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Stock Derivatives and Seasoned Equity Offerings

Rob Hull, Sungkyu Kwak, and Rosemary Walker

Abstract

Purpose – To explore if stock derivative types (stock options and stock warrants) are associated with stock returns for firms undergoing seasoned equity offerings (SEOs).

Design/methodology/approach – We regress stock returns against stock derivatives for periods around SEO announcements with standard errors clustered at the month level.

Findings – We find that lower stock derivatives holdings for the fiscal year after the SEO are associated with superior pre-SEO returns. This can be explained by owners exercising their derivatives to capitalize on the pre-SEO price run-up. We find that greater stock option holdings by insiders for the fiscal year after the SEO are associated with superior post-SEO returns for up to ten years after the SEO announcement. This new finding does not hold for stock warrants.

Research limitations/implications – Stock derivatives are supplied by *Capital IQ*. Given their description, we infer that stock options are owned largely by insiders. Thus, our insider conclusions for stock options depend on this implication.

Practical implications – Stock options and stock warrants can be used strategically to reward stock derivative owners of strong performing firms for past performance. Stock options can be used to motivate insiders (primarily key executives) to achieve superior future performance.

Originality/value – This study is unique in comparing the influence of holdings for stock options and stock warrants on stock price performance around SEOs. We show that the sign of the association depends on whether the test includes pre-SEO periods.

JEL Classification: G11, G14, G23, G32

Keywords – Stock Derivatives · Seasoned Equity Offerings · Insider Ownership

Paper type – Research paper

1. Introduction

We test the association between stock derivatives and stock returns for firms undergoing seasoned equity offerings (SEOs). Our tests cover two major stock derivative types: stock options and stock warrants. We retrieve data for stock derivatives from *Capital IQ* (*CIQ*). Based on their description, we interpret *CIQ*'s stock options as belonging extensively to the ownership categories of executive officer and large equity holders (who are not executives). These two categories are similar to the two insider ownership categories given in SEO prospectuses where insiders consist of (i) directors and officers as a group (*D&Os* group) and (ii) large owners who control five percent or more of the company's outstanding stock (*FP* group).

Stock derivatives are important as they are the backbone of insider incentive plans such as executive stock option plans. These plans reduce moral hazard by aligning the goals of upper level

management with those of stockholders. However, large stock derivative holdings can make executives less risk adverse causing them to undertake riskier projects that not only offer greater profits but also greater losses.

While stock options are a significant part of pay for executives, stock warrants are often issued as an attachment to security issues to make them more attractive to large investors like financial institutions. Stock warrants can also be offered as a significant part of underwriting compensation. In terms of total outstanding value, stock options dominate stock warrants as most firms issue stock options but not stock warrants. This is also true for our sample where only 9% of our SEO firms have stock warrants compared to 74% for stock options (with 7% having both). Based on the common use of executive stock options, we suspect that they have the largest influence on the role of stock derivatives in our empirical tests.

Given the firm's power to award stock derivatives to executives, it raises concerns about the use stock derivatives as an effective form of compensation to reward executive performance. Jensen and Murphy (1990) spoke to this concern over three decades ago when they argued that stock derivatives should be used more to motivate executive performance. Two decades later, Jensen and Murphy wrote that progress had been made the past twenty years with a greater usage of stock derivatives occurring. Nearly another decade later, researchers (Roe and Papadopoulos, 2019; Mishel and Wolfe, 2019) suggested that even more progress has been made as over half of executive compensations are now related to either current stock holdings or derivatives that represent future stock holdings. Since our tests cover 1996 through 2020, we are able to address the role that stock derivatives play in firm performance for the past twenty-five years.

What exactly has recent research found in terms of increasing stock derivatives to enhance firm performance? For a ten-year period beginning January 2009, Roe and Papadopoulos (2019) of Institutional Shareholder Services Analytics (*ISSA*) indicate that increases in total executive compensation are primarily driven by greater portions of pay received in the form of equity including stock derivatives. Despite a shift in the composition of CEO compensation, Mishel and Wolfe (2019) of the Economic Policy Institute note that it remains the case that stock awards and options make up between 68% and 74% of all CEO compensation.

This paper extends stock derivative research by comparing stock warrants and stock options for periods up to thirteen years around SEO announcement days. We find that most regression tests using our stock warrant variable have insignificant coefficients thus yielding support for the notion

that stock derivatives have no influence on firm performance. However, for short-run post-SEO tests over thirty day and long-run pre-SEO tests that include at least one pre-SEO year, we find respective coefficients are significantly positive and negative. This is similar to the results for stock options for the same tests. However, unlike the stock warrant tests, the stock option tests are dominated by significant coefficients. Below we detail these results.

First, we find a negative association between stock option holdings for the fiscal year ending after the SEO announcement day (Day 0) and firm performance if the test includes a pre-SEO period. This result can be explained by insiders exercising their shares during or somewhat shortly after the pre-SEO price run-up. In regard to this run-up, we find an average stock return of 111% for the year before the month of the SEO announcement. This compares with an average return of 22% for CRSP's equal-weighted, exchanged based index. The 110% SEO return is not explained totally by outliers as the median return is 53%. While insiders could sell significant portions of their exercised stock options before Day 0, they would also be able to sell on the offer day through secondary selling. In fact, nearly four out of every ten shares sold are by current owners who are most likely large inside owners as they control more than half the outstanding shares.

Second, we find a positive association between stock option holdings and firm performance if tests include only a post-SEO period. This result holds for up to ten years after the SEO. It also holds despite SEO firms, as a whole, underperforming index returns. For our sample, the average annual SEO return for the ten years after the SEO announcement month is 11%, which falls short of CRSP's equal-weighted, exchanged based index of 12%. When we look at the medians for the ten post-SEO years, we find that they average 3% for SEOs with the index still at 12%.

From the above results, we conclude that insiders for a typical SEO firm would have a two-fold strategy. *First*, they would exercise derivatives to take advantage of the pre-SEO price peak. This would ceteris paribus cause their derivative holdings to fall by the fiscal year ending after Day 0 resulting in a negative association between pre-SEO stock returns and derivative holdings. *Second*, owners of firms with poorer performance prior to Day 0 would be less likely to cash in their derivatives and so would have relatively larger stock derivative holdings. These larger holdings would motivate inside decision-makers to achieve superior post-SEO performance resulting in a positive association between stock derivative holdings and post-SEO stock returns.

To our knowledge, this is the first study to compare stock options and stock warrants around SEOs and find that larger stock option holdings after an SEO is associated with superior firm

performance for ten years after Day 0. We further contribute to the literature by showing how the association between stock derivative holdings and firm performance change based on the period tested and the type of derivative tested. In the process of showing this, we not only confirm that insiders can make profits from their derivative holdings around SEOs but also cast light on how insiders do this in terms of the strategies used based on prior and expected future firm performance.

The remainder of this paper is organized as follows. Section 2 contains a literature review, a price pattern analysis, and an introduction to our two stock derivative variables used in regression tests. Section 3 presents our hypotheses, return methodology, and regression model. Section 4 describes the data and gives descriptive statistics. Section 5 provides regression results and Section 6 offers conclusions.

2. Background

2.1. Literature Review

Prior research related to this study include SEO stock price behavior and the association of stock derivative holdings and firm performance. In regard to the former, Loughran and Ritter (1995) document that SEO firms perform 5% less than non-issuers for a period from 1970 through 1990. Loughran and Ritter (1997) find that SEO firms have a 70% increase in stock price for the year prior to the SEO offering and a deterioration in the operating performance after the offering. More recent researchers (Gokkaya and Highfield, 2014; Hull, *et al.*, 2019) confirm that SEO stock price does very well before the SEO offering but not so well after.

In regard to the relation between stock derivatives and firm performance, the research is mixed. Some researchers argue that stock derivatives lead to poorer performance. For example, Brick *et al.* (2006) investigates CEO and director compensation where compensation includes equity awards like stock derivatives. They find that excess compensation is associated with inferior performance. This is explained by compensation being based on cronyism and not skill. Sanders and Hambrick (2007) find that CEO stock options can produce risky projects that more often than not lead to huge losses. Other researchers find superior performance. For example, Mehran (1995) finds that firm performance is positively related to the percentage of compensation that is equity-based such as stock options. Chen and Ma (2011) find a positive long-term increase in firm performance induced by greater executive stock options.

There is also research that combines both of the above research topics. For example, Brazel and Webb (2006) argue that greater executive equity-based compensation leads to greater overvaluation and thus a more negative market response to the SEO announcement. Cline and Fu (2010) suggest that insiders do not always optimally time the exercise of their stock options around SEOs. However, focusing on a subset with informed exercising, they document a positive association between informed stock derivative exercises and SEO performance for three years after the offering. Bae *et al.* (2013) find short-run overperformance and long-run underperformance for SEOs with underwriter stock warrant compensation compared to underwriter cash compensation.

2.2. Price pattern analysis

Figure 1 provides three price trajectories for months -36 through +120 when the price at beginning of month -36 is normalized at \$1. Each price trajectory represents a portfolio price where the price is computed by the compounding of mean monthly portfolio returns with returns supplied by the Center for Research in Security Prices (CRSP). The three trajectories represent the following portfolios: (i) SEOs given by the solid line; (ii) equal-weighted, exchange-based index (EWI) represented by the dotted line; and, (iii) value-weighted, exchange-based index (VWI) given by the dashed line. As seen in Figure 1, the first SEO portfolio plot point occurs at the end of month -36 and is the portfolio mean of \$1.007 (\$1 is the price at the beginning of month -36 or the end of month +37). The plot point at the end of month 0 is the portfolio mean of \$3.231. A large increase in the SEO portfolio price from \$6.840 to \$9.103 occurs between the end of months +90 and +120.

Insert Figure 1

As seen in Figure 1, while the SEO portfolio achieves a mean price of \$9.103, the EWI and VWI portfolio mean prices are \$4.218 and \$2.820, respectively. The better index performance for EWI can be explained in terms of smaller firms that are given equal weight but have better performance than larger firms. While the indices have a full set of 1,189 returns for each of the fourteen periods tested, SEOs do not. In response, we eliminated index returns for months without SEO return data and found that the index price trajectories still have similar shapes.

Insert Figure 2

Figure 2 repeats Figure 1 using median monthly returns instead of mean monthly returns. In contrast to Figure 1, Figure 2 shows that the price trajectories for EWI and VWI increase much more over time compared to the SEO price trajectory, albeit we can still see the price run-up the

year before Day 0. By the end of month +120, the SEO median price has increased to \$2.477 while the EWI and VWI median prices are now \$7.031 and \$6.740, respectively.

The figures provide two points of interest. *First*, SEOs have large price run-ups for the year before the SEO announcement so that insiders would be predisposed to exercise their stock derivative holdings sometime before or somewhat shortly after the SEO. *Second*, given the differences in mean and median results, winsorization should be used in regression tests.

2.3. Derivative variables

From *S&P Capital IQ (CIQ)*, we find 99 stock derivative variable (*DVs*) with 52 for stock options and 47 for stock warrants. Both stock options and stock warrants can have tranche data. A tranche refers to all stock derivatives (be it a stock option or stock warrant) with the same grant date, expiration date, exercise price and vesting schedule.

Our empirical tests use two independent *DVs* formed using *CIQ* data. *First*, we have the relative value of stock option holdings (*OVM_{SO}*). *Second*, we have the relative value of stock warrants holdings (*OVM_{WAR}*). Both *DVs* are computed in a two stage process.

For *OVM_{SO}*, the first stage involves computing the total value of all stock options at the end of the fiscal year after Day 0. This is performed by multiplying the total number of stock options by their corresponding strike prices at the end of the same fiscal year. We call this value *OTV*. For the second stage, we divide *OTV* by the common stock value after the SEO (*CVA*) where *CVA* is the shares outstanding after the SEO times the offer price given in the final prospectus. In formula format, we have:

$$OVM_{SO} = OTV/CVA. \quad (1)$$

For *OVM_{WAR}*, the first stage involves computing the value of all stock warrants at the end of the fiscal year after Day 0. This is performed by multiplying the number of stock warrants by their corresponding strike prices at the end of the same fiscal year. We call this value *WTV*. For the second stage, we divide *WTV* by *CVA*. In formula format, we have:

$$OVM_{WAR} = WTV/CVA. \quad (2)$$

3. Hypotheses, methodology, and model

3.1. Hypotheses

For this paper's empirical examination, we test competing theories on the impact of stock derivatives on firm performance. The literature review discussed the empirical evidence to support

a research hypothesis with either a positive or negative prediction. Given these predictions the null hypothesis (*NH*) is:

NH: A neutral association is predicted between the relative investment in stock derivatives and SEO stock returns.

For our tests, *NH* predicts neutral coefficients for *OVM_{SO}* and *OVM_{WAR}* when regressed against SEO stock return variables.

The first research hypothesis is:

H1: A positive association is predicted between stock derivative holdings and SEO stock returns.

For our tests, *H1* predicts positive coefficients for *OVM_{SO}* and *OVM_{WAR}* when regressed against SEO stock returns. Positive coefficients reveal that SEO firms perform better when they have greater relative amounts of stock derivatives.

Our second research hypothesis is:

H2: A negative association is predicted between the stock derivative holdings and SEO stock returns.

While *H2* predicts negative coefficients for *OVM_{SO}* and *OVM_{WAR}*, our pre-SEO tests can generate negative coefficients for reasons other than those given by researchers (such as cronyism and risky projects). For example, assume insiders with large stock derivatives holdings witness the rise in stock price and want to cash in when the price peaks. If the latter is true, then their holdings would be lowered by the time they are measured at the end of the fiscal year after the SEO announcement. The end result would be negative coefficients for *OVM_{SO}* and *OVM_{WAR}*.

3.2. Return methodology

CRSP computes an SEO return from one period's ending price to a subsequent period's ending price where a period can be either a day or a month. We compute both daily and monthly compounded SEO returns as the dependent variables in our main regression tests. For our main tests, we use daily and monthly compounded raw returns (*CRRs*) for SEO firms. For robust tests, we use daily and monthly compounded abnormal returns (*CARs*) as the dependent variables in regression tests. To get an SEO *CAR*, a *CRR* is first computed for a designated holding period using return data supplied by CRSP. We have

$$CRR_n = \{(1+r_1) \times \dots \times (1+r_n)\} - 1 \quad (3)$$

where r_j is the daily or monthly SEO raw return for day or month $j = 1, \dots, n$ and n is the number of days or months in the period. Next an expected daily or monthly compounded expected return

(*CER*) is computed for the same period using the equal-weighted, exchange-based CRSP index as the expected return. This yields

$$CER_n = \{(1+i_1) \times \dots \times (1+i_n)\} - 1 \quad (4)$$

where i_j is the index return for day or month $i = 1, \dots, n$ and n is the number of days or months in the period. Through a simple subtraction of equation (3) minus equation (4), the *CAR* is

$$CAR_n = CRR_n - CER_n. \quad (5)$$

3.3. Regression model

This paper uses a regression analysis to determine the association of independent variables with *CRRs* given by equation (3). The general regression model is:

$$CRR = \beta_0 + \sum_{j \in J} \beta_j DV_j + \sum_{i \in I} \beta_i NV_i + \varepsilon \quad (6)$$

where

CRR = SEO daily or monthly compounded raw return

DV = Derivative variable representing relative value of stock derivatives

NV = Non-derivative variables used as control variables

The two *DVs* used with equation (6) are:

OVM_{SO} = Relative value of outstanding stock options after SEO compared to the common stock market value at that time (first described in [Section 2.2](#) where equation (1) was given as $OVM_{SO} = OTV/CMV$)

OVM_{WAR} = Relative value of outstanding stock warrants after SEO compared to the common stock market value at that time (first described in [Section 2.2](#) where equation (2) was given as $OVM_{WAR} = WTV/CMV$)

The eight *NVs* are control variables used with equation (6) are:

CIL = Change in the proportion of shares held by insiders that is caused by the SEO

MLA = Proportion of shares outstanding held by mutual funds at the end of the fiscal year after Day 0 (labeled as fiscal year +1)

UND = Underpricing: (Estimated offer price – Offer price) / Estimated offer price

PFT = Profitability: Operating income before depreciation / Total assets (computed on the fiscal year ending before Day 0, which we label fiscal year -1)

RD1 = Dummy Variable: *RD1* = 1 if positive investment in R&D for fiscal years -3, -2, -1, and +1

EXP = Dummy Variable: *EXP* = 1 if primary purpose of offering is for expansion

DBT = Dummy Variable: *DBT* = 1 if primary purpose of offering is for debt reduction

RD2 = Dummy Variable: *RD2* = 1 if primary purpose of offering is for R&D expenditures

Our control variables were chosen because of their potential to predict future firm performance. In particular, the purpose of the offering should help indicate the long-run potential. For example, the purposes of expansion and R&D expenditures indicate future growth possibilities whereas a debt purpose indicates overvaluation and the need to control executives from wasteful spending.

Section 3.1 described the predicted coefficient signs for our two *DVs* of OVM_{SO} and OVM_{WAR} . Below we describe the predicted coefficient sign for our eight control variables.

Signaling theory premised in Leland and Pyle (1977) argues that greater decreases in inside ownership levels (*CIL*) signal greater negative news about firm performance. This suggests a positive coefficient for *CIL*. However, if the market believes insiders are using the SEO offering for personal needs such as cash or diversification, then the negative news from lowering their ownership levels can be offset. In addition, this study's sample contains SEO firms where insiders are maintaining high proportions of ownership after the SEO even after disposing of a proportion of their ownership. Thus, when all factors are considered, we predict negative coefficients for *CIL*.

We expect a positive relations between mutual fund ownership (*MLA*) and stock returns. Consistent with this expectation, researchers (Jiambalvo, *et al.*, 2002; Ahmad and Jusoh, 2014) suggest that greater institutional ownership is generally associated with greater stock prices.

Underpricing (*UND*) measures the extent that the offer price is set below the market price. For this study, we define underpricing as the difference between the estimated offer price (given in the final prospectus) relative to the offer price. In percentage terms, *UND* averages 4.04%. We predict a negative coefficient for *UND* since greater underpricing should have a greater negative effect. This should be especially true for short-run tests around the SEO but could also apply to long-run tests because greater underpricing would be needed if there are poor long-run performance expectations.

We predict a positive coefficient for our profitability variable (*PFT*). The market is less likely to believe overvaluation is operative if the SEO firm is showing greater profits prior to the SEO as these firms would have a legitimate reason to issue new shares. In fact, one would expect superior performing firms to increase funds for future profitable projects. A positive coefficient is consistent with Kim and Purnanandam (2014) who suggest greater profitability enables a better market response to an SEO announcement. In particular, their results indicate that investors react negatively to SEO announcements by firms that have engaged in value-destroying acquisitions prior to the offering.

The last four *NVs* used with equation (6) are dummy variables. The first *NV* is *RDI* and captures the extent of commitment to research and development for the three years before the SEO announcement and the one year after. For our regression tests, $RDI = 1$ if the SEO firm reports investments in research development for all four of these years. To the extent this sustained four-

year investment in R&D leads to increase in firm performance, we predict a positive coefficient for *RDI* in our regression tests.

The last three dummy variables capture the purpose of the offering. When looking at the final prospect, we assign a primary purpose to each offering. For this paper, we break the primary purpose into nine major categories. The most common primary purpose given is for selling shareholders where 338 SEO firms (28.43% of 1,189 total) list this as the primary purpose. In order of most common, the remaining eight primary purpose categories are: expansion (303, 25.48%); debt reduction (210, 17.67%); research and development (163, 13.71%); general corporate purposes (72, 6.06%), sales and marketing (48, 4.04%), repurchase/redemption of securities (29, 2.44%); working capital (15, 1.26%), and, dividends (11, 0.93%). For this paper's regression tests, the dummy variables include the three most common purposes that are not for selling shareholder purpose. Our predictions for these dummy *NVs* are given below.

For the expansion variable (*EXP*) where $EXP = 1$ indicates expansion purposes, we predict a positive coefficient under the assumption that an SEO firm is less likely to be issuing overvalued shares if they publicly announce growth initiatives, which is what expansion represents. Mikkelson and Partch (1986) discover a greater decrease in SEO returns when the proceeds refinance debt as opposed to financing capital expenditures.

For the debt reduction variables (*DBT*) where $DBT = 1$ indicates debt reduction, we predict a negative coefficient under the assumption that an SEO firm is more likely to be issuing overvalued shares if they retire debt. Also, as just noted, this prediction is consistent with Mikkelson and Partch. In addition, agency theory suggests that lower levels of debt cause a situation where surplus funds may be more likely to cause problems. For example, Jensen (1986) argues that less debt will lead to more squandering of cash flows.

Finally, for the R&D expenditures variable (*RD2*) where $RD2 = 1$ indicates research and develop purposes, our prediction is like that given for *EXP*. Thus, we predict a positive coefficient under the assumption that the SEO firm is less likely to be issuing overvalued shares if they publicly announce growth initiatives, which is what R&D (like expansion) represents. In brief, the announcements of either expansion or R&D expenditures can indicate positive signaling about future growth prospects.

4. Data and descriptive statistics

4.1. Data

We use the same SEO sample used by Hull, *et al.* (2018). As they describe, their initial sample of 4,118 firms is whittled down to 1,189 observations. As discussed in Section 2.2, *CIQ* supplies our stock derivative data consisting of stock options and stock warrants. From *CIQ*'s description, we conclude that *CIQ*'s stock options are not owned by a typical employee but key decision-makers who are insiders.

Unlike stock options, stock warrants are typically issued to incentivize a third party to enter into a financial or commercial transaction with the company. In contrast to stock options, it can be more difficult to conclude that insiders are the recipient of stock warrants. Finally, while less likely than stock options to be given for executive compensation, stock warrants can still be part of an executive compensation plan.

4.2. Descriptive statistics for key variables)

Table I reports descriptive statistics for nineteen key variables including the ten independent variables used in our regression tests. The discussion that follows will largely focus on these ten variables.

Insert Table I

The two stock derivative variables of OVM_{SO} and OVM_{WAR} have means of 15.684 and 0.005, respectively, revealing that options dominate warrants. The change in the insider ownership level (CIL) averages -0.106. In percentage terms, this drop represents a change of nearly -20% based on the proportion of 0.535 of shares held by insiders before the SEO. The proportion of outstanding common stock after the SEO held by mutual funds (MLA) averages 0.118.

Means for the estimated offer price (EOP) and offer price (OP) are \$27.991 and \$27.210, respectively. We compute underpricing (UND) as the relative amount that OP is set below EOP . For this computation, UND averages 0.040. The mean for profitability (PFT), defined as operating income before depreciation divided by total assets, is negative at -0.010. However, the median for PFT is 0.092 indicating negative outliers drive the mean statistics.

The next four NVs in Table I are dummy variables. The means for these variables indicate the proportion of SEOs that take on a value of 1. Thus, the mean for RDI of 0.567 indicates that $0.567 \times 1,189 = 674$ SEOs have a positive R&D investment for the fiscal ending years of -3, -2, -1, and

+1. Similarly, the respective means for *EXP*, *DBT*, and *RD2* indicate that 302, 210, and 163 SEOs use proceeds primarily for expansion, debt reduction, and R&D.

4.3. Descriptive statistics for return variables

Table II provides descriptive statistics for SEO stock return variables. These return variables are used as dependent variables in our regression tests. Panel A provides statistics for short-run return periods from one day to four months. These variables use either daily or monthly returns. Except when using the Day 0 return or the Month 0 return, return variables in Panel A are either compounded daily or compounded monthly. Panel B provides statistics for long-run return periods from 13 months to 157 months using monthly data. For this panel, all SEO return variables are compounded monthly.

Insert Table II

Panel A reveals most short-run SEO returns are positive except for those that include days -1 through -16. The panel further reveals that most short-run compounded monthly returns are highly positive if pre-SEO months are used. However, when we use post-SEO months, we find smaller positive returns. Panel B provides long-run statistics that supplement what was shown in Figures 1 and 2. As seen in the last row of Panel B, the mean for the greatest long-run variable of *SYM3P10* covers 157 month and has a compounded monthly return of 412.20%. The 157 months include the 36 months (or three years) before Month 0; month 0; and, the 120 months (or ten years) after month 0.

5. Empirical results

This section presents empirical results using equation (6). Because we use monthly return data for most tests and there are multiple SEOs in each month, there can be clustering of the independent variables. Thus, for regression tests, standard errors are clustered at the month level. This clustering adjustment also corrects for heteroscedasticity. Because variance inflation factors are well below the standard cut-off of 2.5, we rule out multicollinearity concerns. We also find no concerns for non-normality. Finally, all regression variables are winsorized at ½% on both sides to prevent outliers from driving our results.

5.1. Short-run daily regression results

Table III presents regression results for twenty short-run periods using the regression model given in equation (6). For the post-SEO tests, the positive coefficients for *OVM_{SO}* and *OVM_{WAR}* are consistent with HL. For the pre-SEO tests, the negative coefficients for *OVM_{SO}* and *OVM_{WAR}* are

consistent with *H2*. Fourteen of twenty tests for *OVM_{SO}* manifest significance especially for periods greater than fifteen days (using daily return data) or over one month (using monthly return data). Only six of the twenty tests for *OVM_{WAR}* manifest significance with this significance occurring for periods greater than thirty days (using daily returns) or over one month (using monthly returns). Except for five tests where *OVM_{SO}* and *OVM_{WAR}* are significant between 5.50% and 10.49% levels, all significant levels range from 0% to 5.49%.

Insert Table III

We interpret the results in Table III as follows. Except for the Day 0 test, the five short-run tests for days -11 through +15 do not significantly influence returns. Thus, consistent with the null hypothesis (*NH*), the market is not generally impacted by stock derivative ownership for days immediately around Day 0. The thirteen significant negative coefficients for *OVM_{SO}* and *OVM_{WAR}* that include pre-SEO days or month indicate SEOs with strong price run-ups have less post-SEO stock derivative holdings. We explain this in terms of SEO firms exercising their stock derivatives before the fiscal year after Day 0. The seven significant positive coefficients for *OVM_{SO}* and *OVM_{WAR}* that include post-SEO days or months indicate that those SEOs with greater stock derivative holdings perform better for up to four months after the SEO announcement. This indicates that SEO firms with large stock derivative holdings perform better. However, this result tends to primarily hold for stock derivatives and periods from twenty days to four months after Day 0. The result for the 101 day test around the SEO announcement (*SD101* in the return column) is negative and significant. This suggests that the negative pre-SEO market response dominates any post-SEO stock positive market response.

Finally, there is consistency in how stock options and stock warrants influence stock returns. This is best seen in the tests for the return variables *SDM31*, *SDP40*, *SDM41*, *SDM51*, *SD101*, and *SM3M1* where the coefficient signs for *OVM_{SO}* and *OVM_{WAR}* are not only the same but all are significant. In brief, our short-run tests suggest that the market responses to both stock derivatives are similar, albeit the response is the strongest for *OVM_{SO}*.

In terms of the control variables, underpricing (*UND*) dominates the short-run tests and this is particularly true for the two tests with the smallest periods (*SDP0* and *SD3*). Thus, as expected, greater underpricing has a greater negative effect. As indicated by the results for the dummy variable *RD1*, SEO firms that engage in positive R&D expenditures from years -3 to +1 have a strong influence on firm performance as greater R&D leads to a more positive market response for pre-SEO tests. Similarly, as indicated by the results for the dummy variable *EXP*, firms that declare

usage of proceeds for expansion purpose have a greater short-run performance and this is true for both pre-SEO and post-SEO tests.

5.2. Long-run daily regression results

Table IV presents regression results for twenty-eight long-run periods. As seen in this table, support for the first and second research hypothesis (H1 and H2) is found as the coefficients for OVM_{SO} have their predicted signs and are significant. However, the support for OVM_{WAR} is only for H2 and even so is much weaker than that found for OVM_{SO} where 27 of the 28 tests yield significant coefficients. Thus, unlike our short-run tests where the market responses to both stock derivatives manifest similarities, we now find that OVM_{WAR} no longer supports H2 as most coefficients are insignificant and coefficient signs often differ from those for OVM_{SO} . This is especially true for post-SEO tests. Of interest, the support for H1 and H2 found for OVM_{SO} extends up to ten years after the SEO. Thus, there is value in looking at periods up to ten years, which are periods rarely, if ever, examined.

Insert Table IV

While, more tests generally support H2, we explain this in terms of our unique sample of SEOs that is marked by a pre-SEO period of positive returns that would induce an early exercise of outstanding stock derivatives. Thus, absent this inducement, it is possible that more results supporting H1 could occur. Finally, like the short-run results for test that covered days -50 through +50, we find negative coefficients whenever we look at tests that include periods before and after the SEO announcement. Once again, this suggests that the negative pre-SEO market response dominates any post-SEO stock positive market response.

In terms of the control variables, the relative holdings by mutual fund companies (MLA) stands out for the long-run tests. However, there is a switch in the coefficient sign from negative to positive once our tests include year +5 and beyond. We interpret this as revealing that mutual funds are good at identifying long-run performance for five years and beyond. The negative coefficients for underpricing indicate that greater underpricing is associated with inferior long-run performance. As indicated by the results for the dummy variables EXP and $RD2$ (and a lesser extent $RD1$) declaring growth opportunities at the time of the SEO is largely a subterfuge as these firms perform worse over time. Whatever positive expectation that occurred before and around the time of the SEO announcements, these expectations begin vanishing three year after Day 0.

5.3. Additional tests

We performed additional tests for robust purposes. For example, we repeated our tests using equation (5) with various index returns given by CRSP. Our general findings are unchanged. Additionally, tests were repeated after deleting observations often omitted from event studies (such as REITs, unit offerings, ADRs, concurrent offerings, firms with multiple offerings, and so forth). The results for these tests were similar.

Due to space constraints, tests of other *DVs* given by *CIQ* must be reserved for future research. These variables include the relative value of options granted and exercised.

6. Conclusions

This paper uses a sample of 1,189 SEOs to investigate if stock derivatives (stock options and stock warrants) are significantly associated with stock returns. This is done in conjunction with testing two competing research hypotheses. *First*, *H1* predicts a positive association between stock derivative ownership and firm performance. *Second*, *H2* predicts a negative association. Short-run post-SEO tests show support for *H1*, while short-run pre-SEO tests support *H2*. In both cases, the strongest support is for stock options with very little post-SEO support for stock warrants.

For long-run tests, we also find support for *H1* and *H2*. Long-run post-SEO tests display support for *H1* but only for stock options. Long-run tests that include pre-SEO periods reveal support for *H2* but primarily for stock options with the support for stock warrants only occurring for shorter long-run periods that include pre-SEO years.

To our knowledge, we offer the first tests that compare the two stock derivative types of options and warrants for their impact on firm performance around SEO announcements. Unlike prior studies, we look at longer periods. By doing this, we show that the influence of stock option holdings after the SEO is strong and persistent for up to ten years after Day 0. Those firms that perform the best after Day 0 have greater stock option holdings. We explain our negative pre-SEO association between stock derivative holdings and firm performance in terms of owners exercising their stock options to capitalize on the pre-SEO price run-up. Our long-run tests also show how the role of control variables can change over time. Of importance, we show that larger mutual fund holdings after the SEO are a good long-run predictor of strong SEO performance but this strong performance does not occur until year +5 and beyond.

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Table I. Acronyms, Descriptions, and Statistics for Key Variables ([Return to Insert Table I](#))

This table provides acronyms, descriptions, and statistics for 19 key variables including the ten independent variables used in regression tests. Sources for statistics include final prospectuses, *Investment Dealers' Digest (IDD)*, *CRSP*, and *S&P Capital IQ (CIO)*. StDev refers to standard deviation. *CSB* stands for common shares outstanding before the SEO offering, *CSA* stands for common shares outstanding after the SEO offering. Fiscal year -1 refers to the fiscal year before the SEO announcement; fiscal year +1 refer to the fiscal year after the SEO announcement; and so forth.

Acronym	Description	Mean	Median	StDev
<i>EOP</i>	Estimated offer price based on market price at time of final prospectus	27.991	22.400	25.821
<i>OP</i>	Offer price	27.210	21.500	25.464
<i>CVB</i>	Common stock value before offering: $OP * CSB$ (in millions)	2,223	644	8,650
<i>CVA</i>	Common stock value after offering: $OP * CSA$ (in millions)	2,396	745	9,526
<i>OTV</i>	Total option value fiscal year +1 (in millions)	721	14	22,256
<i>WTV</i>	Total warrant value fiscal year +1 (in millions)	1.538	0.000	11.659
<i>ILB</i>	Insider level of shares owned before SEO / <i>CSB</i>	0.535	0.533	0.230
<i>ILA</i>	Insider level of shares owned after SEO / <i>CSA</i>	0.429	0.416	0.207
<i>TAB</i>	Total assets fiscal year -1 (in million)	3,494	318	29,847
<i>OVM_{SO}</i>	$OVM_{SO} = OTV / CVA$ (winsorized ½% both sides)	0.0518	0.0258	0.0924
<i>OVM_{WAR}</i>	$OVM_{WAR} = WTV / CVA$ (winsorized ½% both sides)	0.0033	0.0000	0.0198
<i>CIL</i>	Change in insider ownership level: $CIL = ILA - ILB$ (in millions)	-0.106	-0.089	0.086
<i>MLA</i>	Level of <i>CSA</i> held by mutual funds (fiscal year +1)	0.118	0.000	0.168
<i>UND</i>	Underpricing: $(EOP - OP) / EOP$	0.040	0.042	0.361
<i>PFT</i>	Profitability: Operating income before Depreciation / <i>TAB</i> (fiscal year -1)	-0.010	0.092	0.485
<i>RD1</i>	$RD1 = 1$ if positive investment in R&D for fiscal years -3, -2, -1, and +1; else 0	0.567	1.000	0.496
<i>EXP</i>	$EXP = 1$ if primary purpose of offering is for expansion; else 0	0.254	0.000	0.435
<i>DBT</i>	$DBT = 1$ if primary purpose of offering is for debt reduction; else 0	0.177	0.000	0.382
<i>RD2</i>	$RD2 = 1$ if primary purpose of offering is for R&D expenditures; else 0	0.137	0.000	0.344

Table II. Acronyms, Descriptions, and Statistics for Return Variables (Return to Insert Table II)

This table provides acronyms, descriptions, and statistics for return variables used in regression tests as dependent variables. Panel A presents twenty short-run return variables. Panel B provides twenty-eight long-run return variables.

Acronym	Description	Mean	Median	StDev
Panel A. Short-Run Return Tests (1 Day to 4 Months)				
<i>SDP0</i>	SEO Daily 1-Day Return (Day 0)	-1.64%	-1.42%	6.3%
<i>SD3</i>	SEO Compounded Daily 3-Day Return (Days for -2, -1, & 0)	-2.61%	-2.43%	9.2%
<i>SDP10</i>	SEO Compounded Daily 10-Day Return (Days +1 through +10)	1.83%	0.91%	12.6%
<i>SDM11</i>	SEO Compounded Daily 11-Day Return (Days -10 through 0)	-1.74%	-2.67%	21.3%
<i>SDP15</i>	SEO Compounded Daily 15-Day Return (Days +1 through +15)	2.27%	1.60%	15.4%
<i>SDM16</i>	SEO Compounded Daily 16-Day Return (Days -15 through 0)	-0.78%	-1.70%	22.1%
<i>SDP20</i>	SEO Compounded Daily 20-Day Return (Days +1 through +20)	2.81%	2.16%	17.5%
<i>SDM21</i>	SEO Compounded Daily 21-Day Return (Days -20 through 0)	0.57%	-0.86%	24.4%
<i>SDP30</i>	SEO Compounded Daily 30-Day Return (Days +1 through +30)	3.00%	2.62%	22.5%
<i>SDM31</i>	SEO Compounded Daily 31-Day Return (Days -30 through 0)	4.67%	1.33%	28.7%
<i>SDP40</i>	SEO Compounded Daily 40-Day Return (Days +1 through +40)	3.90%	2.83%	26.9%
<i>SDM41</i>	SEO Compounded Daily 41-Day Return (Days -40 through 0)	8.88%	3.04%	36.3%
<i>SDP50</i>	SEO Compounded Daily 50-Day Return (Days +1 through +50)	4.01%	3.17%	30.0%
<i>SDM51</i>	SEO Compounded Daily 51-Day Return (Days -50 through 0)	14.41%	6.60%	47.6%
<i>SD101</i>	SEO Compounded Daily 101-Day Return (Day -50 through +50; includes Day 0)	18.65%	9.55%	62.0%
<i>SYZ</i>	SEO Monthly 1-Month Return (Month 0)	0.56%	-0.86%	23.7%
<i>SM3M1</i>	SEO Compounded Monthly 3-Month Return (Months -3 through -1)	28.37%	13.68%	73.5%
<i>SM4M1</i>	SEO Compounded Monthly 4-Month Return (Months -4 through -1)	39.33%	17.89%	104.4%
<i>SYM3P0</i>	SEO Compounded Monthly 4-Month Return (Months -3 through 0)	28.47%	13.76%	78.7%
<i>SP1P4</i>	SEO Compounded Monthly 4-Month Return (Months +1 through +4)	4.41%	1.05%	41.2%
Panel B. Long-Run Return Tests (13 Months to 157 Months)				
<i>SYM1P0</i>	SEO Compounded Monthly 13-Month Return (Year -1 & Month 0)	106.12%	52.76%	212%
<i>SY0P1</i>	SEO Compounded Monthly 13-Month Return (Month 0 & Year +1)	4.99%	-5.41%	86%
<i>SYM21</i>	SEO Compounded Monthly 24-Month Return (Years -2 & -1)	143.55%	58.31%	314%
<i>SY1P2</i>	SEO Compounded Monthly 24-Month Return (Years +1 & +2)	6.05%	-7.17%	89%
<i>SYM2P0</i>	SEO Compounded Monthly 25-Month Return (Years -2 & -1 and Month 0)	143.56%	60.15%	314%
<i>SYM1P1</i>	SEO Compounded Monthly 25-Month Return (Year -1, Month 0, and Year +1)	115.78%	48.30%	306%
<i>SY0P2</i>	SEO Compounded Monthly 25-Month Return (Month 0, and Years +1 & +2)	5.96%	-8.60%	90%
<i>SYM31</i>	SEO Compounded Monthly 36-Month Return (Years -3, -2 & -1)	166.69%	82.45%	311%
<i>SY1P3</i>	SEO Compounded Monthly 36-Month Return (Years +1, +2 & +3)	19.66%	-3.24%	122%
<i>SYM3P0</i>	SEO Compounded Monthly 37-Month Return (Years -3, -2, & -1, and Month 0)	165.01%	82.25%	302%
<i>SY0P3</i>	SEO Compounded Monthly 37-Month Return (Month 0 and Years +1, +2, & +3)	19.71%	-3.84%	122%
<i>SY1P4</i>	SEO Compounded Monthly 48-Month Return (Years +1, +2 & +4)	38.19%	1.99%	169%
<i>SYM2P2</i>	SEO Compounded Monthly 49-Month Return (Years -2 through +2 and Month 0)	142.53%	61.85%	295%
<i>SY1P5</i>	SEO Compounded Monthly 60-Month Return (Years +1 through +5)	50.30%	3.61%	193%
<i>SY1P6</i>	SEO Compounded Monthly 72-Month Return (Years +1 through +6)	57.13%	11.20%	199%
<i>SYM3P3</i>	SEO Compounded Monthly 73-Month Return (Years -3 through +3 and Month 0)	176.40%	73.29%	338%
<i>SY1P7</i>	SEO Compounded Monthly 84-Month Return (Years +1 through +7)	75.18%	15.95%	233%
<i>SYM3P4</i>	SEO Compounded Monthly 85-Month Return (Years -3 through +4 and Month 0)	209.39%	92.18%	418%
<i>SY1P8</i>	SEO Compounded Monthly 96-Month Return (Years +1 through +8)	91.27%	17.00%	261%
<i>SYM3P5</i>	SEO Compounded Monthly 97-Month Return (Years -3 through +5 and Month 0)	227.91%	79.73%	491%
<i>SY1P9</i>	SEO Compounded Monthly 108-Month Return (Years +1 through +9)	106.66%	18.42%	282%
<i>SYM3P6</i>	SEO Compounded Monthly 109-Month Return (Years -3 through +6 and Month 0)	252.07%	89.55%	526%
<i>SY1P10</i>	SEO Compounded Monthly 120-Month Return (Years +1 through +10)	127.90%	24.57%	338%
<i>SYM3P7</i>	SEO Compounded Monthly 121-Month Return (Years -3 through +7 and Month 0)	290.54%	103.58%	638%
<i>SY0P10</i>	SEO Compounded Monthly 121-Month Return (Month 0 and Years +1 through +10)	125.51%	23.81%	327%
<i>SYM3P8</i>	SEO Compounded Monthly 133-Month Return (Years -3 through +8 and Month 0)	324.28%	125.32%	663%
<i>SYM3P9</i>	SEO Compounded Monthly 145-Month Return (Years -3 through +9 and Month 0)	348.55%	140.45%	710%
<i>SYM3P10</i>	SEO Compounded Monthly 157-Month Return (Years -3 through +10 and Month 0)	412.20%	181.85%	860%

Table III. Short-Run Regression Results (Return to Insert Table III)

This table presents twenty short-run regression results using daily and monthly return data for the dependent variables in our regression model given in equation (6). The twenty dependent regression variables in the first ("Return") column were described in Table II. The ten independent regression variables in the last ten column were described in Table I. Because coefficients have a definite predicted sign, one-tailed *t*-statistic are given for independent variables. One asterisk (*) indicates significance from the 5.50% to the 10.49% level. Two asterisks (**) indicate significance from the 1.50% to the 5.49% level. Three asterisks (***) indicate significance from the 0% to the 1.49% level.

Return	<i>OVM_{SO}</i>	<i>OVM_{WAR}</i>	<i>CIL</i>	<i>MLA</i>	<i>UND</i>	<i>PFT</i>	<i>RDI</i>	<i>EXP</i>	<i>DBT</i>	<i>RD2</i>	<i>F</i> (Adj <i>R</i> ²)
<i>SDP0</i>	1.39'	-0.38	-2.71***	-0.28	-12.66***	0.86	3.41***	0.64	0.75	1.34'	56.8*** (0.367)
<i>SD3</i>	1.06	-1.02	-0.10	0.98	-13.36***	1.07	1.63*	0.69	-1.99**	0.63	104.9*** (0.313)
<i>SDP10</i>	1.03	0.26	-1.31*	-1.35'	-3.08***	1.55'	-0.21	0.88	0.66	-0.02	3.6*** (0.019)
<i>SDM11</i>	-0.85	-1.27	-2.16**	1.09	-6.85***	-0.03	0.59	2.11**	0.40	1.14	24.0*** (0.094)
<i>SDP15</i>	0.50	1.18	-1.23	-0.98	-3.10***	1.47'	0.78	1.09	1.16	-0.96	8.6*** (0.021)
<i>SDM16</i>	-1.46'	-0.74	-1.32'	1.62'	-4.95***	0.41	0.84	1.61'	0.35	2.15**	36.3*** (0.063)
<i>SDP20</i>	2.08**	0.90	-3.04***	-0.59	-2.64***	1.79**	-0.56	2.15**	0.83	-0.54	8.1*** (0.034)
<i>SDM21</i>	-0.84	-0.71	-0.78	0.83	-4.43***	0.85	1.88**	1.46'	0.75	1.60'	18.6*** (0.037)
<i>SDP30</i>	2.09**	0.28	-2.44***	-1.11	-3.51***	2.22**	-0.84	1.33'	0.15	-0.17	6.4*** (0.035)
<i>SDM31</i>	-2.82***	-2.01**	-0.93	-0.19	-2.98***	-0.17	3.72***	1.17	0.62	1.14	9.0*** (0.029)
<i>SDP40</i>	2.25**	1.48*	-2.73***	-0.04	-3.08***	2.02**	-1.02	2.04**	0.70	0.45	4.1*** (0.034)
<i>SDM41</i>	-4.83***	-2.02**	-1.34'	-0.97	-1.98**	-0.71	4.73***	2.23**	0.47	1.06	8.4*** (0.044)
<i>SDP50</i>	2.11**	0.31	-3.19***	0.29	-2.13**	1.75**	-1.77**	1.37'	0.11	0.00	4.1*** (0.029)
<i>SDM51</i>	-4.56***	-2.46***	-1.69**	-1.29	-1.53'	-1.33'	4.61***	3.23***	0.83	1.37'	11.5*** (0.052)
<i>SD101</i>	-1.30'	-1.37'	-2.72***	-0.57	-2.80***	0.16	1.74**	2.91***	0.59	0.68	14.5*** (0.031)
<i>SYZ</i>	-0.23	-0.88	-1.99**	0.38	-5.04***	1.32'	1.96**	3.03***	-0.20	0.78	14.0*** (0.089)
<i>SM3M1</i>	-3.83***	-1.91**	-1.61'	-3.15***	-2.83***	-2.05**	7.63***	3.68***	1.11	1.04	16.5*** (0.075)
<i>SM4M1</i>	-4.27***	-1.13	-0.40	-2.96***	1.57'	-2.30**	5.83***	3.67***	1.47'	0.37	11.7*** (0.083)
<i>SYM3P0</i>	-2.70***	-1.09	-0.41	-5.71***	-1.05	2.62***	3.25***	4.83***	0.83	1.13	21.6*** (0.124)
<i>SPIP4</i>	2.13**	0.80	-1.15	-1.30'	-0.62	1.74**	-1.65'	1.28	-0.73	0.87	4.6*** (0.015)

Table IV. Long-Run Regression Results (Return to Insert Table IV)

This table presents long-run regression results using monthly return data for the dependent variables in our regression model given in equation (6). The twenty-eight dependent regression variables in the first ("Return") column were described in Table II. The ten independent regression variables in the last ten column were described in Table I. Because coefficients have a definite predicted sign, one-tailed *t*-statistics are given for independent variables. One asterisk (*) indicates significance from the 5.50% to the 10.49% level. Two asterisks (**) indicate significance from the 1.50% to the 5.49% level. Three asterisks (***) indicate significance from the 0% to the 1.49% level.

Return	<i>OVM_{SO}</i>	<i>OVM_{WAR}</i>	<i>CIL</i>	<i>MLA</i>	<i>UND</i>	<i>PFT</i>	<i>RDI</i>	<i>EXP</i>	<i>DBT</i>	<i>RD2</i>	<i>F</i> (Adj <i>R</i> ²)
<i>SYMIP0</i>	-2.39***	-2.18**	-0.63	-5.61***	0.54	-0.01	7.37***	3.17***	1.35*	0.99	14.1*** (0.086)
<i>SYP0P1</i>	2.57***	-1.88**	-2.38***	-1.20	-2.19**	1.79**	-1.30*	1.05	0.53	1.79**	7.8*** (0.025)
<i>SYM2I</i>	-1.45*	-1.95**	-0.76	-4.64***	0.40	0.02	3.32***	2.89***	0.19	1.47*	13.0*** (0.065)
<i>SYP12</i>	2.45***	-0.58	-2.35**	-0.53	-1.54*	2.03**	-10.9***	-2.91***	1.28	1.96**	20.1*** (0.072)
<i>SYM2P0</i>	-1.61*	-1.31*	-0.79	-5.19***	-0.67	0.60	3.74***	2.53***	0.08	1.63*	13.0*** (0.073)
<i>SYMIP1</i>	-1.21	-2.11**	-1.66*	-5.83***	0.43	1.66*	3.23***	2.04**	1.27	1.53*	4.9*** (0.048)
<i>SYP0P2</i>	2.32**	-0.84	-2.43***	-0.32	-3.22***	2.36**	-10.8***	-2.52***	0.69	2.26**	17.3*** (0.081)
<i>SYM3I</i>	-2.67***	-1.48*	-0.13	-5.00***	-0.01	0.93	3.28***	4.73***	0.97	0.50	17.2*** (0.117)
<i>SYP13</i>	1.73**	0.30	-2.15**	1.08	-1.57*	2.17**	-7.37***	-3.04***	0.54	0.92	18.6*** (0.078)
<i>SYM3P0</i>	-2.70***	-1.09	-0.41	-5.71***	-1.05	2.62***	3.25***	4.83***	0.83	1.13	21.6*** (0.124)
<i>SYP0P3</i>	1.70**	0.07	-2.35**	1.22	-3.10***	2.45***	-6.92***	-3.16***	0.22	1.36*	23.1*** (0.084)
<i>SYP14</i>	2.38***	-0.23	-1.42*	1.26	-1.38*	1.90**	-5.46***	-2.45***	1.24	-0.14	12.9*** (0.074)
<i>SYM2P2</i>	-3.32***	-0.97	-2.75***	-4.41***	-1.52*	3.82***	-0.64	0.40	-0.23	2.75***	7.8*** (0.083)
<i>SYP15</i>	3.48***	0.09	-0.69	1.22	-0.88	1.47*	-5.59***	-3.41***	0.62	-0.77	22.2*** (0.090)
<i>SYP16</i>	2.41***	-0.60	-1.33*	3.83***	-0.98	4.36***	-3.51***	-4.75***	1.02	-0.66	11.7*** (0.079)
<i>SYM3P3</i>	-3.69***	-0.20	-3.05***	-2.73***	-2.79***	2.32**	0.13	0.48	0.43	2.72***	9.9*** (0.101)
<i>SYP17</i>	2.23**	-1.45*	-1.07	3.57***	-1.16	1.94**	-2.95***	-3.92***	1.02	-0.76	18.2*** (0.079)
<i>SYM3P4</i>	-2.63***	0.70	-0.70	1.17	-2.69***	0.53	1.43*	-0.07	0.14	-0.41	12.5*** (0.027)
<i>SYP18</i>	3.18***	-0.36	-0.52	5.49***	-1.35*	2.14**	-1.92**	-5.27***	1.26	-1.39*	29.7*** (0.107)
<i>SYM3P5</i>	-4.27***	0.19	-0.79	2.48***	-3.81***	0.58	-0.78	-2.59***	-1.27	-0.04	11.0*** (0.070)
<i>SYP19</i>	4.30***	0.54	-0.43	6.81***	-2.66***	1.08	-1.46*	-4.05***	-0.06	-1.55*	14.9*** (0.127)
<i>SYM3P6</i>	-4.93***	-0.03	-1.19	3.59***	-3.73***	-0.03	0.66	-1.42*	0.14	-0.15	32.5*** (0.061)
<i>SYP110</i>	3.56***	0.11	-0.68	6.81***	-2.12**	0.71	-0.13	-3.18***	0.45	-1.42*	12.8*** (0.101)
<i>SYM3P7</i>	-1.68*	0.76	-1.60*	1.90**	-3.47***	0.59	0.98	-1.74***	-0.15	-0.68	9.9*** (0.060)
<i>SYP0P10</i>	3.85***	0.02	-0.72	7.18***	-3.71***	0.46	-0.05	-3.35***	0.14	-1.62*	13.7*** (0.120)
<i>SYM3P8</i>	-3.17***	0.66	-1.16	1.53*	-4.00***	0.70	0.61	-1.20	-0.43	0.21	13.2*** (0.050)
<i>SYM3P9</i>	-2.90***	0.76	-1.57*	2.54***	-3.20***	0.42	0.08	-1.98**	-0.25	-0.26	11.4*** (0.072)
<i>SYM3P10</i>	-3.26***	0.36	-1.18	2.14**	-4.99***	0.73	0.89	-0.78	0.31	0.08	26.2*** (0.068)

Figure 1. Mean price trajectories using compounded monthly returns for SEOs (solid line), EWI (dotted line), and VWI (dashed line) for months -36 through 120 when the price at beginning of month -36 is normalized at \$1.

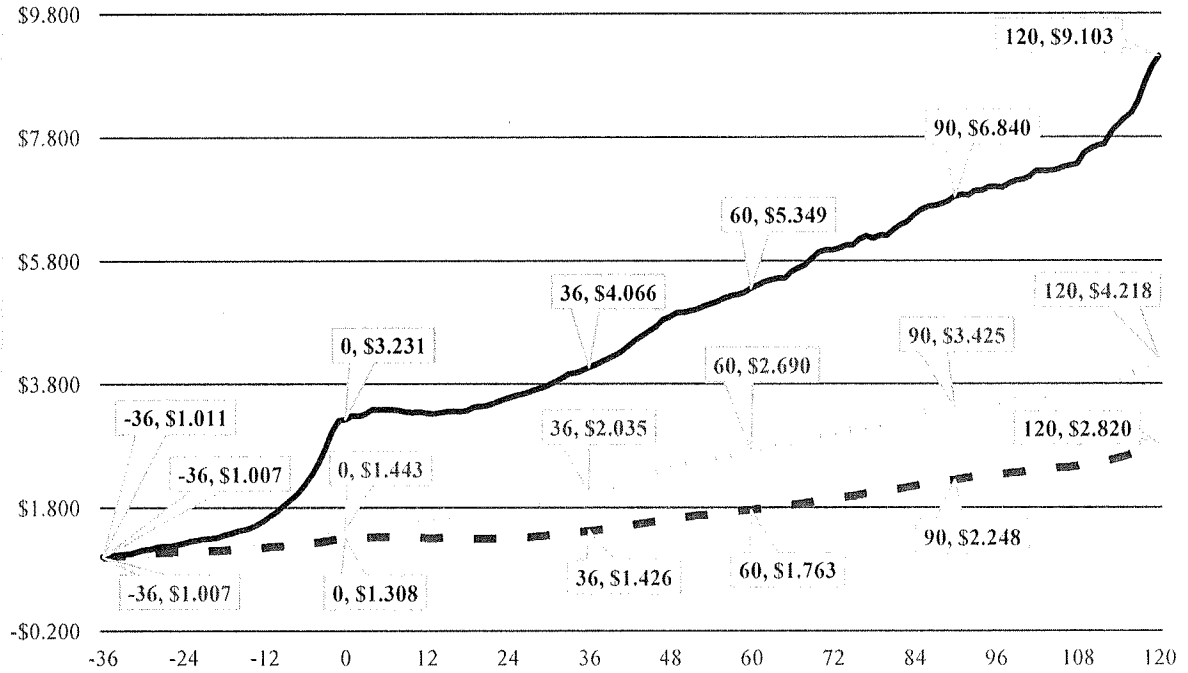


Figure 2. Median price trajectories using compounded monthly returns for SEOs (solid line), EWI (dotted line), and VWI (dashed line) for months -36 through 120 when the price at beginning of month -36 is normalized at \$1.

