside ownership level.

Keywords Inside ownership · Seasoned Equity Offering · Signaling theory

JEL Classification D82 · G14 · G32

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Abstract In this paper, we use a multivariate framework to extend the recent univariate seasoned equity offering (SEO) research that investigated the valuation impact of inside ownership. Our multivariate findings re-enforce and add to the univariate findings as we show that the inside ownership level is a consistent factor in accounting for short-run and long-run returns around SEOs, while the decrease in inside ownership has no impact on short-run returns but influences long-run returns in a manner inconsistent with signaling theory. Compared to prior research, our regression tests do a much better job of accounting for returns associated with SEO announcements. For short-run regression tests, the four major factors associated with superior stock returns are: lower underpricing; greater profitability prior to SEO; lower inside ownership level; and, less stock price variability prior to SEO. For long-run regression tests, the four major conditions linked to superior returns are: greater profitability prior to SEO; smaller inside ownership level; relative size of the offering; and, greater decrease in inside ownership level.

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1 Introduction

This paper uses firms undergoing seasoned equity offerings (SEOs) to investigate the influence of both the level of inside ownership and the change in this ownership level within a regression framework. Myers and Majluf (1984) argue that an SEO signals negative news about overvaluation with the strength of the negative signaling increasing as the level or proportion of inside ownership increases. Leland and Pyle (1977) predict that insiders signal negative information to the extent insiders lower their ownership levels by (i) not buying primary SEO shares or (ii) selling shares if secondary shares are involved in the SEO.

SEOs in our data set cover 1999 through 2005. We divide these seven years into two periods: the bubble period covering 1999–2001 and the post-bubble period covering 2002–2005. The bubble period contains both the height of the internet-technology bubble and also the bursting of this bubble. SEOs occurring during this bubble period are characterized by greater price volatility attributable to the greater pre-SEO price run-ups.

From our short-run tests that extend to about a calendar month surrounding SEOs, we find superior (or less inferior) stock returns for these four major conditions: lower underpricing; greater profitability prior to SEO; lower inside ownership level; and, less stock price variability prior to SEO. For our long-run tests, we find superior stock returns for the four years surrounding SEOs for these four major conditions: greater profitability prior to SEO; smaller inside ownership level; relative size of the offering; and, greater decrease in inside ownership level. If we focus on either the pre-SEO or the post-SEO returns, two other variables can be deemed important in explaining both short-run and long-run returns surrounding SEOs. These two variables are pre-SEO price variability and time period of occurrence. Because coefficient signs for these variables are opposite for the pre-SEO and post-SEO tests, these variables do not consistently influence the stock return for the four years around SEOs for all tests. For long-run tests, leverage and Tobin Q variables give opposite pre-SEO and post-SEO effects.

In terms of overall statistical significance for all short-run and long-run tests, the following six variables are the most important: pre-SEO profitability, inside ownership level, pre-SEO price variability, period of occurrence, underpricing, and change in inside ownership. The first two variables are the two most important variables and owe their greater importance to their significant pre-SEO and post-SEO coefficients that have the same predicted coefficient signs for both short-run and long-run returns. The two inside ownership variables (inside ownership level and change in inside ownership level) are included among the six most important variables. However, the significant results for the change in inside ownership are inconsistent with signaling theory based in Leland and Pyle (1977). The inconsistency results because greater insider selling does not signal poorer post-SEO performance. Underpricing is one of the six most important explanatory variables but owes its importance strictly to its impact on short-run price behavior. Two variables (pre-SEO price variability and period of occurrence) owe their importance to their opposite influence on pre-SEO and post-SEO returns.

Our regression tests compare favorably with extant research in terms of accounting for the stock price behavior that accompanies SEOs. For example, our short-run three-day return has an R^2 of 0.20. This is about three times greater than prior short-run SEO regression studies. To illustrate, Asquith and Mullins (1986) examine 140 SEOs with primary and secondary components and find an R^2 of 0.064; Hull and Moellenberndt (1994) report an R^2 of 0.06 for 496 SEOs; Hull and Mazachek (2001) find an R^2 value of 0.07 for 455 observations; and, Errunza and Miller (2003) report an R^2 of 0.07 for 123 U.S.A. and foreign SEOs. The SEO regression research on long-run price behavior is sparser than the short-run regression research. This makes it difficult to find comparable studies in terms of the number of observations used in tests. Kahle (2000) and Gao and Mahmudi (2008) perform long-run regression tests but analyze much greater sample sizes. They both report an *adjusted* R^2 of 0.02 for a post-SEO three-year return, which is below our R^2 of 0.14 for both of our post-SEO two-year tests. While not reported in table format, we find an *adjusted* R^2 of 0.23 when raw returns are used for this test. While our pre-SEO long-run returns yield an R^2 of 0.28 for one test, the independent variables included for this test cannot be classified as strictly causal because they occur during or immediately after the time period associated with our pre-SEO dependent return variable. In conclusion, our regression tests do a much better job than prior research when accounting for returns that accompany SEO announcements.

We organize the remainder of our paper as follows. Section 2 gives a literature review. Section 3 presents our sample, methodology and summary statistics. Section 4 offers our general regression model and predictions for independent variables. Section 5 provides empirical results for short-run tests, while Section 6 reports results for long-run tests. Section 7 overviews other tests and future research. Section 8 gives a summary.

2 Literature review

2.1 Inside ownership research

Researchers (Vermaelen, 1981; John and Lang, 1991; Hirschey and Zaima, 1989; Seyhun, 1990; Han and Suk, 1998; Fried, 2005; Firth, Leung and Rui, 2008) collectively show that inside ownership can significantly influence stock price behavior in a variety of ways including dividend initiations, repurchases, sell-offs, take-over bids, stock splits, and share repurchases. In regards to the study of inside ownership as applied to security offerings, there is a variety of research (Gerard and Nanda, 1993; Lee, 1997; Kahle, 2000; Limpaphayom and Ngamwutikul, 2004; Ching, Firth, and Rui, 2006; Cornett and Travlos, 1989; Hull and Mazachek, 2001; Lundstrum, 2009; Hull, Kwak, and Walker, 2010). This research covers the investigation of (i) insider trading before and after the time of the announcement, (ii) the inside ownership level at the time of the announcement, and (iii) the change in the inside ownership level at the time of a security offering announcement. Prior to Hull, Kwak, and Walker (2010), the change in inside ownership level research associated with SEOs was neglected other than attempts by researchers (Cornett and Travlos, 1989; Hull and Mazachek, 2001) to proxy for insider selling by using the percent change in common stock or the amount of secondary selling.

The findings of insider empirical research, especially as applied to SEOs, are often cited as being consistent with signaling theory originating with Myers and Majluf (1984) and Leland and Pyle (1977). Each of these two theories assumes that insiders have a private information advantage. Concerning this advantage, Myers and Majluf suggest that insiders-managers know more and can take advantage of this knowledge by issuing securities when they are overvalued. Because investors know that a firm does not have to issue equity (such as when it has financial slack), Myers and Majluf argue that issuing equity sends a strong negative signal about overvaluation. It follows that firms with higher levels of inside ownership (who have more to gain from issuing an overvalued security) should signal more negative news when they announce a negative corporate event such as an SEO.

The signaling theory of Leland and Pyle posits that the change in the inside ownership level impacts stock value but this theory makes no real mention of the role of any absolute level or proportion. Leland and Pyle suggest that insiders can signal that a project is good (bad) if they maintain or increase (decrease) their ownership level at the time of an equity offering. Thus, if markets are efficient and insiders have information not known to the market, then how insiders change their ownership levels at the time of an SEO should determine the market response.

2.2 Seasoned equity offering (SEO) research

SEOs provide an ideal experimental setting to examine signaling theories premised on superior insider knowledge since prospectuses can reveal both the level of inside ownership and the change in this inside level caused by the amount of insider selling and buying that will accompany the SEO. The SEO line of research has its origins in a number of short-run announcement period studies beginning with Masulis (1983) and Mikkelson and Partch (1986) who find negative announcement period returns. Regardless of the purpose of the offering, the consensus is that the negative market short-run market response occurs because SEOs signal negative news about stock overvaluation. If this is the case, then greater negative news should be signaled to the extent that insiders have more at stake. Hull and Mazachek (2001), Lundstrum (2009), and Hull, Kwak, and Walker (2010) all find that greater inside ownership levels cause greater negative announcement period returns for SEOs and thus greater signaling about overvaluation.

The long-run SEO research, like the short-run SEO research, is plentiful. For example, Spiess and Affleck-Graves (1995) analyze SEOs from 1975 through 1989 and find that their post-offering performance is worse than a sample of matched non-SEO firms that did not issue equity. This poorer performance suggests that managers undertake SEOs to take advantage of overvaluation. Rangan (1998) blames the poorer post-SEO stock price performance on overvaluation that occurs during the price run-ups prior to SEOs. Jegadeesh (2000) uses a number of benchmarks to examine the long-run performance of SEO firms and finds that SEO stock prices significantly underperform these benchmarks for long periods following SEOs. Clarke, Dunbar, and Kahle (2001) examine insider trading surrounding SEOs and discover that the market fails to fully capitalize the negative information in the offering announcement and the insider trading that is taking place around this time. This finding indicates that insiders can use SEOs to change their ownership levels without revealing the extent of their motives. Much of the long-run SEO research (Ritter and Loughran, 1995; Kothari and Warner, 1997; Lyon, Barber, and Tsai, 1999; Panagiotis, 2009; Lyandres, Sun, and Zhang, 2008) focuses on problems related to interpretation of this performance given the disagreements over methodologies. Thus, one must be cautious in interpreting long-run results because long-run abnormal return methodologies are viewed with skepticism and sharp disagreements are found (Kothari and Warner, 1997; Barber and Lyon, 1997; Lyon, Barber, and Tsai, 1999; Mitchell and Stafford, 2000; Li and Zhao, 2006). As argued by Hull, Kwak, and Walker (2010) univariate comparison tests can minimize methodology problems to the extent methodological errors are canceled out in the comparison process. Likewise, multivariate regression tests can also render correct results regardless of the long-run methodology used. This is because different methodologies should render long-run abnormal returns that are highly correlated since the main component of each methodology involves its cumulative long-run raw return.

2.3 Potential explanatory variables

Inside ownership variables are potential explanatory variables when trying to understand stock price behavior surrounding SEOs. In particular, Myers and Majluf (1984) theorize that the level of inside ownership is an important factor, while Leland and Pyle (1977) predict that it is the change in the inside ownership level that is important. Besides inside ownership effects, there are other effects that should be considered in a regression analysis that seeks to weigh possible factors capable of accounting for the market response to SEOs. For example, Bhushan (1989) advocates a size effect related to greater asymmetric information for smaller firms. Myers and Majluf (1984), Miller and Rock (1985), and Brennan and Kraus (1987) suggest that the purpose of the offering can have an impact. Jensen and Meckling (1976) and Jensen (1986) argue for agency effects related to a firm's leverage choice. Smith (1977), Hull and Fortin (1993/1994) and Hull and Kerchner (1996) posit an impact from issue expenses.

Grinblatt and Hwang (1989) generalize the Leland and Pyle model by allowing for both the mean and the variance of the project's cash flow to be unknown. A central finding that emerges from their analysis is that inside ownership is not sufficient to signal the project's expected value. In their model a second signal, the degree of underpricing, is needed. Thus, when explaining market price behavior at the time of an SEO, it could be useful to include an underpricing variable along the lines suggested by Corwin (2003) who provides an analysis of SEO underpricing. DeAngelo, DeAngelo, and Stulz (2010) argue that SEOs are undertaken to resolve a near-term liquidity squeeze. In light of this finding, a regression analysis should examine variables capturing a "liquidity" motive. Finally, researchers

(Ritter and Loughran, 1997; Harvey, Lins, and Roper, 2004) suggest a variety of accounting performance variables that can be used to help augment multivariate tests. Besides those mentioned above (like leverage and liquidity), accounting-based variables that can be used include those capturing valuation effects associated with growth, profitability, and Tobin's Q. It remains to be seen if any of the above-mentioned variables have merit when used with variables representing (i) the Myers and Majluf (1984) school of thought that speaks to the "absolute" inside ownership level and (ii) the Leland and Pyle (1977) way of thinking that argues for the "change" in the inside ownership level.

3 Sample, methodology, and descriptive statistics

3.1 Sample

The following five screening criteria are used to determine inclusion in our SEO sample. *First*, a firm must announce its SEO in the *Investment Dealers' Digest* (*IDD*) from January 1999 through December 2005. *Second*, the firm's shares must have trading data in the Center for Research in Security Prices (CRSP). *Third*, we must be able to get a prospectus that is filed with an SEO registration statement. This screen eliminates private placements that are not required to file registration statements.

Fourth, the prospectus must provide information to compute the "change in inside ownership" brought about by an SEO and defined as: (Insider Shares after SEO / Shares Outstanding after SEO) minus (Insider Shares before SEO / Shares Outstanding before SEO) where "insider" includes (i) officers and directors as a group and (ii) any other owner who possesses five percent or more of the company's shares. For all computations, we find only one increase in the inside ownership level. For this reason, we refer to the "change" in insider level as a "decrease" and thus negative mean and median values occur for the variable representing the insider change. This screen tends to eliminate firms with low insider holdings who would have nothing to report in its prospectus. *Fifth*, the prospectus must indicate a primary purpose for the offering so that we can classify it as either expansionary or non-expansionary. Examples of a non-expansionary classification include offerings done primarily to reduce debt or to allow current holders to sell shares.

After applying these screens, we are left with a working sample of 706 SEOs. This sample is unique in the sense that it is characterized by firms with higher levels of inside ownership. We examined the 1,599 SEOS that did not satisfy all of our criteria but still had CRSP data. Besides including firms with lower inside ownership levels, this sample appears to be biased by containing SEOs with less stock price run-ups. This indicates that SEOs in our sample of 706 observations have more to gain if the stock price run-up represents greater overvaluation.

3.2 Methodology

We utilize the established abnormal return methodology described previously by researchers (Lyon, Barber, and Tsai, 1999; Li and Zhao, 2006; Viswanathan and Wei, 2008; Hull, Kwak, and Walker, 2010) where the holding period's abnormal return equals that period's compounded raw stock return minus its compounded expected return. Short-run compounded raw stock returns are figured by compounding *daily* raw stock returns for a designated holding period, while long-run compounded raw stock returns are calculated by compounding *monthly* stock returns for a selected holding period. In regards to the specific details, we follow Hull, Kwak, and Walker (2010) in computing short-run and long-run abnormal returns. This procedure is described below.

For short-run return calculations, the daily expected return is computed using the OLS procedure described by Brown and Warner (1980) where alphas and betas are calculated using an equal-weighted exchange-based index to represent the market where "exchange-based" indicates the exchange on which the stock is traded: NYSE, AMEX or NASDAQ. We utilize a six-year estimation period (from three years before to three year after the announcement date) to calculate alpha and beta parameters. For firms not traded over the full six years, we use whatever trading data are available on CRSP. For long-run expected returns, we use the equal-weighted exchange-based index's monthly return to represent the expected return. Once short-run (long-run) expected returns are computed for each day (month), we are then able to calculate the holding period's compounded expected return. Subtracting the compounded expected return from the compounded raw return gives the compounded abnormal return.

Our general findings are robust to other variations used to get expected returns including the weighting scheme used (equal-weights or value-weights), the index used (exchange-based index or NYSE/AMEX/NASDAQ index), the method used (simple index versus the OLS procedure), or the estimation period used for computing OLS parameters. Due to disagreements over the best method to use especially when computing long-run expected return (Ritter and Loughran, 1995; Kothari and Warner, 1997; Lyon, Barber, and Tsai, 1999; Panagiotis, 2009; Lyandres, Sun, and Zhang, ~~2009~~ 2008), we also tested just raw returns. Whatever methodology is used to get a compounded expected return, this return has to be subtracted from the compounded raw return. Thus, it is the raw return that should drive the regression results regardless of the methodology used to compute the expected return. While using raw returns give similar results compared to abnormal returns, it can be pointed out that the use of raw returns yield *F* values that tended to be smaller for pre-SEO long-run returns and greater for post-SEO long-run returns. However, all *F* values are highly significant regardless of using compounded raw returns or compounded abnormal returns.

3.3 Descriptive statistics for key variables

Table 1 provides descriptive statistics in two panels. Panel A in Table 1 gives the number of observations for each year followed by its percentage of the sample's total. The earlier years of 1999–2001 represent 54% of the sample number while forming just 43% of the sample years. These three years of 1999–2001 are the group of years that best characterize SEOs in our sample that capture the internet-technology bubble period. This period covers the years where prices begin escalating sharply during 1999 before deteriorating during 2001 when the bubble bursts.

Panel B in Table 1 reports mean and median statistics for key variables with medians reported in parentheses. Since the key variables in Panel B are used in regression tests where outliers can pose problems, we checked all variables for outliers to see if winsorization was desirable. This check revealed a need to winsorize the *Tobin's Q Ratio* and the *Profitability Ratio*. We winsorized the extreme values for these two variables as follows. We divided the sample into 40 percentile groups so that each group contains 2.5% of the sample's observations. We then set the low extreme values (in the first percentile group) equal to the first value in the next percentile group and high extreme values (in the last percentile group) equal to the last value in the next-to-last percentile group.

The "*Total Shares Offered*" variable has a mean of 6.83 million shares with one-quarter of these shares being typically offered by current owners as reflected in the median value of 0.250 for the variable "*Secondary Selling Level*." The mean "*Offer Value*" is $213 million and the mean "*Common Value*" is 2.06 billion. The "*Issue Cost Level*" variable averages –0.0084 with the negative sign indicating a cost from a current shareholder's viewpoint. Thus, if shareholders are responsible for issue costs, then these costs cause a fall in value of about 84 cents per $100 dollar of common ownership. The computation of –0.0084 does not include the expenses from the secondary shares sold (as these expenses are assumed to be paid by those who sell the secondary shares). The –0.0084 value can be significantly understated because it does not consider noncash expenses like employees' time, warrants given to underwriters, and underpricing. Although not given in Table 1, the cost to the firm for every dollar raised is about six cents. The "*Inside Ownership Level Before*" has a mean of 0.491 indicating that, on average, about half of the total shares outstanding before an SEO are owned by insiders.

The remaining ten variables in Panel B in Table 1 will all be found in at least one regression test reported later. The mean "*Inside Ownership Level After*" is 0.384 indicating insiders own over 38 out of every one hundred shares outstanding after the SEO is completed. The mean "*Change in Inside Ownership Level*" is –0.107 with a minus sign reflecting the lowering of the inside ownership proportion caused by the SEO where insiders very rarely buy primary shares while often selling their holdings when secondary shares are involved in the offering. The –0.107 reflects the fall in the mean insider ownership level from 0.491 before the SEOs to 0.384 after the SEOs. For our sample, there is only one observation that had a positive inside ownership change and five that showed no change.

The "*Relative Size of Offering*" has a mean value of 0.195 indicating that about 20 shares are being offered for every 100 outstanding. We compute underpricing following prior research (Hull and Fortin, 1993/1994; Hull and Kerchner, 1996) as a negative value to represent a negative impact on shareholder wealth from selling a security below its market value. The mean for "*Underpricing*" is –0.0371 indicating that the offering price is 3.71% below its estimated price. This estimated price used in the underpricing computation is taken from *IDD*. The negative sign for underpricing emphasizes the lost value to outstanding shareholders. The lost value would be –0.0371 times the dollar value of the offering with the loss directly attributed to selling shares below the current market value. The "*Volatility*" variable represents the standard deviation of daily stock returns two years before SEOs and has a mean of 0.0458, which is high compared to most reported norms but is in keeping with our sample and years covered. For the 25 observations with a missing return for at least one day, the volatility is computed using whatever returns are available.

Table 1 Descriptive statistics for time periods and key variables

Panel A *Years*		*N (%)*	*Years*	*N (%)*
	1999	140 (19.8%)	2003	75 (10.6%)
	2000	143 (20.3%)	2004	95 (13.5%)
	2001	101 (14.3%)	2005	70 (9.9%)
	2002	82 (11.6%)	1999–2005	706 (100%)

Panel B *Key variables*	*Means*	*(Medians)*
Total Shares Offered: Primary Shares Offered + Secondary Shares Offered	6.83M	(4.40M)
Secondary Selling Level: Secondary Shares / Total Shares Offered	0.396	(0.250)
Offer Value: (Offer Price) × (Total Shares Offered)	213M	(111M)
Common Value: (Offer Price) × (Shares Outstanding before SEO)	2.06B	(0.66B)
Issue Cost Level: Issue Costs / Common Value	–0.0084	(–0.0053)
Inside Ownership Level Before: (Insider Shares before SEO) / (Shares Outstanding before SEO)	0.491	(0.467)
Inside Ownership Level After: (Insider Shares after SEO) / (Shares Outstanding after SEO)	0.384	(0.345)
Change in Inside Ownership Level: (Inside Ownership Level After) – (Inside Ownership Level Before)	–0.107	(–0.091)
Relative Size of Offering: Total Shares Offered / Shares Outstanding before SEO	0.195	(0.171)
Underpricing: (Offer Price – Estimated Price) / (Estimated Price)	–0.0371	(–0.0300)
Volatility: Daily standard deviation of a firm's stock return for the two years before its SEO	0.0458	(0.0421)
Tobin's Q Ratio: (Common Value + Total Asset – Book Value Equity) / Total Assets (n = 699)	7.114	(2.667)
Profitability Ratio: (Operating Income before Depreciation) / Total Assets (n = 682)	0.026	(0.100)
Tangible Assets Ratio: (Net Plant and Equipment) / Total Assets (n = 682)	0.228	(0.137)
Growth Ratio: Capital Expenditures / Total Assets (n = 676)	0.059	(0.037)
Leverage Ratio: Total Liabilities / (Total Liabilities + Common Value) (n = 699)	0.249	(0.161)

This table provides descriptive statistics. Panel A gives the number of observations for each year followed by its percentage of the sample's total. This total includes the 706 SEO observations that satisfy the selection criteria described in Section 3.1 Panel B reports means and medians for key variables. *Offer Value* and *Common Value* are in U.S. dollars with M and B referring to millions and billions, respectively. Inside ownership consists of (i) officers and directors as a group and (ii) any other owner who possesses five percent or more of the company's shares. The estimated price used in computing values for the *Underpricing* variable is given by *IDD*. Underpricing, like issue costs, is considered an outflow to current owners; thus, negative values are computed so that greater underpricing is expressed with more negative values. Values for the last five *Compustat* variables are computed using available data from the fiscal year ending closest to the announcement date.

The last five variables in Panel B use accounting data taken from *Compustat*. Due to incomplete *Compustat* data, the number of observations used in computing means and medians ranges from 676 to 699. These numbers are less than our working sample of 706 observations that satisfy our screening criteria. Accounting numbers used by *Compustat* are taken from the annual financial statements occurring closest (yet prior) to the SEO announcements. For *Tobin's Q Ratio*, the replacement cost of a firm's total assets is proxied by the book value for total assets. The median for the *Tobin's Q Ratio* is 2.667. Like the *Volatility* variable, it is high compared to most reported norms but is in keeping with our sample and years covered. The median of 0.100 for the *Profitability Ratio* indicates that a typical firm issuing an SEO has operating income before depreciation that is 10% of its total assets. In regards to the last three ratios in Panel B, the typical firm (as judged by medians) has close to 14% of its total assets in net plant and equipment, has capital expenditures that are near 4% of its total assets, and has about 16% of its firm value in total liabilities.

3.4 Descriptive statistics for compounded abnormal return variables

Table 2 reports means and medians for short-run and long-run abnormal return variables. These return variables will be used as dependent variables in regression tests. Panel A provides short-run compounded abnormal returns (*SRARs*), while Panel B reports long-run compounded abnormal returns (*LRARs*). *LRARs* are given for both a "full" sample and a "partial" sample. The partial sample deletes an observation if at least one monthly return is missing. Because *SRARs* and *LRARs* have outliers that can create errant results, we winsorized the extreme values by following the procedure described previously for *TBQ* and *PFT*. While the results reported in this paper are similar whether we winsorized or not, we feel the results are more accurate if winsorization is used.

Table 2 Dependent variables used in regression tests

Panel A Four short-run compounded abnormal return (*SRAR) variables*		*Means*	*(Medians)*
Eleven-Day SRAR (day –10 to 0)		–0.0325	(–0.0354)
Three-Day SRAR (days –2, –1, 0)		–0.0260	(–0.0233)
Ten-Day SRAR (days +1 to +10)		0.0233	(0.0150)
Twenty-One-Day SRAR (days –10 to +10)		–0.0096	(–0.0200)
Panel B Three long-run compounded abnormal return (*LRAR) variables*		*Means*	*(Medians)*
Pre-SEO LRAR (months –24 to –1)	Full Sample (*n* = 706)	1.419	(0.593)
	Partial Sample (*n* = 506)	1.549	(0.610)
Post-SEO LRAR (months +1 to +24)	Full Sample (*n* = 706)	–0.201	(–0.379)
	Partial Sample (*n* = 657)	–0.202	(–0.395)
Four-Year LRAR (months –24 to +24)	Full Sample (*n* = 706)	0.804	(–0.019)
	Partial Sample (*n* = 473)	1.168	(0.188)

This table provides short-run compounded abnormal return (SRAR) and long-run compounded abnormal return (*LRAR*). Panel A gives mean and median *SRARs* for four holding periods for the 706 SEO observations that satisfy the selection criteria described in Section 3.1. Panel B reports mean and median *LRARs* for three holding periods. Because a long-run *LRAR* loses, on average, about one in five observations for pre-SEO and post-SEO tests, we follow Hull, Kwak, and Walker (2010) by reporting *LRARs* for (i) a "full sample" by using whatever monthly returns are available for each observation for a particular holding period, and (ii) a sample where an observation is deleted if at least one monthly return is missing. The *Four-Year LRAR* includes 49 months: the 24 months before the SEO, the event month, and the 24 months after the SEO.

Panel A in Table 2 reports that that the mean *Three-Day SRAR* (days –2, –1, and 0) is –0.0260. This is similar to prior SEO research that typically finds around a –0.03 (or –3%) announcement day response. The mean *Twenty-One-Day SRAR* (days –10 to +10) of –0.0096 is noticeably less negative than the mean *Three-Day SRAR* of –0.0260. The more neutral *Twenty-One-Day SRAR* of –0.0096 reflects the negative mean *Eleven-Day SRAR* (days –10 to 0) of –0.0325 and the positive mean *Ten-Day SRAR* (days +1 to +10) of 0.0233. Thus, the ten days after the offering can largely offset whatever negativity is occurring up to the day of the announcement. The *Twenty-One-Day SRAR* of

–0.0096 is similar to the negative impact from issue costs as given in Table 1 by the *Issue Cost Level* mean of –0.0084. Thus, the price negativity for these 21 days can be primarily explained by issue costs.

Consistent with prior research, Panel B reveals that Pre-SEO *LRARs* (months –24 to –1) are extremely positive. To illustrate, the Pre-SEO *LRAR* means are 1.419 for the full sample (n = 706) and 1.549 for the sample without any missing monthly returns (n = 506). These means indicate that the stock price increases about 150% regardless of which sample is used. While the *Pre-SEO LRAR* medians for each sample are virtually the same (0.593 versus 0.610), they are noticeably smaller than the means indicating that some large positive returns are driving the larger means. The negative *Post-SEO LRARs* (month +1 to +24) are like prior research. The *Post-SEO LRARs* means and medians for both the full and partial samples are almost identical (–0.201 versus –0.202 and –0.379 versus –0.395). The likeness in means and medians occur because there are fewer lost observations for *Post-SEO LRARs* for the partial sample. The *Four-Year LRAR* (months –24 to +24) for each observation is computed using CRSP return data for the 49 months consisting of (i) the 24 months before the event month, (ii) the event month, and (iii) the 24 months after the event month. From the *Four-Year LRAR* means of 0.804 and 1.168 for the full and partial samples, respectively, we see that an investor could roughly double their money during this period even after we adjust for expected returns.

4 Regression Model and Variables

4.1 General regression model

To determine a regression model from independent variables suggested by researchers (and described in Section 2.3), we begin by conducting Pearson and Spearman correlation tests. If there is no significant correlation between a dependent variable with an independent variable, then a meaningful explanatory relation should be ruled out. For briefness's sake, we do not report details for all of the independent variables tested but only those that pass the following two tests. *First*, the independent variable had to be significantly correlated with a dependent *SRAR* or *LRAR* variable given in Table 2. *Second*, it had to be significant within a regression framework when entered with other independent variables. Table 3 defines the fifteen independent variables that passed these two tests. Except for the dummy variables in Table 3, the descriptive statistics for the independent variables in Table 3 were given in Panel B of Table 1.

In determining our independent variables, we occasionally found that an independent variable could be highly significant in correlation analysis with a dependent variable but not significant in regression tests with that same dependent variable. To illustrate, consider a liquidity variable (*LIQ*) such as computed by adding cash plus short-term investments and then dividing by the market value of its common stock. Bates, Kahle, and Stulz (2009) suggest that *LIQ* should be important given the gradual increase in liquidity since 1980 that enables firms to be viewed as less risky. However, *LIQ* never entered one of our regression tests as significant because it is highly correlated with our profitability variable, *PFT*, and our risk variable, *RSD*. These two variables (*PFT* and *RSD*) apparently better capture a valuation effect that might otherwise be associated with *LIQ*.

Our general regression model includes four of the fifteen independent variables in all regression tests. These four variables are included based on following two considerations. *First*, because this study aims at extending the univariate insider research, we include two insider variables in all tests. These variables are *ILA* (which captures the inside ownership level after the SEO) and *CIL* (which represents the change in the inside ownership level caused by the SEO). *Second*, we include two additional variables because they are deemed important for our study. The first of these two variables is the time period dummy variable (*TIM*) that is judged important because our study covers the bubble period and the post-bubble period. The second variable (*RSD*) is considered important because SEOs are characterized by great stock price volatility. For example, our mean standard deviation of daily returns for the two years prior to SEOs (as given in Table 1 as 0.0458) is over 70% greater than that reported by Brown and Warner (1984). In addition, the average daily stock price volatility of 0.0530 during the bubble period is much greater than the post-bubble period average of 0.0371.

Table 3 Fifteen independent variables used in regression tests

Variable	*Definition of variable*
ILA	*Inside Ownership Level After*: (Insider Shares after SEO) / (Shares Outstanding after SEO)
CIL	*Change in Inside Ownership Level*: (Inside Ownership Level After) – (Inside Ownership Level Before)
TIM	*TIM* = 1 if SEO announced after 12/31/01; else *TIM* = 0
RSD	*Volatility*: Daily standard deviation of a firm's stock return for the two years before its SEO
UND	*Underpricing*: (Offer Price – Estimated Price) / (Estimated Price)
EXC	*EXC* = 1 if NYSE/AMEX; else *EXC* = 0
SIZ	Logarithm of *Common Value* (described in Table 1 and expressed in millions before the log is taken)
RSZ	*Relative Size of the Offering*: Total Shares Offered / Shares Outstanding
SEC	*SEC* = 1 if secondary selling greater than one-third of total offering; else *SEC* = 0
EXP	*EXP* = 1 if major purpose is expansion-related; else *EXP* = 0
TBQ	*Tobin's Q Ratio*: (Common Value+Total Asset–Book Value Equity) /Total Assets
PFT	*Profitability Ratio*: (Operating Income before Depreciation) / Total Assets
PTA	*Tangible Assets Ratio*: (Net Plant and Equipment) / Total Assets
GRO	*Growth Ratio*: Capital Expenditures / Total Assets
LEV	*Leverage Ratio*: Total Liabilities / (Total Liabilities+Common Value)

This table reports definitions for the fifteen independent variables used in regression tests. Each independent variable shares two common characteristics. *First*, the variable had to be significantly correlated with a dependent return variable. *Second*, it had to be significant when regressed against this same dependent variable when other independent variables were included in the test. *UND* values are negative so that less underpricing represents a less negative value indicating a smaller cash outflow for current equity owners.

With the above in mind, our general regression model is:

$$Return = \beta_0 + \beta_1 ILA + \beta_2 CIL + \beta_3 TIM + \beta_4 RSD + \beta_5 V5 + \beta_6 V6 + \beta_7 V7 + \beta_8 V8 + \xi.$$

Return is one of the *SRAR* and *LRAR* dependent variables described in Table 2.

ILA is the "*Inside Ownership Level After*": (Insider Shares after SEO) / (Shares Outstanding after SEO).

CIL is the "*Change in Inside Ownership Level*": (Inside Ownership Level After) – (Inside Ownership Level Before).

TIM = 1 if SEO announced after 12/31/01; else *TIM* = 0.

RSD is the daily standard deviation of a firm's stock return for the two years before its SEO.

V5 through *V8* denotes that no more than four other independent variables enter any one of our regression tests.

ξ is the error term.

Each regression test is allowed to add independent variables (beyond *ILA*, *CIL*, *TIM*, and *RSD*) to produce a set of independent variables that best explain the dependent variable being used. As will be seen later when presenting regression results, no more than four other independent variables besides *ILA*, *CIL*, *TIM* and *RSD* will enter a regression test. This is because no more than four additional variables are significant for any one test.

When conducting our regression tests, we attempt to adjust for collinearity if two independent variables are highly correlated and the regression results deviate from what is indicated from correlation analysis. For example, consider the leverage variable (*LEV*) which has Pearson and Spearman correlation coefficients of −0.48 and −0.59 with *RSD*. Suppose *LEV* and *RSD* both enter a regression test and *LEV*'s regression coefficient is inconsistent with its correlation coefficient with the dependent variable. In order to determine if this inconsistency is caused by collinearity, we get the residuals formed from regressing *LEV* against *RSD*. These residuals are nearly perfectly correlated with *RSD* but not correlated with *LEV*. Using this residual for *RSD* may weaken the significant effect of *RSD* but this can be more than offset if *LEV* is enabled to better represent its true effect.

4.2 Predictions for independent variables when regressed against dependent variables

Each independent variable and its predicted coefficient sign are given in Table 4. Except for the constant term, one-tailed *t*-tests are used since each variable has a definite prediction as to its coefficient sign. Below is a description of each independent variable and an explanation for its expected coefficient sign.

Myers and Majluf (1984) predict that *Inside Ownership Level After* (*ILA*) will have a negative coefficient since a greater ownership level will signal more negative news at the time of the announcement (as insiders have more to gain by issuing overvalued equity when their ownership levels are greater). The greater negative news prediction should carry over in the *post-SEO LRAR*. The negative signaling about overvaluation suggests a positive coefficient for the *Pre-SEO LRAR* if greater pre-SEO price run-ups signal more overvaluation. We predict a negative coefficient for the *Four-Year LRAR* as firms with more inside ownership that undergo SEOs would likely be signaling greater overvaluation and thus underperforming for a long-run period that includes post-SEO returns. Although they do not test long-run returns, Hull and Mazachek (2001) find that a variable resembling *ILA* is the key variable in their short-run regression tests and is significantly negative when regressed with three other independent variables that are included in our tests: the relative size of the offering (*RSZ*), firm size (*SIZ*), and secondary selling (*SEC)*.

Leland and Pyle (1977) predict a positive coefficient for the *Change in Inside Ownership Level* (*CIL*) when used with the four *SRAR* variables and a post-SEO *LRAR* variable. This is because a sample of SEOs that almost exclusively reveal net decreases in inside ownership should have more negative *SRARs* when the decreases in inside ownership is greater. The greater negative signaling for greater negative values for *CIL* should be fully realized through the *Post-SEO LRAR* value, thus suggesting a positive coefficient. The notion of insiders unloading greater shares indicates greater overvaluation from greater price run-ups. If so, this indicates a negative coefficient for the *Pre-SEO LRAR*. Relatedly, Fahlenbrach and Stulz (2009) suggest that greater decreases in inside ownership occur when firms have been performing well. We predict a positive coefficient for the *Four-Year LRAR* as firms with more inside ownership decreases would likely be underperforming for long-run periods surrounding SEOs.

Table 4 Predicted coefficient signs of independent variables for the seven dependent variables

Variables	*Eleven-Day SRAR*	*Three-Day SRAR*	*Ten-Day SRAR*	*Twenty-One-Day SRAR*	*Pre-SEO LRAR*	*Post-SEO LRAR*	*Four-Year LRAR*
ILA	–	–	–	–	+	–	–
CIL	+	+	+	+	–	+	+
TIM	+	+	+	+	–	+	+
RSD	–	–	–	–	+	–	–
UND	+	+	+	+	–	+	+
EXC	+	+	+	+	–	+	+
SIZ	+	+	+	+	–	+	+
RSZ	–	–	–	–	+	–	–
SEC	–	–	–	–	+	–	–
EXP	–	–	–	–	+	–	–
TBQ	–	–	–	–	+	–	–
PFT	+	+	+	+	+	+	+
PTA	+	+	+	+	+	+	+
GRO	+	+	+	+	+	+	+
LEV	+	+	+	+	–	+	+

This table gives the predicted coefficient signs for the fifteen independent variables (described in Table 3) when regressed against each of the seven dependent return variables (described in Table 2). Even though all independent variables do not enter all regression tests, we still give all predicted signs because generally speaking the same predicted sign for each independent variable occurs for most (if not all) tests.

For *TIM*, we predict positive coefficients for *SRAR* variables. This is because SEOs that occur after the end of the year 2001 (when *TIM* = 1) take place after the internet-technology bubble period has ended and thus overvaluation is less of a concern due to relatively smaller stock price run-ups. This translates into a less negative market response immediately surrounding an SEO announcement. For *Pre-SEO LRARs*, we expect a negative coefficient because SEOs that occur in later years (when *TIM* = 1) will have less positive price performance compared to SEOs that occur during a bubble period where there is much greater market-adjusted price run-ups for firms having SEOs. Because SEOs after the bubble period avoid the dramatic drop-offs, we predict positive coefficients for *Post-SEO LRARs* and *Four-Year LRARs* with the positive coefficient for the latter partially resulting from the fact some post-bubble SEOs will have also shared in part of the bubble period's price run-ups.

Greater values for the daily standard deviation of a firm's stock return for the two years before its SEO (*RSD*) indicate more uncertainty and greater negative asymmetric information for a negative event like an SEO. Thus, we predict negative coefficients for *RSD* when used with *SRAR* variables and the *Post-SEO LRAR*. We predict a positive coefficient when used with *Pre-SEO LRAR* as greater price volatility before SEOs should be associated with greater positive prices given the fact that SEOs follow on the heels of price run-ups. Greater uncertainty should imply inferior returns for longer time periods surrounding SEOs, so we predict a negative coefficient for the *Four-Year LRAR*.

UND refers to underpricing. Greater underpricing (which is represented by greater negative numbers because it creates greater costs to current shareholders) should cause more negative *SRAR* values. Thus, we predict positive coefficients for *SRAR* tests. Greater underpricing (greater negative values for *UND*) can reflect greater positive stock price run-ups so we predict a negative coefficient for *Pre-SEO LRAR* tests. Because greater underpricing can indicate negative news about overvaluation, we hypothesize a positive coefficient for *Post-SEO LRARs* and longer periods as captured by the *Four-Year LRARs*.

The exchange listing and size of the firm variables (*EXC* and *SIZ*) should behave in a similar fashion because *EXC* = 0 represents NASDAQ firms with smaller values for *SIZ*. As suggested by Bhushan (1989), we predict positive coefficients for *SRARs* due to greater negative news associated with more differential information for smaller firms that tend to be traded on NASDAQ. Hull and Mazachek (2001) find a positive coefficient for *SIZ* in their announcement period tests. The negative announcement period news should be realized over time causing a positive coefficient for the *Post-SEO LRAR* and the *Four-Year LRAR* tests. We predict a negative coefficient for the *Pre-SEO LRAR* test as smaller firms should do better during periods of stock price run-ups where uncertainty and risk tend to be underestimated due to the well-documented euphoria and irrationality associated with a bubble period.

Greater values for the relative size of the offering (*RSZ*) should signal greater negative news due to fears that owners (including its selling shareholders) are taking greater advantage of an overvalued stock price situation. The rationale for the coefficient predictions for *RSZ* are like those stated previously for *CIL*. However, the predicted signs of the coefficients are opposite because values for *RSZ* are positive and values for *CIL* are negative. The predictions for our secondary selling variable (*SEC* = 1 if secondary selling greater than one-third of total offering) are (like *RSZ*) opposite of *CIL* since *SEC* = 1 signifies greater selling by current owners and we estimate that half of these current owners can be insiders. Hull and Mazachek (2001) test a variable similar to *SEC* and report short-run results consistent with our predictions.

According to Myers and Majluf (1984), SEOs undertaken for expansion-related purposes should signal negative news because good projects should typically be financed with debt. Thus, we predict a negative coefficient for *EXP* (*EXP* = 1) for *SRAR* tests. Miller and Rock (1985) and Brennan and Kraus (1987) also suggest a negative coefficient as they argue that the use of proceeds for debt reduction mitigates any negative market response. Thus, the lack of a debt purpose indicates greater negative news. This negative response should carry over for the *Post-SEO LRAR* and the *Four-Year LRAR* tests. A positive coefficient is predicted for *Pre-SEO LRAR* tests as the greater negative news about overvaluation is likely associated with greater pre-SEO price run-ups.

Greater values for Tobin's Q (*TBQ*) indicate the possibility of overvaluation, thus exacerbating risk and causing negative coefficient for all tests except *Pre-SEO LRAR* tests where increases in stock prices translate into rising *TBQ* values. Greater profitability should mitigate any negative signaling and also magnify any pre-SEO run-ups, thus we predict positive coefficient for all *PFT* tests. Likewise, greater levels of tangible assets should also mitigate risk in its own fashion and thus cause all coefficients for *PTA* to be positive. Growth (as captured by relatively greater capital expenditures for the past year) indicates a greater likelihood that firms have good projects and so an SEO can be greeted with less negativity. Thus, like *PFT* and *PTA*, positive coefficients for *GRO* are expected for *SRAR* and *LRAR* tests. Agency theories (Jensen and Meckling, 1976; Jensen, 1986) predict that greater amounts of debt prevent wasteful spending by managers. If so, returns surrounding SEOs should be less negative. Thus, we predict positive coefficients for *LEV* for *SRAR* and *LRAR* tests. An exception is *Pre-SEO LRAR* tests where more positive price run-ups should lead to lower leverage ratios. Thus, we predict a negative coefficient for *LEV* for this test.

As capsulized in Table 4, we always predict that the *Ten-Day SRAR* will render the same predicted sign as for the three other *SRAR* tests. However, this may not be the case if there is overreaction on Day 0 such that the *Ten-Day SRAR* will have an opposite market response to what occurs immediately prior to an SEO. Similarly, buying by underwriters to smooth the market or trading strategies by large institutional investors (like hedge funds) may cause prediction problems. Table 4 reveals that the predicted sign for *Post-SEO LRAR* tests resemble the *Four-Year LRAR* tests. This prediction may not always hold if an independent variable is associated with an extremely large positive *Pre-SEO LRAR* that can dominate the return for the longer four year horizon. While only 25% of the signs will later be shown to disagree with their predicted signs, those that do disagree tend to be associated with the *Ten-Day SRAR* and *Four-Year LRAR* tests.

5 Regression results for *SRAR* variables

Table 5 reports short-run regression results for the four *SRAR* dependent variables. A *SRAR* test can lose anywhere from 26 to 31 observations due to missing *Compustat* data. Variance inflation factors (*VIFs*) are not reported in Table 5 because they are well below any generally accepted cutoff (ranging from 4.0 to 10.0) for indicating multicollinearity concerns. For example, the maximum *VIF* is only 1.38. Regardless, as described toward the end of Section 4.1, collinearity tests were conducted when warranted. The more noteworthy of these tests are incorporated into the results in Table 5. Because R^2 values are similar to *adjusted* R^2 values, we only report *adjusted* R^2 values. The greatest *adjusted* R^2 value of 0.20 and F value of 28.9 occur for the *Three-Day SRAR* (days –2, –1, and 0) test indicating this short-run test does the best job of accounting for the market response. The test that does the poorest job is the *Ten-Day SRAR* test (+1 to +10), which has *adjusted* R^2 and F values of 0.04 and 4.36, respectively.

5.1 Results for *Eleven-Day SRARs* and *Three-Day SRARs*

Table 5 reveals that the *Eleven-Day SRAR* (days −10 to 0) and *Three-Day SRAR* tests give similar results except *EXP* and *SIZ* only enter the *Eleven-Day SRAR* test as significant. Three independent variables stand out for both tests: *ILA*, *UND*, and *PFT*. The negative coefficient for *ILA* and the positive coefficients for *UND* and *PFT* are significant at the 1% level and have their predicted signs as given in Table 4 with the results for *ILA* consistent with Myers and Majluf (1984) negative signaling about overvaluation. While less significant, Table 5 discloses that *TIM* and *RSD* are two other factors of importance. *TIM* has its predicted positive sign and is significant at the 1% level for the *Three-Day SRAR* test and at the 5% level for the *Eleven-Day SRAR* test. *RSD* has its predicted negative sign and shares in the same significant levels as *TIM*. We conclude that the market will react in a less negative fashion (immediately before and at the time of the SEO announcement) if the firm has lower inside ownership, less underpricing, more profitability for the prior year, SEO occurring after a bubble period, and less pre-SEO price volatility.

There are two other independent variables in Table 5 for *Eleven-Day SRAR* tests that are significant: *EXP* and *SIZ*. *First*, *EXP* has a positive coefficient that is significant at the 5% level. However, its positive sign is opposite of that predicted by signaling theory indicating that an expansion-related purpose (*EXP* = 1) is not perceived as more negative compared to other purposes such as debt reduction or the needs for insiders to sell shares. However, the correlation between *EXP* and the *Three-Day SRAR* is negative indicating that for days −10 to −3 firms may be doing things differently when the purpose of the offering is for expansion. Whatever is being done serves to offset the negative response that occurs for days –2, –1, and 0. Thus, we cannot necessarily find evidence against signaling theory (Myers and Majluf, 1984; Miller and Rock, 1985; Brennan and Kraus, 1987) that suggests more negative *SRARs* for expansion purposes. *Second*, the coefficient for *SIZ* for the *Eleven-Day SRAR* test has its predicted positive sign and is significant at the 5% level. Consistent with Bhushan (1989), this indicates that the negative market response can be lessened by firms with greater sizes.

Table 5 Short-run regression results for four dependent variables

Dependent Variable: *Eleven-Day SRAR* for days –10 to 0 (*n* = 682)									
Const	*ILA*	*CIL*	*TIM(R)*	*RSD(R)*	*UND(R)*	*PFT(R)*	*EXP*	*SIZ*	*AdjR²/F*
–0.059	–0.079	–0.050	0.019	–0.552	0.610	0.056	0.026	0.007	0.08
–1.92*	–3.16***	–0.68	1.68**	–2.15**	5.78***	2.32***	2.15**	1.64**	8.36***
Dependent Variable: *Three-Day SRAR* for days –2, –1, and 0 (*n* = 682)									
Const	*ILA*	*CIL*	*TIM(R)*	*RSD(R)*	*UND(R)*	*PFT(R)*			*AdjR²/F*
–0.010	–0.035	0.027	0.020	–0.609	0.617	0.036			0.20
–1.49	–2.66***	0.72	3.25***	–4.52***	11.1***	2.83***			28.9***
Dependent Variable: *Ten-Day SRAR* for days +1 to +10 (*n* = 675)									
Const	*ILA*	*CIL*	*TIM(R)*	*RSD(R)*	*UND(R)*	*RSZ(R)*	*GRO*		*AdjR²/F*
0.036	–0.022	0.046	–0.026	0.262	0.282	0.086	0.138		0.04
3.24***	–1.02	0.66	–2.56***	1.15	3.04***	2.09**	2.12**		4.36***
Dependent Variable: *Twenty-One-Day SRAR* for days –10 to +10 (*n* = 682)									
Const	*ILA*	*CIL*	*TIM(R)*	*RSD(R)*	*UND(R)*	*PFT(R)*	*EXP*		*AdjR²/F*
0.013	–0.092	–0.041	–0.016	–0.526	0.880	0.088	0.034		0.08
0.78	–2.76***	–0.43	–1.06	–1.51*	6.17***	2.69***	2.06**		9.38***

TIM(R): A residual nearly perfectly correlated with *TIM*, but not correlated with *RSD*, was used in the test. Pearson and Spearman *rhos* between *TIM* and *RSD* are –0.38 and –0.40.
RSD(R): A residual nearly perfectly correlated with *RSD*, but not correlated with *ILA*, was used in the test. Pearson and Spearman *rhos* between *RSD* and *ILA* are 0.21 and 0.16.
UND(R): A residual nearly perfectly correlated with *UND*, but not correlated with *RSD*, was used in the test. Pearson and Spearman *rhos* between *ILA* and *RSD* are –0.22 and –0.22.
PFT(R): A residual nearly perfectly correlated with *PFT*, but not correlated with *RSD*, was used in the test. Pearson and Spearman *rhos* between *PFT* and *RSD* are –0.42 and –0.41.
RSZ(R): A residual nearly perfectly correlated with *RSZ*, but not correlated with *ILA*, was used in the test. Pearson and Spearman *rhos* between *RSZ* and *ILA* are –0.13 and –0.11.

This table gives statistical results for short-run regression tests. Our general regression model for these tests is described in Section 4.1 and allows each dependent *SRAR* variable to be used with four independent variables of concern (*ILA*, *CIL*, *TIM*, and *RSD*) and any other independent variable described in Table 3 that is significant for the *SRAR* being tested. The first column gives the constant's coefficient with its *t* statistic below. Subsequent columns for independent variables provide coefficients with the corresponding *t* statistics below. Except for the constant variable, the *t*-test is one-tailed because each independent variable has a definite predicted sign for its coefficient for each test (see Table 4 for each predicted sign). The last column gives the *adjusted* R^2 value with the *F* value below. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Finally, the results for *CIL* are not significant. For the *Eleven-Day SRAR* test, *CIL* has a negative sign that is opposite of that predicted by Leland and Pyle (1977). For the *Three-Day SRAR* test, *CIL* has its predicted positive coefficient but remains insignificant. Overall, the results for *CIL* do not support the Leland and Pyle signaling theory as there is no evidence that the change in inside ownership exercises a significant influence on short-run returns. In light of the results for *ILA* and *CIL*, we conclude that the short-run response is determined more by the absolute level of inside ownership than the change in this absolute level.

From the *Eleven-Day SRAR* and *Three-Day SRAR* results in Table 5, we offer the following conclusion. Firms undergoing SEOs will experience less negativity at the time of its SEO announcement and for up to ten days prior to that if these five main conditions are present: (i) the SEO has less underpricing; (ii) the firm has less inside ownership; (iii) the firm has been more profitable during the fiscal year prior to the SEO; (iv) the firm's stock has experienced less price volatility for the two years prior to its SEO; and, (v) the SEO occurs after a bubble period (where stock price run-ups can be less than what is experienced during the bubble period).

5.2 Results for *Ten-Day SRARs* and *Twenty-One-Day SRARs*

As seen in Table 5, the results for the *Ten-Day SRAR* test (days +1 to +10) differ from the *Eleven-Day SRAR* and *Three-Day SRAR* tests. The one major exception is for *UND*, which once again has its predicted coefficient and is significant at the 1% level. The two insider variables (*ILA* and *CIL*) have their predicted signs but are insignificant. Both *TIM* and *RSD* change their signs for the *Ten-Day SRAR* test but only *TIM* is significant. Neither *TIM* nor *RSD* has its predicted sign. Besides *UND*, and *TIM*, two other independent variables have significant coefficients: *RSZ* and *GRO*. While *GRO* has its predicted positive sign indicating that growth firms can be received more positively immediately after an SEO announcement, the positive sign for *RSZ* is not like that predicted in Table 4. Inconsistent with signaling theory, we conclude that the relative greater offering sizes (that include both primary and secondary shares) do not signal greater negative news as judged by the *Ten-Day SRAR* test.

The *Twenty-One-Day SRARs* cover a period of about a calendar month surrounding SEOs. Table 5 reveals that the results for *ILA*, *RSD*, *UND*, *PFT*, and *EXP* are alike for both *Three-Day SRAR* and *Twenty-One-Day SRAR* tests in that all variables have coefficients that are not only of the same signs for both short-run tests but are also statistically significant. The insignificant coefficient sign for *TIM* for the *Twenty-One-Day SRAR* tests is like its sign for the *Ten-Day SRAR* tests. We conclude the firms undergoing SEOs will perform better for the 21 days surrounding SEOs if they undergo less underpricing, have less inside ownership, exhibit more pre-SEO profitability, are more likely to use proceeds for expansionary purposes, and have less pre-SEO price variability.

When one looks at the change in the inside ownership level (*CIL*) results in Table 5, we find that our multivariate results for *ILA* and *CIL* re-enforces the univariate analysis of Hull, Kwak, and Walker (2010). In brief, like their investigation, we find that (i) greater levels of insider holdings are associated with more negative short-run returns and (ii) the degree of the decrease in the inside ownership has no obvious impact on short-run returns that accompany SEOs. While insignificant in short-run tests, we will see in the next section that the change in the inside ownership level (*CIL*) is a dominant variable for long-run tests that looks at post-SEO price behavior.

6 Regression results for *LRAR* variables

Table 6 provides long-run regression results for three *LRAR* dependent variables for both the "full" sample and the "partial" sample. Like a *SRAR* test, a *LRAR* test can lose up to 31 observations due to insufficient *Compustat* data. As noted in Table 2, the partial sample also loses observations without full monthly return data. Table 6 reveals that similar *LRAR* results occur for both the full and partial samples with greater likeness in results occurring for the *post-SEO LRAR* test. This is the test where fewer observations are lost for the partial sample. As was true for *SRAR* tests, *VIFs* are very low for *LRAR* tests and so they are not reported (the maximum *VIF* is only 1.78). Nevertheless, as described toward the end of Section 4.1, collinearity tests were conducted when warranted. The more noteworthy of these tests are incorporated into our results in Table 6. The last column in Table 6 reports *adjusted* R^2 and F values for each *LRAR* test. We only report *adjusted* R^2 values for *LRAR* tests because R^2 values are once again similar to *adjusted* R^2 values. The greatest *adjusted* R^2 and F values of 0.28 and 24.8, respectively, occur for the *Pre-SEO LRAR* (months −24 to −1) for the partial sample test. The *Four-Year LRARs* (months −24 to +24) generate the lowest *adjusted* R^2 of 0.06 for the full sample test and the lowest F value of 7.15 for the partial sample test.

Table 6 Long-run regression results

Dependent Variable: *Pre-SEO LRAR* (months −24 to −1): Full sample (n=681) followed by partial sample (n=500)

Const	*ILA*	*CIL*	*TIM(R)*	*RSD(R)*	*LEV(R1)*	*PFT(R)*	*TBQ(R)*	*SEC(R)*	$AdjR^2/F$
1.045	–1.680	–0.557	–0.326	25.962	–1.771	1.619	0.063	–0.720	0.14
9.99***	–4.35***	–0.51	–1.85**	5.67***	–4.80***	4.07***	7.60***	–4.05***	15.1***
Const	*ILA*	*CIL*	*TIM*	*RSD(R)*	*LEV(R1)*	*PFT(R)*	*TBQ(R)*	*SEC(R)*	$AdjR^2/F$
2.034	–0.630	–0.855	–0.483	69.026	–3.098	2.279	0.166	–0.465	0.28
9.79***	–1.36*	–0.68	–2.47***	9.80***	–7.40***	4.77***	10.59***	–2.21***	24.8***
Dependent Variable: *Post-SEO LRAR* (months +1 to +24): Full sample (*n*=675) followed by partial sample (*n*=631)									
Const	*ILA*	*CIL*	*TIM(R)*	*RSD(R)*	*LEV(R2)*	*EXC(R)*	*EXP*	*PTA(R)*	$AdjR^2/F$
–0.257	–0.176	–1.232	0.172	–8.452	0.506	0.187	–0.083	0.314	0.14
–4.02***	–1.38*	–3.55***	2.93***	–5.29***	4.29***	2.72***	–1.30	2.71***	14.4***
Const	*ILA*	*CIL*	*TIM(R)*	*RSD(R)*	*LEV(R2)*	*EXC(R)*	*EXP*	*PTA(R)*	$AdjR^2/F$
–0.264	–0.185	–1.322	0.173	–8.233	0.559	0.181	–0.085	0.332	0.14
–3.98***	–1.41*	–3.66***	2.86***	–4.96***	4.55***	2.54***	–1.35*	2.79***	14.1***
Dependent Variable: *Four-Year LRAR* (months –24 to +24): Full sample (*n* = 676) followed by partial sample (*n* = 456)									
Const	*ILA*	*CIL*	*TIM(R)*	*RSD(R)*	*RSZ*	*PFT(R)*			$AdjR^2/F$
0.659	–1.227	–2.580	0.379	–13.753	1.316	1.388			0.06
2.81***	–2.86***	–1.96**	1.84**	–2.79***	1.74*	3.49***			8.51***
Const	*ILA*	*CIL*	*TIM(R)*	*RSD(R)*	*RSZ*	*PFT(R)*	*TBQ*		$AdjR^2/F$
0.204	–0.829	–2.744	0.344	–10.267	2.073	2.912	0.081		0.09
0.59	–1.38*	–1.50*	1.11	–1.13	1.98**	4.82***	4.26***		7.15***

TIM(R): A residual nearly perfectly correlated with *TIM*, but not correlated with *RSD*, was used in the test.
Pearson and Spearman *rhos* between *TIM* and *RSD* are –0.38 and –0.40.

RSD(R)): A residual nearly perfectly correlated with *RSD*, but not correlated with *LEV*, was used in the test.
Pearson and Spearman *rhos* between *RSD* and *LEV* are –0.48 and –0.58.

LEV(R1): A residual nearly perfectly correlated with *LEV*, but not correlated with *TBQ*, was used in the test.
Pearson and Spearman *rhos* between *LEV* and *TBQ* are –0.41 and –0.89.

PFT(R): A residual nearly perfectly correlated with *PFT*, but not correlated with *RSD*, was used in the test.
Pearson and Spearman *rhos* between *PFT* and *RSD* are –0.42 and –0.41.

TBQ(R): A residual nearly perfectly correlated with *TBQ*, but not correlated with *RSD*, was used in the test.
Pearson and Spearman *rhos* between *TBQ* and *RSD* are 0.50 and 0.58.

SEC(R): A residual nearly perfectly correlated with *SEC*, but not correlated with *ILA*, was used in the test.
Pearson and Spearman *rhos* between *SEC* and *ILA* are 0.13 and 0.14.

LEV(R2): A residual nearly perfectly correlated with *LEV*, but not correlated with *TIM*, was used in the test.
Pearson and Spearman *rhos* between *LEV* and *TIM* are 0.31 and 0.36.

EXC(R): A residual nearly perfectly correlated with *EXC*, but not correlated with *LEV*, was used in the test.
Pearson and Spearman *rhos* between *EXC* and *LEV* are 0.44 and 0.47.

PTA(R): A residual nearly perfectly correlated with *PTA*, but not correlated with *EXC*, was used in the test.
Pearson and Spearman *rhos* between *PTA* and *EXC* are 0.27 and 0.23.

This table gives statistical results for long-run regression tests. Our general regression model for these tests is described in Section 4.1 and allows each dependent *LRAR* variable to be used with four independent variables of concern (*ILA*, *CIL*, *TIM*, and *RSD*) and any other independent variable described in Table 3 that is significant for the *LRAR* being tested. The first set of results (for each dependent variable) is for the full sample and the second set of results are for the partial sample. The first column gives the constant's coefficient with its *t* statistic below. Subsequent columns for independent variables provide coefficients with the corresponding *t* statistics below. Except for the constant variable, the *t*-test is one-tailed because each independent variable has a definite predicted sign for its coefficient for each test (see Table 4 for each predicted sign). The last column gives the *adjusted* R^2 value with the *F* value below. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

6.1 Results for Pre-SEO LRARs

Table 6 begins by reporting results for *Pre-SEO LRARs*. Despite the fact that 181 observations (26.6% of the full sample) are lost for the partial sample test, the independent variables that enter this test are identical to the full sample test. Except for *ILA* and *SEC*, all coefficients have their predicted coefficient signs as given in Table 4. The significant negative coefficients for *ILA* do not bear out our prediction that SEO firms with greater inside ownership take advantage of greater price run-ups but indicate they perform worse prior to their SEO announcements. The significant negative coefficient for *SEC* fails to find that greater secondary selling through an SEO follows a greater pre-SEO stock price run-up. Except for *CIL*, all independent variables have coefficients that are significant at the 1% level for at least one of the *Pre-SEO LRAR* tests. Consistent with the univariate analysis of Hull, Kwak, and Walker (2010), the change in the inside ownership (captured by *CIL*) has no significant relation with prior stock price run-ups. Thus, greater decreases in inside ownership (attained through SEOs) are unrelated to greater stock price run-ups. We infer that inside ownership behavior at the time of an SEO is not associated with (and thus cannot be predicted from) the value of the *Pre-SEO LRAR*.

Given the significant coefficients for all independent variables except *CIL*, we offer the following conclusion about pre-SEO stock price performance. Firms have superior pre-SEO stock price run-ups when they manifest the following seven conditions: higher Tobin's Q ratios prior to the SEO (where greater price-run-ups help cause higher Tobin's Q ratios); experience more variability in stock prices for the two years before an SEO (where the higher variability can be associated with greater stock price run-ups); have lower leverage ratios (which can be related to the greater pre-SEO stock price run-up); exhibit greater profitability (from a book standpoint) for the fiscal year before the SEO; have less secondary selling by current owners that accompanies the SEO; have lower inside ownership; and, occur during a bubble period.

6.2 Results for *Post-SEO LRARs*

Table 6 next gives results for *Post-SEO LRARs* (months +1 to +24). Once again, the results for both the full and partial samples mirror one another. The even greater similarity between the full and partial samples (for *Post-SEO LRARs* relative to *Pre-SEO LRARs*) can be attributed to the fact that the partial sample for the *Post-SEO LRAR* test only loses 44 observations (6.5% of the full sample). Except for the negative coefficient for *CIL* (which is significant at the 1% level), all coefficients for the *Post-SEO LRAR* tests have their predicted signs as given in Table 4. The positive prediction for *CIL* was based on Leland and Pyle (1977) who hypothesize that greater decreases in inside ownership should signal inferior future performance. Clearly, our results are inconsistent with this prediction. We conclude that decreases in inside ownership are done for other reasons that dominate signaling. These reasons can include (i) diversification needs for those insiders who are selling; (ii) the exercise of expiring options by insiders where their gains are greater than any loss that might be expected to occur from their selling; and (iii) the insider unfounded fear that share prices will fall in the long-run due to poor prospects.

Besides *CIL*, five other variables are significant at the 1% level for both tests: *TIM*, *RSD*, *LEV*, *EXC*, and *PTA*. Thus, once again the time period of occurrence (*TIM*), risk as captured by pre-SEO stock price variability (*RSD*), and leverage (*LEV*) are important determinants of long-run returns. However, the coefficient signs for all three variables are opposite of their *pre-SEO LRAR* signs. This indicates that the influence of the time period, pre-SEO price variability, and leverage all undergo a dramatic change in their influence on stock prices. *EXC* and *PTA* enter a regression test for the first time as significant variables. Thus, the *Post-SEO LRAR* test is the only test of importance that involves (i) the listing of the firm's stock (NASDAQ versus NYSE/AMEX) and (ii) growth as represented by the relative amount of tangible assets (as measured by net plant and equipment to total assets). There are two variables for the *Post-SEO LRAR* tests that significant: *ILA* and *EXP*. The negative coefficients for *ILA* indicate that firms with higher inside ownership perform worse after an SEO. The very marginal results for *EXP* indicate some weak support for the notion that firms will have poorer post-SEO performance if the purpose of the SEO is related to expansion.

From our regression analysis of long-run post-SEO stock price behavior, we offer the following conclusion. Firms will have superior post-SEO stock price returns when they exhibit the following six conditions: less pre-SEO stock price volatility; more leverage at the time of their SEOs; greater decreases in inside ownership; occurrence of SEO after a bubble period; greater profitability for the year prior to their SEOs; and, NYSE/AMEX listing.

6.3 Results for *Four-Year LRARs*

The last set of results in Table 6 is for *Four-Year LRARs* (months –24 to +24). Despite being overall similar, the "full" and "partial" results for the two *Four-Year LRAR* tests differ more than the pre-SEO and post-SEO *LRAR* tests. This can be explained by a greater number of missing observations for the longer time period of four years.

The insignificant coefficient for *TIM* for the partial sample test is not surprising given the loss of 220 observations and the fact that it had significant negative coefficients for the *Pre-SEO LRAR* tests and significant positive coefficients for the *Post-SEO LRAR* tests. Similar conclusions could be voiced for the variables *RSD* and *LEV* (where the latter is not shown in Table 6 because it does not have a significant coefficient for the *Four-Year LRAR* tests).

Unlike pre-SEO and post-SEO results, coefficient predictions for the two *Four-Year LRAR* tests are more likely to be wrong as seen from comparing the signs for *CIL*, *RSZ*, and *TBQ* in Table 6 with their predicted signs in Table 4. The results for *ILA*, *CIL*, *RSZ*, and *PFT* all render similar significant levels for both the full and partial sample tests. However, *RSD* and *TBQ* present a noteworthy difference because each is only significant for one of the two tests.

From our investigation of long-run price behavior surrounding SEOs, we offer the following conclusion. In order of statistical significance, firms will perform better for the four years around SEOs when the following four conditions are present: greater profitability before an SEO; lower inside ownership levels; relatively greater offering sizes; and, greater decreases in inside ownership brought about by their SEOs. It also appears there is some support that superior long-run returns can be associated with a larger Tobin's Q, less pre-SEO price variability, and occurrence during a post-bubble period.

7 Other tests and future research

Of the other tests that we performed, eight of the most noteworthy are summarized below. *First*, variations of the fifteen independent variables given in Table 3 were computed. The results did not change significantly from those presented in this paper. *Second*, we repeated our tests by deleting observations typically omitted from tests such as utilities, financials, and repeat observations. The similar results (with or without deletions) are expected given these observations are small in number. *Third*, the White (1980) *t* statistics were also computed and were found to be similar to *OLS t* statistics indicating heteroscedasticity is not a problem.

Fourth, we investigated other insider variables. For example, we replaced the "*Inside Ownership Level After*" (*ILA*) with the "*Inside Ownership Level Before*" and repeated tests, but the results were similar. This is because those firms with large holdings before generally have large holdings afterwards as reflected in their correlation coefficient 0.95 for both the Pearson and Spearman tests. We also examined if our insider results for our two insider variables (*Change in Inside Ownership Level* and *Inside Ownership Level After*) could be better explained by the "director and officer group" by itself or the "other five percent or more ownership group" by itself. When we tested each separately, they generally gave similar results albeit weaker when tested individually versus tested together. This suggests that using both groups together offers a more powerful test. While these tests indicate our general conclusions hold, we still recommend that future research build on this study's findings by better cataloging the effects of the "director and officer group" and the "other five percent or more ownership group."

Fifth, we chose to report results using winsorized variables when extreme outliers were found. However, our main conclusions and general results are robust regardless of whether winsorizing is used. *Sixth*, one might argue that for a regression analysis, we want to know how the independent variables respond to raw returns. This is because any abnormal return methodology contains the cumulative raw returns. Whatever compounded expected return is subtracted out may be irrelevant even if one used a methodology that is more biased (albeit within the literature one can find strong claims about biases for any methodology). In conducting tests with just raw compounded returns, we found that results were similar with one exception: the R^2 values increased for long-run tests when using just raw returns. For the post-SEO long-run test, the *adjusted* R^2 jumped from 0.14 to 0.23 for both the full and partial sample tests (compared to jumps of only about 0.02 for other long-run tests).

Seventh, long-run regression tests for different periods were performed other than two years before SEOs, two years after SEOs, and four years around SEOs. While our tests for these years confirmed many of the general results presented in this paper, a more detailed analysis would be needed to explore if other regression models could be formed to better account for periods where one year or three years replace the two years before and after that we used. *Eighth*, for short-run abnormal return tests, we also conducted tests after abnormal returns were adjusted for flotation costs following the methodology used by Hull and Fortin (1993/1994) and Hull and Kerchner (1996). The results were similar. We surmise that adjusting for issue costs tends to have little impact compared to the underlying compounded returns. Thus, the failure of the adjustment for issue costs to influence results is parallel to the failure of the expected compounded returns methodology to affect results. In conclusion, the independent variables are influenced by the underlying compounded raw returns.

We now offer five suggestions for future research. *First*, given all of the attacks on long-run methodology, future research needs to continue to explore how different methodologies might affect the results reported in long-run return studies. *Second*, future research can go beyond our research by including the role of an industry. *Third*, our findings suggest that insider selling at the time of an SEO can be done for multiple reasons that trump any effect tied to Leland and Pyle (1977) signaling theory. Future research might explore the strength of other reasons including: diversification of personal assets, exercise of expiring options, or selling overvalued shares as might be caused by pre-SEO stock price run-ups. *Fourth*, by reporting both short-run pre-SEO and short-run post-SEO returns, we reveal an opposite price movement for the ten days before and after SEOs. Future research might try to explain these short-run findings. For example, is there short-term manipulation of prices by large institutional investors such as hedge funds? *Fifth*, our sample is unique in that it is characterized by observations with large inside holdings. Future research can test some of our conclusions for more diverse samples of inside ownership. For example, one might find support for Leland and Pyle if one tests a sample of SEOs that contain not only large holdings by insiders (which is a sample like what this paper analyzes) but also contains SEOs that would have small (or no) insider holdings. Thus, our lack of multivariate support for *CIL* can only be said to hold for a sample like what this paper analyzes and may not be found for a sample that contains a wider diversity of inside ownership levels. Getting such a sample may be difficult since prospectuses accompanying SEOs tend to only report inside holdings when there is something substantial to report.

8 Summary

Univariate seasoned equity offering (SEO) research investigates the valuation impact of inside ownership. We extend this research by investigating if the inside ownership level and its decrease are significant factors within a multivariate analysis. We find that the level of inside ownership is a consistent factor in accounting for both short-run and long-run returns surrounding SEOs. The change in the inside ownership level is not a factor influencing short-run returns at the time of an SEO, but is a major factor associated with long-run returns, especially those that occur after SEOs. While we find these factors to often be statistically significant and influential in determining stock price behavior around SEOs, there are other variables that can be just as influential. Below we describe the impact of such variables in accounting for both short-run and long-run stock returns.

For short-run regression tests, we find a number of factors that can influence (in varying degree) stock returns for a variety of short-run periods. Of particular relevance are two short-run periods: (i) the three-day announcement period, and (ii) the twenty-one-day period (about a calendar month) surrounding SEOs. The four major factors associated with superior stock returns for these two short-run periods are: (i) lower underpricing (degree that the offer price is set below the estimated offer price); (ii) greater profitability for the fiscal year prior to SEOs; (iii) smaller inside ownership levels; and, (iv) less pre-SEO price variability (as measured by the daily standard deviation of stock returns for two years before SEOs). Not included in this list is the occurrence of the SEO during or after the internet-technology bubble period. However, it can have a very significant impact if we look at either a short-run period before and including day 0 or a period that includes the ten days after an SEO. Similarly, the pre-SEO price variability variable has a more pronounced effect on stock prices if we look at either its pre-SEO or post-SEO impact on short-run returns.

For long-run tests for both the full and partial samples, we find four major independent variables linked to superior returns for the four years surrounding an SEO. These four variables are: (i) greater profitability prior to SEO; (ii) lower inside ownership level; (iii) greater relative size of the offering; and, (iv) greater decrease in inside ownership level. Three other possible factors contributing to superior long-run returns surrounding SEOs are less pre-SEO price variability prior to SEOs, the occurrence of an SEO after the internet-technology bubble has ended, and greater Tobin's Q values,.

While the regression tests we offered are all highly significant, they can still differ in R^2 and F values. In general, the three-day test for short-run returns and the two-year pre-SEO long run test for the partial sample do the best job of accounting for stock price behavior associated with SEO announcements. However, for the two-year pre-SEO tests, the independent variables cannot be viewed as having predictive power about the future as their values do not occur prior to the pre-SEO period.

Our multivariate results for our two insider variables are consistent with prior univariate research. *First*, we verify univariate findings that the inside ownership level does have a negative impact on short-run returns as predicted by Myers and Majluf (1984). We extend this short-run finding by showing that this negative effect also occurs for long-run returns. One might think that insiders are encouraging SEOs because they want to capitalize on prices that are temporarily elevated and that this could be somewhat destructive in the long-run and may even lead to some post-SEO negativity. However, this argument is countered by valid reasons for why insider might want to encourage an SEO. These reasons include (i) diversification needs for those insiders who are selling; (ii) the exercise of expiring options by insiders where their gains are greater than any loss that might be expected to occur from their selling; and (iii) the insider unfounded fear that share prices will fall in the long-run due to poor prospects. Together such reasons can collectively account for why insiders would be encouraging many of the SEOs. Of noteworthy importance, if shares are overvalued, then insider behavior that encourages SEOs is not destructive but wealth-enhancing. This is because insiders can profit when new owners buy overvalued primary shares that are offered, while insiders sell their own overvalued shares through the secondary component of the offering.

Second, we authenticate the univariate findings that the change in inside ownership has no noticeable impact on short-run returns, but the change can influence long-run returns in ways not consistent with Leland and Pyle (1977) signaling theory. The inconsistency occurs when firms with greater decreases in inside ownership do relatively better for the two years after an SEO. However, given the fact that the average stock performance after an SEO is negative, one cannot definitively say that insiders (who use an SEO to lower their levels of ownership) are worse off on the average. We are left to infer that the motivation for insider selling at the time of an SEO is complicated and involves a number of reasons (diversification, exercising expiring options, and fear of poor future prospects) that could all be self-serving.

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