

**Do Investors Use CEOs' Stock Option Exercises as Signals for
Future Firm Performance? Evidence from the Post-Sox Era**

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ABSTRACT

Prior research documents negative stock returns after corporate insiders' early stock option exercises in periods prior to the enactment of the Sarbanes-Oxley Act of 2002 (SOX), and interprets this evidence as suggesting that negative private information underlies early exercises. This study examines whether investors use corporate insiders' early option exercises as signals for firms' future prospects. Regulatory changes mandated by SOX requiring corporate insiders to report option exercises to the SEC within two business days, effective on August 29, 2002, affords us an opportunity to investigate this question. Studying a sample of CEOs' early option exercises from the post-SOX era, we fail to document an immediate stock price response to option exercise disclosures. In an attempt to explain this finding, we analyze firms' stock price behavior in the post-exercise period. Long window return tests and short window earnings announcement return tests suggest that corporate insiders' option exercises are informative about future stock prices and future earnings, respectively. One interpretation of our findings is that in the post-SOX era CEOs' early option exercises are informative, but investors largely overlook the information they convey.

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1. Introduction

Stock option exercises before their expiration dates (i.e., early stock option exercises) may involve a substantial loss of option value to the option holder. This follows because upon exercising the option holder sacrifices the options' fair value and in return receives the (lower) options' intrinsic value (i.e., the stock price on exercise date minus the exercise price). Therefore, option holders looking to cash out their investments are better off selling the options rather than exercising them early. Indeed, traded options are seldom exercised early.

However, executive stock options, which are not tradable or transferable, are often exercised early. Extant literature (see, e.g., Carpenter and Remmers 2001) mentions three primary explanations for early exercises of stock options and sales of the acquired stock by corporate insiders: portfolio diversification, liquidity needs, and private information. The first two explanations, portfolio diversification and liquidity needs, are self-explanatory. The third explanation, the one related to private information, deserves further discussion. According to this explanation, early exercises of stock options and sales of the acquired stock by corporate insiders may follow from private knowledge of bad news about the future stock price because an option represents a long position in the underlying stock, and exercising options and selling the acquired stock prior to a stock price decline allows the option holder to receive higher value for his/her holdings.

The empirical evidence on whether this private-information explanation for early exercises is descriptively valid is mixed, however. Using a sample of all option exercises by corporate insiders, Carpenter and Remmers (2001, p. 515) find little evidence of top-level executives' ability to time stock option exercises in the early 1990s, and conclude that in this

period exercises are driven primarily by diversification or liquidity needs.¹ Conversely, Huddart and Lang (2003)—using a proprietary sample of exercise decisions of over 50,000 employees at seven firms spanning periods up to ten years (the length varies by company) from August 1985 to December 1994—find that the timing of when both top managers and junior employees exercise their stock options can be used to predict future stock returns. Assuming a semi-strong capital market, they conclude that employees of all levels (partially) base their exercise decisions on private information. Finally, Bartov and Mohanram (2004) provide evidence of corporate executives’ ability to time exercises by studying the decision of top-level executives at more than 1,200 public corporations to exercise an unusually large number of stock option awards in the ten-year period 1992-2001. They find that option exercises by top executives predict both future stock price performance and future earnings performance, and conclude that exercises’ predictive ability of stock returns represents private information about disappointing earnings in the post-exercise period.

At this point an interesting question arises: Do investors use corporate insiders’ early option exercises and sales of the acquired stock as signals for firms’ future prospects? Until recently, this question was moot because investors were unable to access these data in a timely fashion. However, regulatory changes introduced by the Securities and Exchange Commission (SEC) have altered this situation. Specifically, in response to changes to disclosure requirements mandated by Section 403 of the Sarbanes-Oxley Act of 2002 (SOX), and the corresponding changes in Section 16(a) of the Securities Exchange Act of 1934, the SEC changed the reporting

¹ Interestingly, they also find, as expected, that prior to the regulatory change of May 1991, which eliminated the six-month “short swing” holding period on shares acquired through exercises, early exercises and sales of the acquired shares preceded significantly positive abnormal returns. This finding suggests that insiders timed exercises so that the forced investment in the stock would generate positive return. Note that after the 1991 regulatory change, the private-information explanation for early exercises predicts negative, not positive, returns in the post-exercise period.

regulations for stock option exercises. Prior to the change, corporate executives reported stock option exercises to the SEC on Form 4 (Statement of Changes of Beneficial Ownership of Securities) within 10 calendar days after the close of each calendar month in which an exercise occurred, and in some instances on Form 5 (Annual Statement of Beneficial Ownership of Securities), which was not due until 45 calendar days after the company's fiscal year-end. The legislative change that became effective on August 29, 2002, however, requires corporate insiders to report option exercises to the SEC on a redesigned Form 4 within two business days of exercise. In addition, since June 30, 2003, corporate insiders are required to submit forms electronically through the SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system. The SEC is required to make this information available on a publicly accessible website one day after receiving the electronic filings.² Companies that maintain websites are also required to post the forms by the end of the next business day after filing them with the SEC. These regulatory changes now allow investors to learn about corporate insiders' option exercises in a timely fashion. It thus affords us the opportunity to explore whether investors respond to corporate insiders' option exercises and sales of the acquired stock.³

We investigate this question by examining abnormal stock price changes in a short window around the option exercises and sales of the acquired stock by 1,082 CEOs at 1,003 distinct firms in the five-year period from August 29, 2002 to July 5, 2007. We focus on CEOs because they typically receive the largest amount of options and possess better information about

² Prior to June 30, 2003, insiders could choose, but were not required, to file electronically. In addition to timely disclosure and easy access, electronic filing has the advantage, from a research design standpoint, that the date at which the disclosure becomes available to investors is easy to ascertain.

³ The private-information explanation underlying our research question relates to early exercises and sales of the acquired stock. For the sake of brevity, we sometimes omit the latter part of the sentence, "and sales of the acquired stock." Early exercises that are not accompanied by a stock sale are not motivated by private information; they may follow from a company's bylaws or an executive's "exercise-and-hold" strategy to save income taxes. While we exclude these exercises from our analysis, their inclusion slightly weakens the magnitude of our results, as expected, but still leads to qualitatively similar findings, and has no effect on our conclusions.

their firms' future prospects than other executives.

If investors consider early option exercises and sales of the acquired stock as signals for CEOs' private knowledge of bad news about future stock performance, a negative stock price response should be observed around these events. However, not all early exercises necessarily follow from private information; early exercises may also follow from diversification or liquidity needs. To the extent that the latter reasons are pervasive in our sample, our ability to document negative stock price response to early exercises will be impaired. To address this potential problem, we consider the magnitude of the option value forgone due to early exercise—defined as the option's fair value minus its intrinsic value on the exercise date—when designing our tests. Considering the option value forgone due to early exercises, and in particular focusing on exercises associated with the highest value forgone should increase our ability to detect a negative stock price response to early exercises, if it exists. This follows because if portfolio diversification or liquidity needs underlie an exercise, the more costly the early exercise (i.e., the higher the option value forgone), the more likely the option holder to resort to other, less expensive, means. For example, the higher the potential loss from an early exercise, the more likely an option holder to satisfy any cash needs by borrowing rather than exercising early his/her stock options and selling the acquired stock. Indeed, evidence in prior literature supports this intuition. Core and Guay (2001, Table 8), find that option exercises are greater when the realizable value of the option portfolio captures a greater percentage of the Black-Scholes value. They interpret this finding as indicating that employees recognize that it is costly to exercise options early because it involves forfeiting the time value of the option. This discussion thus suggests that the higher the loss in option value associated with an early exercise, the stronger the signal conveyed by the early exercise about the negative private knowledge of the CEO, and

consequently the stronger the expected stock price response.

Results from a variety of portfolio tests and regression tests provide little support for the hypothesis that investors view CEOs' early exercises as signals for bad news about firms' future stock price performance. Specifically, portfolio tests show that in the seven-day window [-3; +3], where day zero is the SEC filing date of the option exercise transaction, the mean abnormal stock return for our sample as a whole is significantly positive, 0.41 percent (t-statistic = 5.37), not negative. Partitioning the sample into five portfolios formed based on the magnitude of the option value forgone due to early exercises yields little new insights, as four of the portfolios exhibit a significantly positive mean return, ranging from 0.29 percent to 0.60 percent, and one portfolio exhibits an insignificant mean return. Finally, results from regression tests indicate an insignificant relation between the stock price response to early exercises and the loss in option value associated with this activity, where the loss in option value serves as our proxy for the private information conveyed by early exercises.

What may explain these, somewhat surprising, findings? One possible explanation is that in the post-SOX era CEOs' option exercise decisions follow primarily from diversification or liquidity needs rather than private information. Another possible explanation is that in the post-SOX era CEOs still time exercises but investors overlook the information conveyed by exercises when making their investment decisions. To distinguish between these two explanations, we examine our sample firms' stock price behavior in the post-exercise period. Results from portfolio tests show that in the six-month period after exercise, [+4; +124], where day zero is the SEC filing date of the option exercise, our sample as a whole exhibits a statistically significant, albeit economically unimportant, mean return of -1.11 percent. However, a substantially different picture emerges once we partition the sample into five portfolios based on the option

value forgone due to early exercises, our proxy for private information. Specifically, the portfolios' stock price performance for the six-month window, [+4; +124], monotonically decreases from a significantly positive return of 2.32 percent where the amount of option value forgone is lowest to a significantly negative return of -4.99 percent where the amount of option value forgone is highest. The return spread between the two extreme portfolios, 7.31 percent, which translates into an annualized return of approximately 15 percent, is both statistically significant (t-statistic = -6.38) and economically important.

Next, we replicate the post-exercise return tests after partitioning the sample into three size groups of small, medium, and large firms. Firm size may play a particularly important role in our setting because CEOs' information advantage is likely to vary with firm size: The smaller the firm, the greater the CEOs' information advantage due to greater information asymmetry between insiders and outsiders. Consistent with this intuition, the results reveal that the six-month return spreads between the two extreme portfolios are 15.88 percent (t-statistic = 6.92), 4.63 percent (t-statistic = 2.72), and 1.29 (t-statistic = 1.62), for small, medium and large firms, respectively. In addition, consistent with these portfolio tests, regression results show negative relations between the level of private information conveyed by early exercises (i.e., option value forgone due to early exercises) and post-exercise stock returns. The results also show that these relations vary with firm size; they are most pronounced for small firms and least pronounced for large firms. Finally, results from short window earnings announcement return tests in the four quarters around the exercises support the long window stock return tests by showing that option value forgone due to early exercises, post-exercise quarterly earnings surprises, and firm size are significantly related, i.e., the higher the loss due to an early exercise and the smaller the firm, the higher the negative stock return around earnings announcements in the post-exercise period, but

not in the pre-exercise period.

The primary contribution of this study lies in its finding that in the post-SOX era investors fail to respond to the private information conveyed by CEOs' stock option exercises, notwithstanding the new regulations requiring accelerated and easily accessible option exercise disclosures. Our results also offer a possible explanation for this failure. Namely, investors may be considering all early exercises equally rather than calibrating the CEOs' private information conveyed by early exercises based on the option value forgone.

The remainder of the paper is organized as follows. The next section describes the sample selection and the data, and defines the variables. Section 3 outlines our tests and reports the results. Section 4 summarizes our primary findings and states our conclusions.

2. Data

2.1. Sample selection

Our sample period covers the five-year period, August 29, 2002 – July 5, 2007. The sample period commences on August 29, 2002 because this is the day the regulatory changes requiring corporate insiders to report stock option exercises to the SEC within two business days became effective. The sample period ends on July 5, 2007 in order to examine, for all observations, stock return and earnings information up to six months after exercise (our databases end on December 31, 2007).⁴

The data are obtained from the Thompson Financial database, the CRSP daily returns database, the Compustat annual database, and the Compustat quarterly database. Our analyses include a set of long-window stock return tests followed by a set of short-window earnings

⁴ As a sensitivity analysis, we replicate our tests using the sample period June 30, 2003 – July 5, 2007, as June 30, 2003 is the day electronic filing of corporate insider trades became mandatory. The results, not tabulated for parsimony, are indistinguishable from the tabulated results.

announcement return tests. The sample selection procedures for both sets of tests and their effects on the sample size are summarized in Table 1. We begin our sample selection by retrieving all CEO stock option exercise transactions from the Thomson Financial database in the sample period, August 29, 2002 – July 5, 2007. This yields 10,381 observations covering 2,308 distinct firms. We then eliminate 582 observations (259 firms) due to missing stock return data on the CRSP database. Next, we delete 154 observations (28 firms) because of missing dividend data on the Compustat database. These data are required to estimate the expected dividend yield, a parameter underlying the Black-Scholes model used to proxy for the stock options' fair value. Further, we drop 1,882 observations (297 firms) where the stock options' fair value (i.e., Black-Scholes value) on the exercise date is lower than their intrinsic value.⁵ Then, to eliminate thinly traded stocks, we exclude observations with beginning-of-year total assets less than \$1 million or with a stock price on the day prior to the stock option exercise of less than \$1, which reduces the sample by 70 observations (24 firms). Finally, we eliminate all stock option exercises in a given day not followed by immediate sale of all acquired shares within a three-day period, which reduces the sample by 2,192 observations (628 firms).⁶ Thus, the final sample for our set of stock return tests consists of 5,266 observations covering 1,003 distinct firms. For our set of earnings announcement return tests, we further delete firms with missing quarterly earnings announcement dates on the Compustat quarterly database. This additional data requirement reduces the sample by 372 observations

⁵ This follows because these observations may correspond to either i) observations for which the parameters underlying the Black-Scholes value are measured with a significant error; e.g., the historical dividend yield is too high to be an appropriate proxy for the expected dividend yield, resulting in an artificially low Black-Scholes value, or ii) observations where the stock options' Black-Scholes value on the exercise date is truly lower than their intrinsic value, leading the CEO to exercise the stock options early based on publicly available information, not private information.

⁶ As previously mentioned, including stock option exercises not followed by immediate sale of all acquired shares within a three-day period slightly weakens the magnitude of our results, but still leads to qualitatively similar findings, and has no effect on our conclusions.

(53 firms), and yields the final sample for our set of earnings announcement return tests of 4,894 observations covering 950 distinct firms.

2.2. *Variable definitions*

We measure the option value forgone due to early exercises as the difference between the fair value and the intrinsic value of the options on the exercise date, scaled by beginning-of-year total assets.⁷ The intrinsic value of an option is defined as the stock price on the exercise date less the option's exercise price. We use the Black-Scholes option value to proxy for the option's fair value for two reasons. First, it is standard in the literature to use this measure. Second, U.S. companies regularly use this measure for internal and financial reporting purposes, indicating that CEOs consider Black-Scholes a valid measure for option value. Along the lines of prior research (see, e.g., Core and Guay 1999, 2001), we calculate the Black-Scholes option value employing the formula for valuing European call options developed by Black and Scholes (1973) and generalized by Merton (1973) to account for dividend payouts as expressed in Equation (1):

$$C = Se^{-dT} N(Z) - Xe^{-rT} N(Z - \sigma\sqrt{T}) \quad (1)$$

where, C is the Black-Scholes value of the option, S is the price of the underlying stock retrieved from the CRSP database, d is the expected dividend yield over the life of the option estimated as cash dividends per share (adjusted for stock splits) paid in the fiscal year prior to the exercise divided by beginning-of-year stock price as reported in the Compustat database, T is the time-to-maturity of the option in years reported on Form 4, retrieved from the Thompson Financial database, N is the cumulative probability function for the normal distribution, X is the exercise

⁷ It is arguable that a CEO's total compensation or wealth would be a more appropriate deflator than total assets. Unfortunately, CEO wealth is not available and total CEO compensation is available for only approximately half of our sample as the Execucomp database, our data source for CEO compensation, covers only companies in the S&P 1,500. To avoid losing such a large portion of our sample, we scale by total assets because this variable is correlated with CEO total compensation and wealth.

price of the option reported on Form 4, retrieved from the Thompson Financial database, σ is the expected stock return volatility over the life of the option estimated as the standard deviation of daily stock returns over the 120-trading-day period preceding the exercise retrieved from the CRSP database, r is the risk-free interest rate (i.e., the treasury bill annualized rate corresponding to the option's time-to-maturity), and

$$Z = \frac{\log(S / X) + T(r - d + \sigma^2 / 2)}{\sigma\sqrt{T}} \quad (2)$$

We define the net proceeds from the exercise of stock options as the intrinsic value of the options on the exercise date (i.e., the stock price on the exercise date less the option's exercise price), scaled by beginning-of-year total assets. We measure the reporting lag of a stock option exercise transaction as the number of trading days between the exercise date and the SEC filing date.

We compute buy-and-hold abnormal returns for the firm i over n trading days, as follows:

$$\prod_{t=1,n} (1 + R_{it}) - \prod_{t=1,n} (1 + ER_{it}) \quad (3)$$

where, R_{it} is the return for firm i in day t , inclusive of dividends and other distributions, and ER_{it} is the expected return in day t for that firm. If a firm delists during the return accumulation window, we compute the remaining return by using the CRSP daily delisting return, reinvesting any remaining proceeds in the appropriate benchmark portfolio, and adjusting the corresponding market return to reflect the effect of the delisting return on our measures of expected returns (see, Shumway 1997; Beaver et al. 2007).⁸ We compute daily expected returns based on Carhart's (1997) four factor model. We first estimate the following model using a 250-trading-day hold-out period, ending 125 trading days prior to the SEC filing date of the stock option exercise:

⁸ Poor performance-related delistings (delisting codes 500 and 520–584) often have missing delisting returns in the CRSP database (Shumway 1997). To correct for this bias, we set missing performance-related delisting returns to –100 percent as recommended by Shumway (1997).

$$R_{it} - RF_t = a_i + b_i(RMRF_t) + s_i(SMB_t) + h_i(HML_t) + p_i(UMD_t) + e_{it} \quad (4)$$

where, R_{it} is defined as before, RF_t is the one-month treasury bill daily return, $RMRF_t$ is the daily excess return on a value-weighted aggregate equity market proxy, SMB_t is the return on a zero-investment factor mimicking portfolio for size, HML_t is the return on a zero-investment factor mimicking portfolio for book-to-market value of equity, and UMD_t is the return on a zero-investment factor mimicking portfolio for momentum factor.⁹ We then use the estimated slope coefficients from Equation (4), b_i , s_i , h_i , and p_i , to compute the expected return for firm i in day t as follows:

$$ER_{it} = RF_t + b_i(RMRF_t) + s_i(SMB_t) + h_i(HML_t) + p_i(UMD_t) \quad (5)$$

2.3. Descriptive statistics

Table 2 presents the distribution of sample firms by industry, where the industry classification is based on the Fama-French (1997) 48 industry groups. The sample firms span 46 of the 48 industry groups, and there is little evidence of industry clustering in the sample. The most represented industries are Business Services (11.7 percent of the sample firms) and Electronic Equipment (7.6 percent of the sample firms).

Table 3 reports selected descriptive statistics for the entire sample (Panel A) and for three subsamples of small firms (Panel B), medium firms (Panel C), and large firms (Panel D). Sample observations are classified into small, medium, and large firms using the Fama-French size classification, where small (large) firms have a beginning-of-year market value of equity in the bottom (top) 30 percent of all NYSE, AMEX, and NASDAQ firms, and medium firms have a

⁹ RF , $RMRF$, SMB , HML , and UMD are obtained from Professor Kenneth French's web site (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

beginning-of-year market value of equity in the middle 40 percent.¹⁰ The mean (median) total stock option value forgone by CEOs due to early exercises for our sample is 0.0137 percent (0.0015 percent) of beginning-of-year total assets. This value is decreasing with firm size: 0.0233 percent (0.0024 percent) for small firms, 0.0074 percent (0.0015 percent) for medium firms, and 0.0066 percent (0.0004 percent) for large firms. The mean (median) market capitalization of our sample firms is (in \$billions) 3.172 (1.130), which is larger than that of the Compustat universe, 2.448 (0.1841). The mean (median) share turnover, our proxy for stock liquidity is 0.271 (0.188), which is larger than that of the CRSP universe (mean = 0.172; median = 0.082), and these values vary only slightly with firm size. Overall, there is little evidence to suggest that our sample is dominated by small or illiquid firms.

As expected, most of our sample firms invest in R&D as executive stock options are more pervasive among high technology firms; the median R&D relative to total assets of our sample is 0.009, which is greater than that of the Compustat universe (0.000). However, this holds only for small and medium companies; similar to the Compustat universe the median R&D of our large firms is zero. The dividend yield of our sample firms is well below the average in the capital market: the mean dividend yield is only 0.004 and the median is zero indicating that non-dividend-paying firms dominate our sample. The mean (median) return volatility is 0.383 (0.353), and as expected is decreasing with firm size. The mean (median) time to maturity of the stock option exercises is 3.61 (3.52) years, and it is quite similar across all three size subsamples, indicating that most exercises occur long before expiration. The mean (median) buy-and-hold abnormal return for our sample is 10.2 percent (5.8 percent) for the window [-124; -4], 0.4 percent (0.0 percent) for the window [-3; +3], and -1.1 percent (-1.4 percent) for the window

¹⁰ The market-value-of-equity breakpoints for the size classification are obtained from Professor Kenneth French's web site (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

[+4; +124], where day zero is the SEC filing date of the CEO stock option exercises. For the window [-124; -4], but not for the other return windows, the mean (median) buy-and-hold abnormal return is decreasing with firm size: 17.3 percent (9.1 percent) for small firms, 6.3 percent (4.4 percent) for medium firms, and 3.7 percent (3.3 percent) for large firms. Finally, the mean (median) reporting lag throughout our sample is approximately 1.5 (1) trading day. Interestingly, we find that 97.4 percent of our sample filed within two days or less of the exercise date, consistent with the SEC's two-day reporting requirement. In contrast, Heron and Lie (2007) find that only 79 percent of the observations in their sample of stock option grants filed Form 4 within two days of the transaction date, which means that 21 percent of observations violated the SEC's two-day reporting requirement. Thus, while Heron and Lie (2007) find that the delay in filing of option grants is an important variable in explaining post-grant stock returns, the delay in filing of option exercises is not expected to be important in explaining post-exercise returns.

Table 4 reports the correlation matrix among the main variables examined in this study. The table presents Pearson product-moment correlations above the diagonal and Spearman rank-order correlations below the diagonal. For the sake of brevity, we discuss only the Pearson correlations, as the Pearson and Spearman correlations are generally consistent. The results indicate that, *Forgo*, the total option value forgone by CEOs due to early exercises, exhibits a significantly positive correlation with *NetProceeds*, the net proceeds from the stock option exercises, and with $BHAR_{[-124; -4]}$, the buy-and-hold abnormal returns for the window [-124; -4]. In contrast, *Forgo* exhibits an insignificant correlation with $BHAR_{[-3; +3]}$, the buy-and-hold abnormal returns for the window [-3; +3], and a significantly negative correlation with $BHAR_{[+4; +124]}$, the buy-and-hold abnormal returns for the window [+4; +124]. Considered

together, these correlations provide *prima facie* evidence that investors do not view CEO early exercises as signals for firms' future stock price performance, whereas in fact option value forgone due to early exercises appears to predict negative stock price performance.

3. Tests and Results

3.1. Do investors respond to CEOs' early option exercises?

To test our first research question of whether investors respond to corporate insiders' option exercise disclosures, we investigate abnormal stock price changes in a seven-day window around CEO option exercises and sales of the acquired stock, [-3; +3], where day zero is the SEC filing date of Form 4. We perform two types of tests: portfolio tests (Tables 5 and 6) and regression tests (Table 7). Table 5 reports portfolio-return results for the window [-3; +3], as well as for three- and six-month periods prior to exercise, [-64; -4] and [-124; -4], respectively. Panel A displays stock return results for the entire sample, and Panel B reports stock return results for five portfolios formed based on the amount of option value forgone due to the early exercise (our proxy for the negative private information conveyed) from smallest option value forgone, "Low Forgo," to largest option value forgone, "High Forgo." Consider the results for the pre-exercise period first. Consistent with findings in prior literature (see, e.g., Carpenter and Remmers 2001; Bartov and Mohanram 2004), early exercises are preceded by a stock price run-up. For example, the entire sample exhibits a mean abnormal stock price run-up of 10.25 percent and 5.87 percent in the six months and three months prior to the exercise, respectively. This run-up, however, varies substantially with the amount of option value forgone. For example, in the six-month period prior to exercise, [-124; -4], the High Forgo portfolio exhibits an average stock price run-up of 23.04 percent, whereas the Low Forgo portfolio exhibits an average stock price

run-up of only 3.93 percent.

Turning to the stock price reaction to option exercises, the results for the entire sample and for the five portfolios formed based on option value forgone are inconsistent with investors using insiders' early option exercises and sales of the acquired stock as signals for negative private information regarding firms' future prospects. For example, in the window $[-3; +3]$, the mean return for the entire sample is significantly positive, 0.41 percent, not negative. Likewise, the returns for four of the five portfolios formed based on option value forgone are significantly positive, ranging 0.29 percent to 0.60 percent, and insignificant for the fifth portfolio. Further, the return spread between the Low Forgo portfolio and the High Forgo portfolio is statistically insignificant (0.40 percent).

While we control for firm size when computing abnormal returns, one possible explanation for our failure to document negative stock price response to option exercises may follow because our size control is imperfect. Firm size may play a particularly important role in this study because CEOs' information advantage is likely to vary with firm size: The smaller the firm, the greater the CEOs' information advantage due to greater information asymmetry between insiders and outsiders. To investigate this possibility, we replicate the tests in Panel B of Table 5 after partitioning our sample into small, medium, and large firms using the Fama-French size classification, where small (large) firms have a beginning-of-year market value of equity in the bottom (top) 30 percent of all NYSE, AMEX, and NASDAQ firms, and medium firms have a market value of equity in the middle 40 percent. The results are reported in Panel A (small firms), Panel B (medium firms), and Panel C (large firms) of Table 6. Interestingly, while the size partition reveals a negative relation between firm size and the pre-exercise stock price run-up, it yields little new insights in terms of the stock price response to early exercise

disclosures. Specifically, the abnormal returns in the window [-3; +3] remain either insignificant (11 portfolios) or significantly positive (four portfolios).

To gain more insight into these somewhat surprising results, we estimate the following model using Huber-White robust standard errors clustered by firm:

$$\begin{aligned}
 BHAR_{i,[-3;+3]} = & \alpha_1 + \alpha_2 \textit{Medium} + \alpha_3 \textit{Large} + \beta_1 \textit{Forgo}_i + \beta_2 \textit{Forgo}_i * \textit{Medium} \\
 & + \beta_3 \textit{Forgo}_i * \textit{Large} + \delta_1 BHAR_{i,[-124;-4]} + \delta_2 \textit{NetProceeds}_i \\
 & + \delta_3 \textit{ReportingLag}_i + \sum \gamma_j \textit{Industry}_j + \sum \gamma_k \textit{Year}_k + \varepsilon_{i,[-3;+3]}
 \end{aligned} \tag{6}$$

where, the dependent variable, $BHAR_{i,[-3; +3]}$, is buy-and-hold abnormal stock returns of the firm that corresponds to the i^{th} option exercise for the window [-3; +3], where day zero is the SEC filing date of the i^{th} option exercise. \textit{Forgo}_i , our test variable, is the decile ranking of the stock option value forgone associated with the i^{th} option exercise, scaled by beginning-of-year total assets (Compustat annual data6).¹¹ \textit{Medium} (\textit{Large}) is an indicator variable equal to one if the firm is classified as a medium (large) firm using the Fama-French size classification, zero otherwise.¹² $BHAR_{i,[-124; -4]}$, a control variable for the pre-exercise stock price run-up, is buy-and-hold abnormal returns of the firm associated with the i^{th} option exercise in the six-month window [-124; -4], where day zero is the SEC filing date of the i^{th} option exercise. $\textit{NetProceeds}_i$, a control variable for the net cash payout associated with the exercise, is the decile ranking of the intrinsic value associated with the i^{th} option exercise, scaled by beginning-of-year total assets (Compustat annual data6). $\textit{ReportingLag}_i$, a control variable for reporting lags, is the number of trading days between the exercise date and the SEC filing date of the i^{th} option exercise. Industry (calendar year) indicator variables are included to control for industry (calendar year)

¹¹ Decile rankings of all variables used in this study are based on the distribution of the variable in the prior 12 months, and are scaled to range between zero and one.

¹² In the Fama-French size classification, small (large) firms have a beginning-of-year market value of equity in the bottom (top) 30 percent of all NYSE, AMEX, and NASDAQ firms, and medium firms have a market value of equity in the middle 40 percent.

fixed effects, where the industry indicator variables are based on the Fama-French (1997) 48-industry classification.

We include the first control variable, $BHAR_{[-124; -4]}$, to control for diversification needs and for risk-averse CEOs exercising more stock options after a runup in stock price pushes their options further into the money, thereby increasing their wealth exposure to changes in the stock price, and the second control variable, $NetProceeds$, to control for liquidity needs. The third control variable, $ReportingLag$, is included given evidence in prior research that in the post-SOX era lags in reporting option grants predict stock returns (Heron and Lie 2007). However, as discussed above this variable is not expected to be significant in the current context because, unlike the sample of Heron and Lie (2007), our sample only has a very small number of late filers (2.6 percent). The variables of interest in Equation (6) are $Forgo$ and the two interaction terms $Forgo*Medium$ and $Forgo*Large$. If the magnitude of the option value forgone serves as a signal for CEOs' negative private information about their firms' future stock price performance, the coefficient on the variable $Forgo$, β_1 , should be negative. Further, if CEOs' information advantage varies inversely with firm size, β_2 and β_3 should be increasingly positive.

Table 7 displays the results from estimating two versions of Equation (6). One version, reported in the column to the left of the rightmost column, tests for the relation between $Forgo$ and stock returns around the filing date of option exercises, $BHAR_{[-3; +3]}$, not allowing this relation to vary across firm size. The results show an insignificant coefficient on $Forgo$, $\beta_1 = -0.0011$ (t-statistic = -0.31), implying that there is little immediate market response to the amount of option value forgone due to early exercises. The second version of Equation (6), reported in the rightmost column, allows the coefficient β_1 to vary across firm size, but generates little new insights. Specifically, β_1 is still insignificant, as are the two coefficients on the two interaction

terms, β_2 and β_3 , indicating little difference in the stock price reaction to *Forgo* across small, medium, and large firms. Further $\beta_1 + \beta_2$, the coefficient on *Forgo* for medium firms, and $\beta_1 + \beta_3$, the coefficient on *Forgo* for large firms, are both insignificant. Together, the portfolio and regression results provide little evidence of an immediate stock price response to CEOs' early stock option exercises or to the amount of option value forgone reflected in these exercises.

What may explain these, somewhat surprising, findings? One possible explanation is that in the post-SOX era CEOs' option exercise decisions reflect primarily diversification or liquidity needs rather than private information. In other words, SOX, the "Corporate Corruption Bill," has achieved its goal as stated by President George W. Bush upon signing it into law: "This law says to every dishonest corporate leader: you will be exposed and punished; the era of low standards and false profits is over; no boardroom in America is above or beyond the law." Another possible explanation is that in the post-SOX era CEOs still time exercises but investors overlook the information conveyed by exercises when making their investment decisions. To distinguish between these two explanations, the next section examines our sample firms' stock price behavior in the post-exercise period.

3.2. *Do investors overlook information conveyed by CEOs' early option exercises?*

If our failure to document an immediate negative stock price response to option exercises follows because investors overlook valuation relevant information conveyed by option exercises, a negative stock price drift should be observed in the post-exercise period, as new information becomes publicly available allowing investors to correct their valuation errors. Further, the negative drift should be most pronounced for the High *Forgo* portfolio because this portfolio should be dominated by early exercises due to negative private information. In contrast, the Low

Forgo portfolio may be dominated by early exercises due to reasons other than negative private information (e.g., diversification or liquidity needs, or looming expiration date) that may convey little or perhaps even positive private information.¹³ Clearly, if option exercises convey no private information, a stock price drift should not be observed.

Table 8 reports return results for the three- and six-month post-exercise windows, [+4; +64], and [+4; +124], respectively, for the entire sample (Panel A) and for the five portfolios formed based on the amount of option value forgone due to early exercises (Panel B). In contrast to the positive stock return in the window [-3; +3], displayed in Table 5, the results in Panel A of Table 8 show significantly negative mean stock returns of -0.49 percent and -1.11 percent in the post-exercise windows [+4; +64] and [+4; +124], respectively. Moreover, the results in Panel B show that the post-exercise returns vary in the predicted direction with the amount of option value forgone (our proxy for the private information conveyed by the early exercises). Specifically, for the window [+4; +124], the mean stock return on the portfolio consisting of firms in the highest quintile of option value forgone (the High Forgo portfolio) is significantly negative (-4.99 percent; t-statistic = -5.42). Conversely, the mean stock return on the portfolio consisting of firms in the lowest quintile of option value forgone (the Low Forgo portfolio) is significantly positive (2.32 percent; t-statistic = 3.45). The return spread between these two extreme portfolios is highly significantly negative (-7.31 percent; t-statistic = -6.38).

Figure 1 portrays buy-and-hold abnormal returns over the window [-3; +180] for the entire sample as well as for two portfolios consisting of firms in the lowest and highest quintiles

¹³ Exercises in the Low Forgo portfolio may convey good news if, for example, the option value forgone associated with these exercises is below what the market expected. In other words, little option value forgone may be good news to investors.

of option value forgone (Low Forgo and High Forgo, respectively).¹⁴ The picture that emerges from Figure 1 is that in the immediate period around the SEC filings of the exercises, the returns on all three portfolios appear similar. In contrast, in the post-exercise period the High Forgo portfolio exhibits substantially negative returns whereas the Low Forgo portfolio exhibits substantially positive returns. The entire sample exhibits only small negative returns as the returns on the two extreme portfolios nearly offset each other. This highlights the importance of considering option value forgone when examining stock price behavior around exercises. It is also attention worthy that the abnormal returns of the two extreme portfolios diminish over time, and become virtually zero in the period [+135; +180]. This last finding alleviates concerns that inappropriate risk adjustments (i.e., mismeasured abnormal returns) underlie our findings.

Next, as before, we replicate the return tests for the five portfolios formed based on option value forgone due to early exercises after partitioning the sample into small, medium, and large firms using the Fama-French size classification. Panel A of Table 9 displays the results for small firms, Panel B for medium firms, and Panel C for large firms. Clearly, the returns vary substantially with option value forgone in the predicted direction even after firm size is controlled for. Consider, for example, the results for the subsample of small firms: for the six-month window [+4; +124] the mean return of the High Forgo portfolio is significantly negative (-5.18 percent; t-statistic = -3.66), whereas the mean return of the Low Forgo portfolio is significantly positive (10.70 percent; t-statistic = 7.28). However, the informativeness of exercises appear to diminish as firm size increases, as evidenced by the decreasing return spread between the two extreme portfolios, Low Forgo and High Forgo. While the return spread is substantial and significant for small firms (-15.88 percent; t-statistic = -6.92), it is markedly

¹⁴ Figure 1 covers an extended event period from day -3 to day +180, and as a result the sample period ends on April 2, 2007, not on July 5, 2007.

smaller but still significant for medium firms (-4.63 percent; t-statistic = -2.72), and insignificant for large firms (-1.29 percent; t-statistic = -1.62).

Finally, we re-estimate Equation (6) using as the dependent variable $BHAR_{[+4; +124]}$, the buy-and-hold abnormal returns for the window [+4; +124], to test two predictions. First, if the magnitude of the option value forgone due to early exercises serves as a signal for CEOs' negative private information about their companies' future stock price, the coefficient on the variable *Forgo*, β_1 , should be negative. Second, if CEOs' information advantage varies inversely with firm size, β_2 and β_3 should be increasingly positive.

Table 10 reports the results from estimating two versions of Equation (6). The first version tests for the relation between *Forgo* and $BHAR_{[+4; +124]}$, not allowing this relation to vary across firm size. The results, displayed in the column to the left of the rightmost column, support the first prediction by showing a significantly negative coefficient on *Forgo* ($\beta_1 = -0.0929$; t-statistic = -2.77), indicating that option value forgone conveys valuation relevant information. The results from estimating the second version of Equation (6) reported in the rightmost column of Table 10, which allows the coefficient on *Forgo* to vary across firm size, support the second prediction. Specifically, while β_1 remains significantly negative, -0.1714, the two coefficients on the two interaction terms, β_2 and β_3 , are both significantly and increasingly positive, 0.1129 and 0.1684, respectively, indicating a significant difference in the informativeness of the option value forgone due to early exercises across small, medium, and large firms. Further $\beta_1 + \beta_2$, the coefficient on *Forgo* for medium firms, is negative, -0.0585, and marginally significant, whereas $\beta_1 + \beta_3$, the coefficient on *Forgo* for large firms, is very close to zero, -0.0030, and statistically insignificant.

Together, the results in Table 9 and Table 10 show that early stock option exercises

convey valuation relevant information that varies in the predicted direction with firm size and the magnitude of the option value forgone due to the early exercises. The results also show that the information conveyed by the exercises is incorporated into stock prices over a prolonged period, rather than instantaneously. In the next section, we assess what is the nature of the private information conveyed by the exercises.

3.3. Earnings announcement returns around CEOs' stock option exercises

To assess the nature of the private information conveyed by exercises, we investigate earnings announcement returns in the four quarters around the filing date of CEO stock option exercises. We focus on earnings information because of the ample evidence showing that investors rely on earnings more than on other summary measure of performance such as dividends or EBITDA, a variant of earnings (see, e.g., Biddle et al. 1995) and that corporate executives perceive earnings as the key variable used by investors and financial analysts (see, e.g., Graham et al. 2005).

If the market fails to respond in a timely fashion to the negative private information reflected in option value forgone due to early exercises, quarterly earnings surprises and thus earnings announcement returns for the High Forgo portfolio should be negative in the post-exercise period. Table 11 reports the results for our earnings announcement return tests for the entire sample (Panel A) and for the five portfolios formed based on the amount of option value forgone due to early exercises (Panel B). Consider the results in Panel A first. In the two quarters prior to exercise, quarter q_{-2} and quarter q_{-1} , the earnings announcement returns are significantly positive, 1.32 percent (t-statistic = 10.01) and 2.10 percent (t-statistic = 16.07), respectively, and in the two quarters post-exercise, quarter q_{+1} and quarter q_{+2} , the earnings

announcement returns are statistically insignificant and very close to zero, -0.07 percent (t-statistic = -0.53) and -0.21 percent (t-statistic = -1.56), respectively.

However, in Panel B, a different picture emerges once the sample is partitioned to five portfolios based on option value forgone. Focusing on the High Forgo portfolio and the Low Forgo portfolio, we note that the spread between the two portfolios in the two quarters prior to exercise, quarter q_{-2} and quarter q_{-1} , is, as before, significantly positive, 2.22 percent (t-statistic = 4.59) and 1.92 percent (t-statistic = 3.55). However, in the two quarters post-exercise, quarter q_{+1} and quarter q_{+2} , the spread between the two extreme portfolios turns significantly negative, -0.93 percent (t-statistic = -2.22) and -2.14 percent, (t-statistic = -4.70), respectively. Thus, parallel to the stock return results in Table 5 and Table 8 showing a positive return spread between the two extreme portfolios in the pre-exercise period and a negative return spread in the post-exercise period, the spread in earnings announcement returns between the High Forgo portfolio and the Low Forgo portfolio is significantly positive in the pre-exercise period and significantly negative in the post-exercise period.

Table 12 reports the results from the earnings announcement return tests for three subsamples of small (Panel A), medium (Panel B), and large firms (Panel C). The salient finding is that the earnings announcement returns vary with firm size in the predicted direction, similar to the finding in Table 8 for the long return windows. Specifically, for small firms the earnings announcement return spread between the two extreme portfolios is negative for both quarter q_{+1} and quarter q_{+2} , 2.89 percent (t-statistic = -3.45) and -4.20 percent (t-statistic = -4.72), respectively. For medium firms the spread is significantly negative only for quarter q_{+2} , -1.48 (t-statistic = -2.37), and for large firms the spread is significant for neither quarters.

In summary, the earnings announcement return results in Tables 11 and 12 are generally

consistent with the long window return results in Tables 8 and 9, and further support that the negative post-exercise returns of small and medium firms whose CEOs forgo high amounts of option value due to early exercises are associated with negative private earnings information.

4. Conclusion

Early exercises of stock options and sales of the acquired stock by corporate insiders are likely to follow from portfolio diversification, liquidity needs, or insiders' negative private information about future stock prices. Using data from periods prior to the enactment of SOX, prior research provides mixed evidence on whether corporate insiders' private information underlies early option exercises. Carpenter and Remmers (2001) find little evidence of top-level executives' ability to time stock option exercises in the early 1990s. Conversely, Huddart and Lang (2003) find that stock option exercises of employees at all levels predict future stock returns, suggesting that exercise decisions are based on private information. Bartov and Mohanram (2004) find that early exercises by top-level executives predict both future stock return and earnings performance, and conclude that private information about disappointing future earnings underlies these exercises.

In response to changes to disclosure requirements mandated by SOX and corresponding changes to Section 16(a) of the Securities Exchange Act of 1934, the SEC changed the reporting regulations for stock option exercises requiring corporate insiders to report option exercises to the SEC within two business days, effective August 29, 2002. In addition, the SEC is required to make this information available to the public on its website one day after receiving the electronic filings. These regulatory changes, which now allow investors to learn about corporate insiders' option exercises in a timely fashion, afford us the opportunity to explore whether investors

respond to corporate insiders' option exercises.

In this study, we employ a sample of stock option exercises and sales of the acquired stock by 1,082 CEOs at 1,003 distinct firms in the period from August 29, 2002 to July 5, 2007. In an attempt to identify the extent to which early exercises follow from private information, we consider the magnitude of the option value forgone by CEOs due to early exercises, where the higher the loss in option value due to early exercises, the stronger the signal conveyed regarding the CEOs' negative private knowledge. Using portfolio and regression tests, we fail to find an immediate stock price response to CEOs' early exercises or to the amount of option value forgone reflected in the exercises (our proxy for negative private information).

To shed light on these somewhat surprising findings, we examine our sample firms' stock price behavior in the post-exercise period. Results from portfolio tests show that in the six-month period after exercise, our sample as a whole exhibits a significantly negative, yet economically small, mean stock return of -1.11 percent. However, when partitioning our sample into five portfolios based on the option value forgone due to early exercises, our proxy for private information, we find that in the six-month period after exercise firms' stock price performance monotonically decreases with the amount of option value forgone due to early exercises. The return spread between the portfolio of firms with the least option value forgone and that of firms with the most option value forgone amounts to an annualized return of approximately 15 percent, which is both economically important and statistically significant. In addition, we find that our results vary with firm size; they are most pronounced for small firms and least pronounced for large firms, consistent with the notion that CEOs' information advantage is greatest for small firms due to greater information asymmetry between insiders and outsiders. Furthermore, regression results show negative relations between the level of private

information conveyed by early exercises (i.e., option value forgone due to early exercises) and post-exercise stock returns. Finally, results from earnings announcement return tests support the long-window stock return tests by identifying significant relations between option value forgone due to early exercises, post-exercise quarterly earnings surprises, and firm size, i.e., the higher the loss due to an early exercise and the smaller the firm, the higher the negative earnings announcement return in the post-exercise period.

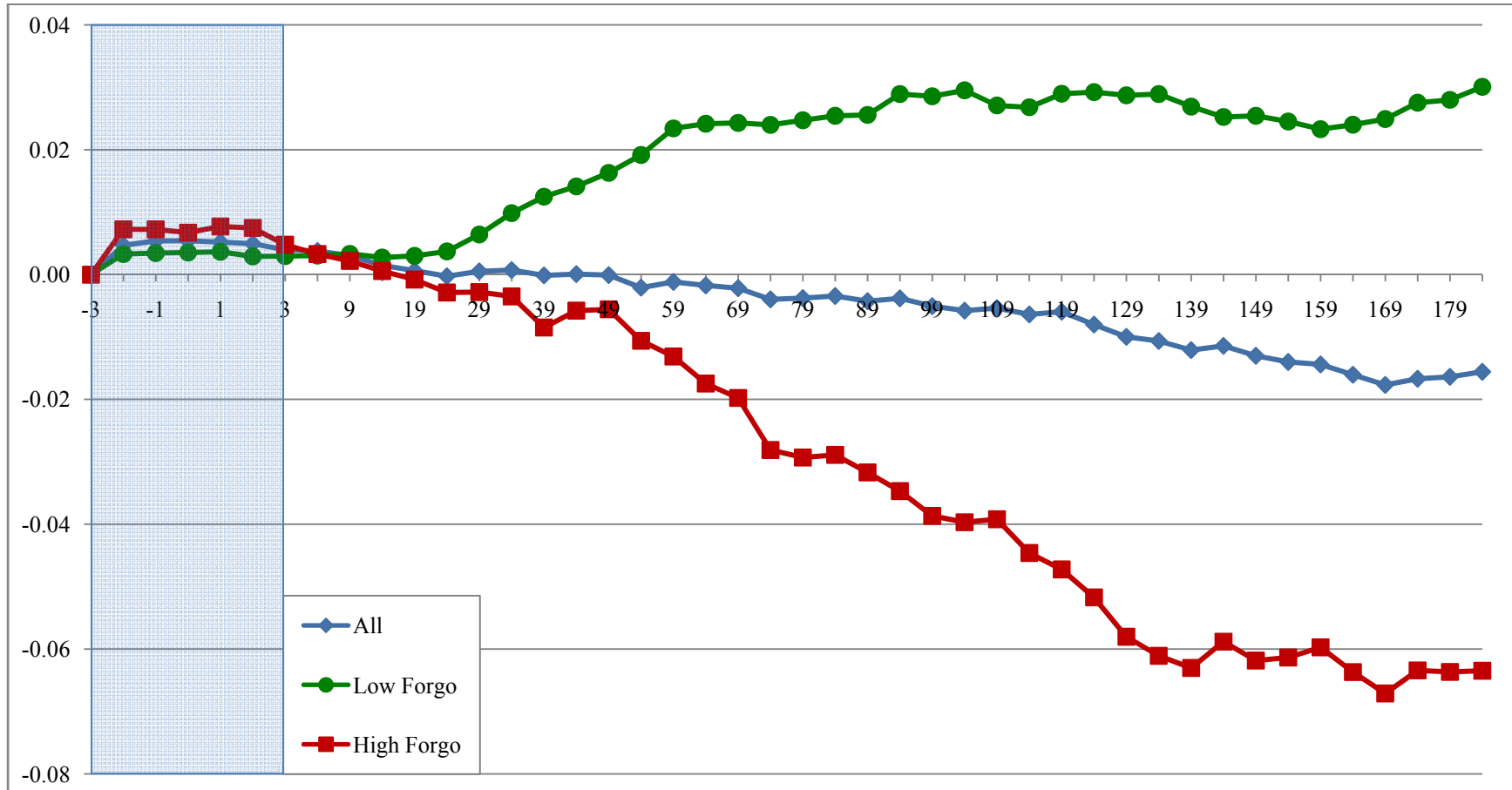
Overall, our findings suggest that in the post-SOX era corporate insiders' option exercises are informative about future firm performance, but investors seem to largely overlook the information they convey. The primary contribution of our study relates to the finding that investors fail to respond in a timely fashion to the private information conveyed by CEOs' stock option exercises, notwithstanding the exercises' accelerated and easily accessible disclosure since August 29, 2002. Further, our study also provides a possible explanation for this failure: investors may be considering all early exercises equally rather than calibrating the CEOs' private information conveyed by these exercises based on the option value forgone.

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Figure 1
Abnormal Stock Returns Around SEC Filings of CEO Stock Option Exercises



Notes:

This figure presents buy-and-hold abnormal stock returns for the window $[-3; +184]$, where day zero is the SEC filing date of CEO stock option exercises. The sample covers the period August 29, 2002 to April 2, 2007. Abnormal returns are measured using Carhart's (1997) four factor model. For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio. High (Low) Forgo consists of sample observations classified into the quintile with the largest (smallest) values of *Forgo*, where *Forgo* is the total value forgone due to the early exercise of stock options, computed as the Black-Scholes value of the options on the exercise date less the intrinsic value of the options on the exercise date (i.e., the stock price less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). The classification of sample observations into quintiles is based on the distribution of *Forgo* in the 12 months prior to day zero.

Table 1
Sample Selection

	Number of Observations	Number of Distinct Firms
All CEO stock option exercise transactions from the Thomson Financial database in the period between August 29, 2002, and July 5, 2007.	10,351	2,302
Less: Firms with no stock return data available on the CRSP database.	(787)	(322)
Less: Firms with missing dividend data on the Compustat database to estimate expected dividend yield necessary to compute stock options' Black-Scholes value.	(154)	(28)
Less: Stock option exercises with stock options' Black-Scholes value lower than their intrinsic value on the exercise date.	(1,882)	(297)
Less: Small firms. ^a	(70)	(24)
Less: Stock option exercises in a given day not followed by immediate sale of all acquired shares within a three-day period.	(2,192)	(628)
Sample for stock return tests	5,266	1,003
Less: Firms with no quarterly earnings announcement dates on the Compustat database.	(372)	(53)
Sample for earnings announcement return tests	4,894	950

Notes:

^a Small firms are defined as having beginning-of-year total assets (Compustat annual data6) less than \$1 million and/or a stock price on the day prior to the stock option exercise less than \$1.

Table 2
Industry Sample Distribution

Industry Code	Industry Description	Number of Distinct Firms	% of Sample
1	Agriculture	2	0.20
2	Food	9	0.90
3	Candy and Soda	2	0.20
4	Alcohol	3	0.30
6	Toys	6	0.60
7	Entertainment	11	1.10
8	Printing	11	1.10
9	Consumer Goods	11	1.10
10	Apparel	21	2.09
11	Healthcare	25	2.49
12	Medical Equip.	45	4.49
13	Pharma. Equip.	59	5.88
14	Chemicals	21	2.09
15	Rubber & Plastic	4	0.40
16	Textiles	1	0.10
17	Construction Mat.	10	1.00
18	Construction	13	1.30
19	Steel Works, Etc.	18	1.79
20	Fabricated Prod.	5	0.50
21	Machinery	48	4.78
22	Electrical Equip.	16	1.59
23	Misc.	7	0.70
24	Cars & Trucks	11	1.10
25	Aircraft	5	0.50
26	Ships, Railroad	1	0.10
27	Defense	2	0.20
29	Nonmetallic Mining	2	0.20
30	Coal	4	0.40
31	Petroleum & Gas	41	4.09
32	Utilities	24	2.39
33	Telecom.	25	2.49
34	Personal Svcs	8	0.80
35	Business Svcs	117	11.66
36	Computers	37	3.69
37	Electronic Equip.	76	7.58
38	Measuring, Control	25	2.49
39	Business Supplies	13	1.30
40	Containers	2	0.20
41	Transportation	26	2.59
42	Wholesale	36	3.59
43	Retail	56	5.58
44	Restaurant, Hotel	20	1.99
45	Banking	59	5.88
46	Insurance	43	4.29
47	Real Estate	4	0.40
48	Trading	18	1.79
<i>All Industries</i>		<i>1,003</i>	<i>100.00</i>

Notes:

This table presents the distribution of the final sample of 1,003 distinct firms by industry. The sample covers the period August 29, 2002 to July 5, 2007. Industry grouping is defined based on the Fama-French (1997) 48-industry classification.

Table 3
Descriptive Statistics

Variable	Mean	Std. Dev.	Q ₁	Median	Q ₃
<i>Panel A: Full Sample</i>					
<i>Forgo (%)</i>	0.0137	0.0808	0.0003	0.0015	0.0060
<i>NetProceeds (%)</i>	0.1790	0.8513	0.0118	0.0404	0.1168
<i>ReportingLag</i>	1.466	2.579	1.000	1.000	2.000
<i>MarketValueEquity</i>	3,172.6	6,308.5	470.3	1,130.3	2,806.7
<i>TotalAssets</i>	3,034.5	8,243.3	235.8	696.6	2,223.5
<i>RDExpense</i>	0.045	0.068	0.000	0.009	0.072
<i>ShareTurnover</i>	0.271	0.325	0.108	0.188	0.330
<i>YearsToMaturity</i>	3.614	2.502	1.278	3.519	5.604
<i>DivYield</i>	0.004	0.008	0.000	0.000	0.003
<i>RetVolatility</i>	0.383	0.164	0.269	0.353	0.458
<i>BHAR</i> _[-124; -4]	0.102	0.317	-0.069	0.058	0.211
<i>BHAR</i> _[-3; +3]	0.004	0.055	-0.026	0.000	0.030
<i>BHAR</i> _[+4; +124]	-0.011	0.253	-0.161	-0.014	0.125

Table 3 (cont'd)
Descriptive Statistics

Variable	Mean	Std. Dev.	Q ₁	Median	Q ₃
<i>Panel B: Small Firms</i>					
<i>Forgo</i> (in %)	0.0233	0.1213	0.0005	0.0024	0.0111
<i>NetProceeds</i> (in %)	0.3163	1.2995	0.0250	0.0781	0.1943
<i>ReportingLag</i>	1.559	3.638	1.000	1.500	2.000
<i>MarketValueEquity</i>	412.9	264.5	191.7	379.3	631.0
<i>TotalAssets</i>	372.0	619.3	100.8	231.9	462.9
<i>RDExpense</i>	0.054	0.084	0.000	0.007	0.072
<i>ShareTurnover</i>	0.260	0.417	0.077	0.156	0.292
<i>YearsToMaturity</i>	3.685	2.621	1.173	3.466	5.729
<i>DivYield</i>	0.003	0.008	0.000	0.000	0.000
<i>RetVolatility</i>	0.441	0.175	0.323	0.402	0.519
<i>BHAR</i> _[-124; -4]	0.173	0.403	-0.056	0.091	0.299
<i>BHAR</i> _[-3; +3]	0.005	0.063	-0.031	0.000	0.035
<i>BHAR</i> _[+4; +124]	-0.011	0.296	-0.196	-0.018	0.164
<i>Panel C: Medium Firms</i>					
<i>Forgo</i> (in %)	0.0074	0.0211	0.0003	0.0015	0.0053
<i>NetProceeds</i> (in %)	0.0943	0.2548	0.0102	0.0332	0.0837
<i>ReportingLag</i>	1.376	1.055	1.000	1.000	2.000
<i>MarketValueEquity</i>	1,810.6	911.3	1,156.2	1,609.1	2,320.6
<i>TotalAssets</i>	1,819.0	2,318.9	549.0	1,112.7	2,017.0
<i>RDExpense</i>	0.043	0.054	0.000	0.014	0.079
<i>ShareTurnover</i>	0.293	0.242	0.124	0.228	0.395
<i>YearsToMaturity</i>	3.787	2.402	1.540	3.925	5.715
<i>DivYield</i>	0.004	0.009	0.000	0.000	0.004
<i>RetVolatility</i>	0.357	0.149	0.248	0.330	0.428
<i>BHAR</i> _[-124; -4]	0.063	0.242	-0.077	0.044	0.172
<i>BHAR</i> _[-3; +3]	0.004	0.052	-0.025	0.000	0.027
<i>BHAR</i> _[+4; +124]	-0.008	0.235	-0.144	-0.009	0.120
<i>Panel D: Large Firms</i>					
<i>Forgo</i> (in %)	0.0066	0.0444	0.0001	0.0004	0.0020
<i>NetProceeds</i> (in %)	0.0695	0.1758	0.0038	0.0171	0.0507
<i>ReportingLag</i>	1.464	2.160	1.000	1.000	2.000
<i>MarketValueEquity</i>	12,268.5	10,524.9	5,921.8	9,319.5	15,601.4
<i>TotalAssets</i>	11,588.8	16,265.5	3,046.1	5,680.6	12,995.0
<i>RDExpense</i>	0.029	0.046	0.000	0.000	0.051
<i>ShareTurnover</i>	0.249	0.248	0.118	0.181	0.282
<i>YearsToMaturity</i>	3.069	2.383	0.811	2.811	4.985
<i>DivYield</i>	0.006	0.009	0.000	0.000	0.009
<i>RetVolatility</i>	0.315	0.125	0.220	0.297	0.393
<i>BHAR</i> _[-124; -4]	0.037	0.201	-0.074	0.033	0.147
<i>BHAR</i> _[-3; +3]	0.003	0.043	-0.021	0.002	0.026
<i>BHAR</i> _[+4; +124]	-0.019	0.183	-0.126	-0.024	0.085

Notes:

Panel A presents selected descriptive statistics for the final sample of CEO stock option exercises (5,266 observations from 1,003 distinct firms). Panels B, C, and D present selected descriptive statistics for, respectively, small, medium, and large firms of the final sample of CEO stock option exercises (small firms consist of 2,119 observations from 492 distinct firms, medium firms consist of 2,178 observations from 383 distinct firms, large firms consist of 969 observations from 213 distinct firms). Sample observations are classified into small, medium, and large firms using the Fama-French size classification, where small (large) firms have a beginning-of-year market value of equity in the bottom (top) 30 percent of all NYSE, AMEX, and NASDAQ firms, and medium firms have a market value of equity in the middle 40 percent. The sample covers the period August 29, 2002 to July 5, 2007. *Forgo* is the total option value forgone due to the early exercise of stock options, computed as the Black-Scholes value of the options on the exercise date less their intrinsic value (i.e., the stock price on the exercise date less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). *NetProceeds* is the intrinsic value of the stock options exercised, computed as the stock price on the exercise date less the option's exercise price, scaled by beginning-of-year total assets (Compustat annual data 6). *ReportingLag* is the number of trading days between the exercise date and the SEC filing date. *MarketValueEquity* is beginning-of-year market value of common equity, in millions (Compustat annual data199*data25). *TotalAssets* is beginning-of-year total assets, in millions (Compustat annual data6). *RDExpense* is research and development expense in the prior year divided by beginning-of-year total assets (Compustat annual data46 / data6). *ShareTurnover* is the average monthly number of shares traded divided by the number of shares outstanding over the three months prior to the stock option exercises, as reported in the CRSP database. *YearsToMaturity* is the number of years between the exercise date and the expiration date of the stock options exercised. *DivYield* is the dividend yield in the prior year, calculated as cash dividends per share (adjusted for stock splits) paid in the prior year divided by beginning-of-year stock price (Compustat annual data201 / data199). *RetVolatility* is the standard deviation of daily stock returns over the 120-trading-day period preceding the stock option exercise retrieved from the CRSP database. $BHAR_{[-124; -4]}$, $BHAR_{[-3; +3]}$, and $BHAR_{[+4; +124]}$ are buy-and-hold abnormal returns measured using Carhart's (1997) four factor model for the windows [-124; -4], [-3; +3], and [+4; +124] respectively, where day zero is the SEC filing date of CEO stock option exercises. For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio. To mitigate the influence of outliers, *MarketValueEquity*, *TotalAssets*, and *RDExpense* are winsorized by year at the 1st and 99th percentiles.

Table 4
Correlation Matrix:
Pearson (Above Diagonal) and Spearman (Below Diagonal) Correlations

	<i>Forgo</i>	<i>Net Proceeds</i>	<i>Reporting Lag</i>	<i>BHAR</i> [-124; -4]	<i>BHAR</i> [-3; +3]	<i>BHAR</i> [+4; +124]
<i>Forgo</i>	—	0.229 (<i><0.01</i>)	-0.004 (<i>0.76</i>)	0.169 (<i><0.01</i>)	0.008 (<i>0.55</i>)	-0.023 (<i>0.09</i>)
<i>NetProceeds</i>	0.627 (<i><0.01</i>)	—	0.010 (<i>0.48</i>)	0.283 (<i><0.01</i>)	0.039 (<i><0.01</i>)	-0.049 (<i><0.01</i>)
<i>ReportingLag</i>	0.063 (<i><0.01</i>)	0.068 (<i><0.01</i>)	—	0.002 (<i>0.87</i>)	-0.004 (<i>0.78</i>)	-0.009 (<i>0.51</i>)
<i>BHAR</i> _[-124; -4]	0.154 (<i><0.01</i>)	0.208 (<i><0.01</i>)	0.046 (<i><0.01</i>)	—	-0.015 (<i>0.26</i>)	-0.030 (<i>0.03</i>)
<i>BHAR</i> _[-3; +3]	0.007 (<i>0.61</i>)	0.015 (<i>0.29</i>)	-0.029 (<i>0.04</i>)	-0.036 (<i>0.01</i>)	—	0.024 (<i>0.08</i>)
<i>BHAR</i> _[+4; +124]	-0.088 (<i><0.01</i>)	-0.073 (<i><0.01</i>)	0.021 (<i>0.13</i>)	-0.002 (<i>0.90</i>)	0.018 (<i>0.19</i>)	—

Notes:

This table presents correlation coefficients for the final sample of CEO stock option exercises (5,266 observations from 1,003 distinct firms). The sample covers the period August 29, 2002 to July 5, 2007. p-values are in parenthesis below the correlations. *Forgo* is the total value forgone due to the early exercise of stock options, computed as the Black-Scholes value of the options on the exercise date less the intrinsic value of the options on the exercise date (i.e., the stock price less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). *NetProceeds* is the intrinsic value of the stock options exercised, computed as the stock price on the exercise date less the option's exercise price, scaled by beginning-of-year total assets (Compustat annual data 6). *ReportingLag* is the number of trading days between the exercise date and the SEC filing date. *BHAR*_[-124; -4], *BHAR*_[-3; +3], and *BHAR*_[+4; +124] are buy-and-hold abnormal returns measured using Carhart's (1997) four factor model for the windows [-124; -4], [-3; +3], and [+4; +124] respectively, where day zero is the SEC filing date of CEO stock option exercises. For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio.

Table 5
Abnormal Stock Returns Before and Around SEC Filings of CEO Stock Option Exercises,
By Option Value Forgone

Forgo Quintile	N	Buy-and-Hold Abnormal Returns		
		[-124; -4]	[-64; -4]	[-3; +3]
<i>Panel A: Full Sample</i>				
All	5,266	0.1025 (23.45)	0.0587 (21.20)	0.0041 (5.37)
<i>Panel B: By Quintiles of Option Value Forgone</i>				
Low Forgo	1,098	0.0393 (6.02)	0.0269 (6.58)	0.0020 (1.53)
2	1,003	0.0611 (7.67)	0.0447 (8.17)	0.0049 (2.86)
3	1,104	0.0981 (11.99)	0.0466 (9.24)	0.0029 (1.72)
4	1,045	0.0887 (10.57)	0.0497 (9.86)	0.0048 (2.76)
High Forgo	1,016	0.2304 (15.33)	0.1293 (13.33)	0.0060 (2.98)
High Forgo – Low Forgo		0.1911	0.1024	0.0040
<i>t-statistic</i>		<i>(10.63)</i>	<i>(8.93)</i>	<i>(1.57)</i>

Notes:

This table presents buy-and-hold abnormal stock returns for the following windows: [-124; -4], [-64; -4], and [-3; +3], where day zero is the SEC filing date of CEO stock option exercises. The sample covers the period August 29, 2002 to July 5, 2007. *t*-statistics are in parenthesis. Abnormal returns are measured using Carhart's (1997) four factor model. For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio. In Panel B, sample observations are classified into quintiles from smallest values of *Forgo* (Low Forgo) to largest values of *Forgo* (High Forgo), where *Forgo* is the total value forgone due to the early exercise of stock options, computed as the Black-Scholes value of the options on the exercise date less the intrinsic value of the options on the exercise date (i.e., the stock price less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). The classification into quintiles is based on the distribution of *Forgo* in the 12 months prior to day zero.

Table 6
Abnormal Stock Returns Before and Around SEC Filings of CEO Stock Option Exercises,
By Firm Size and Option Value Forgone

Panel A: Small Firms

Forgo Quintile	N	Buy-and-Hold Abnormal Returns		
		[-124; -4]	[-64; -4]	[-3; +3]
All	2,119	0.1734 (19.78)	0.0907 (16.47)	0.0051 (3.74)
Low Forgo	336	0.1125 (7.87)	0.0590 (7.01)	0.0029 (1.10)
2	288	0.0842 (5.20)	0.0737 (6.42)	0.0056 (1.59)
3	490	0.1160 (8.41)	0.0424 (5.38)	0.0016 (0.58)
4	432	0.1418 (9.52)	0.0691 (8.09)	0.0053 (1.77)
High Forgo	573	0.3268 (13.43)	0.1755 (11.04)	0.0089 (2.96)
High Forgo – Low Forgo		0.2143	0.1166	0.0060
<i>t-statistic</i>		(9.30)	(7.97)	(2.12)

Panel B: Medium Firms

Forgo Quintile	N	Buy-and-Hold Abnormal Returns		
		[-124; -4]	[-64; -4]	[-3; +3]
All	2,178	0.0627 (12.10)	0.0433 (12.53)	0.0036 (3.25)
Low Forgo	412	0.0186 (1.90)	0.0146 (2.28)	0.0013 (0.61)
2	457	0.0440 (3.52)	0.0329 (3.84)	0.0040 (1.54)
3	453	0.0876 (7.45)	0.0501 (6.29)	0.0040 (1.57)
4	497	0.0572 (5.39)	0.0425 (6.36)	0.0045 (1.94)
High Forgo	359	0.1131 (9.06)	0.0820 (9.59)	0.0041 (1.45)
High Forgo – Low Forgo		0.0946	0.0674	0.0028
<i>t-statistic</i>		(5.24)	(5.50)	(0.70)

Table 6 (cont'd)
Abnormal Stock Returns Before and Around SEC Filings of CEO Stock Option Exercises,
By Firm Size and Option Value Forgone

Panel C: Large Firms

Forgo Quintile	N	Buy-and-Hold Abnormal Returns		
		[-124; -4]	[-64; -4]	[-3; +3]
All	969	0.0368 (5.69)	0.0232 (5.64)	0.0029 (2.08)
Low Forgo	350	-0.0066 (-0.75)	0.0105 (1.69)	0.0019 (0.97)
2	258	0.0657 (5.56)	0.0331 (4.60)	0.0057 (2.04)
3	161	0.0734 (4.38)	0.0495 (4.52)	0.0037 (1.13)
4	116	0.0257 (1.25)	0.0082 (0.57)	0.0042 (0.90)
High Forgo	84	0.0743 (2.42)	0.0162 (1.04)	-0.0054 (-1.00)
High Forgo – Low Forgo		0.0809	0.0058	-0.0074
<i>t-statistic</i>		(2.12)	(0.91)	(-1.36)

Notes:

This table presents buy-and-hold abnormal stock returns for the following windows: [-124; -4], [-64; -4], and [-3; +3], where day zero is the SEC filing date of CEO stock option exercises. The sample covers the period August 29, 2002 to July 5, 2007. *t*-statistics are in parenthesis. Abnormal returns are measured using Carhart's (1997) four factor model. For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio. Sample observations are classified into quintiles from smallest values of *Forgo* (Low Forgo) to largest values of *Forgo* (High Forgo), where *Forgo* is the total value forgone due to the early exercise of stock options, computed as the Black-Scholes value of the options on the exercise date less the intrinsic value of the options on the exercise date (i.e., the stock price less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). The classification into quintiles is based on the distribution of *Forgo* in the 12 months prior to day zero. Sample observations are subsequently classified into small (Panel A), medium (Panel B), and large (Panel C) firms using the Fama-French size classification, where small (large) firms have a beginning-of-year market value of equity in the bottom (top) 30 percent of all NYSE, AMEX, and NASDAQ firms, and medium firms have a market value of equity in the middle 40 percent.

Table 7
Abnormal Stock Returns Around SEC Filings of CEO Stock Option Exercises

Model:

$$\begin{aligned}
 BHAR_{i,[-3;+3]} = & \alpha_1 + \alpha_2 \textit{Medium} + \alpha_3 \textit{Large} + \beta_1 \textit{Forgo}_i + \beta_2 \textit{Forgo}_i * \textit{Medium} + \beta_3 \textit{Forgo}_i * \textit{Large} \\
 & + \delta_1 BHAR_{i,[-124;-4]} + \delta_2 \textit{NetProceeds}_i + \delta_3 \textit{ReportingLag}_i \\
 & + \sum \gamma_j \textit{Industry}_j + \sum \gamma_k \textit{Year}_k + \varepsilon_{i,[-3;+3]}
 \end{aligned}$$

Variable	Expected Sign	Coefficient (<i>t</i> -statistic)	
		Model I	Model II
<i>Medium</i>	–		0.0012 (0.30)
<i>Large</i>	–		0.0025 (0.60)
<i>Forgo</i>	–	-0.0011 (-0.31)	0.0030 (0.57)
<i>Forgo*Medium</i>	+		-0.0061 (-0.95)
<i>Forgo*Large</i>	+		-0.0096 (-1.24)
<i>BHAR</i> _[-124; -4]	–	-0.0061 (-1.23)	-0.0068 (-1.38)
<i>NetProceeds</i>	–	0.0078 (2.24)	0.0072 (2.03)
<i>ReportingLag</i>	–	-0.0001 (-0.29)	-0.0001 (-0.32)
F-Tests:			
$\beta_1 + \beta_2 = 0$ (<i>p</i> -values)			0.43 (0.51)
$\beta_1 + \beta_3 = 0$ (<i>p</i> -values)			1.04 (0.31)
Year Effects		yes	yes
Industry Effects		yes	yes
Number of Observations		5,266	5,266
Adj. <i>R</i> ² (%)		1.3	1.4

Notes:

This table presents the results from the regressions estimated using Huber-White robust standard errors clustered by firm. The sample covers the period August 29, 2002 to July 5, 2007. Calendar year effects and industry effects are included but not reported for brevity. Two F-tests test whether the sum of the estimated coefficients β_1 and β_2 equal zero, and whether the sum of the estimated coefficients β_1 and β_3 equal zero. The dependent variable $BHAR_{i,[-3;+3]}$ is buy-and-hold abnormal stock returns for the window [-3; +3], where day zero is the SEC filing date of the i^{th} option exercise. Abnormal returns are measured using Carhart's (1997) four factor model (FF). For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio. *Forgo*_{*i*} is the decile ranking of the stock

option value forgone associated with the i^{th} option exercise, computed as the Black-Scholes value of the options on the exercise date less the intrinsic value of the options on the exercise date (i.e., the stock price less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). *Medium (Large)* is an indicator variable equal to one if the firm is classified as a medium (large) firm using the Fama-French size classification, zero otherwise. In the Fama-French size classification, small (large) firms have a beginning-of-year market value of equity in the bottom (top) 30 percent of all NYSE, AMEX, and NASDAQ firms, and medium firms have a market value of equity in the middle 40 percent. $BHAR_{i,[-124; -4]}$ is buy-and-hold abnormal stock returns for the window $[-124; -4]$, where day zero is the SEC filing date of the i^{th} option exercise. $NetProceeds_i$ is the decile ranking of the intrinsic value associated with the i^{th} option exercise, computed as the stock price on the exercise date less the option's exercise price, scaled by beginning-of-year total assets (Compustat annual data6). $ReportingLag_i$ is the number of trading days between the exercise date and the SEC filing date of the i^{th} option exercise. The industry indicator variables are based on the Fama-French (1997) 48-industry classification. Decile rankings of all variables used in this study are based on the distribution of the variable in the prior 12 months, and are scaled to range between zero and one.

Table 8
Abnormal Stock Returns Following SEC Filings of CEO Stock Option Exercises,
By Option Value Forgone

Forgo Quintile	N	Buy-and-Hold Abnormal Returns	
		[+4; +64]	[+4; +124]
<i>Panel A: Full Sample</i>			
All	5,266	-0.0049 (-2.08)	-0.0111 (-3.19)
<i>Panel B: By Quintiles of Option Value Forgone</i>			
Low Forgo	1,098	0.0148 (3.09)	0.0232 (3.45)
2	1,003	0.0010 (0.18)	0.0124 (1.49)
3	1,104	-0.0066 (-1.30)	-0.0158 (-2.06)
4	1,045	-0.0168 (-3.63)	-0.0275 (-3.97)
High Forgo	1,016	-0.0180 (-2.96)	-0.0499 (-5.42)
High Forgo – Low Forgo		-0.0329	-0.0731
<i>t-statistic</i>		<i>(-4.26)</i>	<i>(-6.38)</i>

Notes:

This table presents buy-and-hold abnormal stock returns for the following windows: [+4; +64] and [+4; +124], where day zero is the SEC filing date of CEO stock option exercises. The sample covers the period August 29, 2002 to July 5, 2007. *t*-statistics are in parenthesis. Abnormal returns are measured using Carhart's (1997) four factor model. For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio. In Panel B, sample observations are classified into quintiles from smallest values of *Forgo* (Low Forgo) to largest values of *Forgo* (High Forgo), where *Forgo* is the total value forgone due to the early exercise of stock options, computed as the Black-Scholes value of the options on the exercise date less the intrinsic value of the options on the exercise date (i.e., the stock price less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). The classification into quintiles is based on the distribution of *Forgo* in the 12 months prior to day zero.

Table 9
Abnormal Stock Returns Following SEC Filings of CEO Stock Option Exercises,
By Firm Size and Option Value Forgone

Panel A: Small Firms

Forgo Quintile	N	Buy-and-Hold Abnormal Returns	
		[+4; +64]	[+4; +124]
All	2,119	-0.0022 (-0.50)	-0.0106 (-1.65)
Low Forgo	336	0.0584 (5.52)	0.1070 (7.28)
2	288	0.0312 (2.50)	0.0725 (4.13)
3	490	-0.0229 (-2.83)	-0.0552 (-4.49)
4	432	-0.0270 (-3.31)	-0.0532 (-4.55)
High Forgo	573	-0.0183 (-1.93)	-0.0518 (-3.66)
High Forgo – Low Forgo		-0.0767	-0.1588
<i>t-statistic</i>		<i>(-4.65)</i>	<i>(-6.92)</i>

Panel B: Medium Firms

Forgo Quintile	N	Buy-and-Hold Abnormal Returns	
		[+4; +64]	[+4; +124]
All	2,178	-0.0058 (-1.74)	-0.0083 (-1.64)
Low Forgo	412	-0.0036 (-0.51)	-0.0030 (-0.30)
2	457	-0.0158 (-1.87)	-0.0265 (-2.10)
3	453	0.0146 (1.86)	0.0375 (3.22)
4	497	-0.0092 (-1.55)	-0.0079 (-0.84)
High Forgo	359	-0.0167 (-2.14)	-0.0494 (-4.04)
High Forgo – Low Forgo		-0.0131	-0.0463
<i>t-statistic</i>		<i>(-1.12)</i>	<i>(-2.72)</i>

Table 9 (cont'd)
Abnormal Stock Returns Following SEC Filings of CEO Stock Option Exercises,
By Firm Size and Option Value Forgone

Panel C: Large Firms

Forgo Quintile	N	Buy-and-Hold Abnormal Returns	
		[+4; +64]	[+4; +124]
All	969	-0.0087 (-2.15)	-0.0187 (-3.17)
Low Forgo	350	-0.0053 (-0.77)	-0.0263 (-2.93)
2	258	-0.0029 (-0.37)	0.0142 (1.21)
3	161	-0.0165 (-1.77)	-0.0456 (-3.22)
4	116	-0.0114 (-0.89)	-0.0165 (-0.88)
High Forgo	84	-0.0217 (-1.74)	-0.0392 (-1.85)
High Forgo – Low Forgo		-0.0164	-0.0129
<i>t-statistic</i>		(-0.01)	(-1.62)

Notes:

This table presents buy-and-hold abnormal stock returns for the following windows: [+4; +64] and [+4; +124], where day zero is the SEC filing date of CEO stock option exercises. The sample covers the period August 29, 2002 to July 5, 2007. *t*-statistics are in parenthesis. Abnormal returns are measured using Carhart's (1997) four factor model. For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio. Sample observations are classified into quintiles from smallest values of *Forgo* (Low Forgo) to largest values of *Forgo* (High Forgo), where *Forgo* is the total value forgone due to the early exercise of stock options, computed as the Black-Scholes value of the options on the exercise date less the intrinsic value of the options on the exercise date (i.e., the stock price less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). The classification into quintiles is based on the distribution of *Forgo* in the 12 months prior to day zero. Sample observations are subsequently classified into small (Panel A), medium (Panel B), and large (Panel C) firms using the Fama-French size classification, where small (large) firms have a beginning-of-year market value of equity in the bottom (top) 30 percent of all NYSE, AMEX, and NASDAQ firms, and medium firms have a market value of equity in the middle 40 percent.

Table 10
Abnormal Stock Returns Following SEC Filings of CEO Stock Option Exercises

Model:

$$\begin{aligned}
 BHAR_{i,[+4;+124]} = & \alpha_1 + \alpha_2 \textit{Medium} + \alpha_3 \textit{Large} + \beta_1 \textit{Forgo}_i + \beta_2 \textit{Forgo}_i * \textit{Medium} + \beta_3 \textit{Forgo}_i * \textit{Large} \\
 & + \delta_1 BHAR_{i,[-124;-4]} + \delta_2 \textit{NetProceeds}_i + \delta_3 \textit{ReportingLag}_i \\
 & + \sum \gamma_j \textit{Industry}_j + \sum \gamma_k \textit{Year}_k + \varepsilon_{i,[+4;+124]}
 \end{aligned}$$

Variable	Expected Sign	Coefficient (t-statistic)	
		Model I	Model II
<i>Medium</i>	-		-0.0763 (-1.71)
<i>Large</i>	-		-0.1082 (-2.60)
<i>Forgo</i>	-	-0.0929 (-2.77)	-0.1714 (-3.24)
<i>Forgo*Medium</i>	+		0.1129 (2.04)
<i>Forgo*Large</i>	+		0.1684 (2.78)
<i>BHAR_[-124; -4]</i>	-	0.0011 (0.05)	0.0026 (0.12)
<i>NetProceeds</i>	-	-0.0284 (-0.86)	-0.0387 (-1.26)
<i>ReportingLag</i>	-	-0.0012 (-1.42)	-0.0013 (-1.49)
F-Tests:			
$\beta_1 + \beta_2 = 0$ (p-values)			2.79 (0.09)
$\beta_1 + \beta_3 = 0$ (p-values)			0.01 (0.94)
Year Effects		yes	yes
Industry Effects		yes	yes
Number of Observations		5,256	5,256
Adj. R ² (%)		7.5	8.3

Notes:

This table presents the results from the regressions estimated using Huber-White robust standard errors clustered by firm. The sample covers the period August 29, 2002 to July 5, 2007. Calendar year effects and industry effects are included but not reported for brevity. Two F-tests test whether the sum of the estimated coefficients β_1 and β_2 equal zero, and whether the sum of the estimated coefficients β_1 and β_3 equal zero. The dependent variable $BHAR_{i,[+4; +124]}$ is buy-and-hold abnormal stock returns for the window [+4; +124], where day zero is the SEC filing date of the i^{th} option exercise. Abnormal returns are measured using Carhart's (1997) four factor model (FF). For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio. *Forgo_i* is the decile ranking of the stock option value forgone associated with the i^{th} option exercise, computed as the Black-Scholes value of the

options on the exercise date less the intrinsic value of the options on the exercise date (i.e., the stock price less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). *Medium (Large)* is an indicator variable equal to one if the firm is classified as a medium (large) firm using the Fama-French size classification, zero otherwise. In the Fama-French size classification, small (large) firms have a beginning-of-year market value of equity in the bottom (top) 30 percent of all NYSE, AMEX, and NASDAQ firms, and medium firms have a market value of equity in the middle 40 percent. $BHAR_{i,[-124;-4]}$ is buy-and-hold abnormal stock returns for the window $[-124;-4]$, where day zero is the SEC filing date of the i^{th} option exercise. $NetProceeds_i$ is the decile ranking of the intrinsic value associated with the i^{th} option exercise, computed as the stock price on the exercise date less the option's exercise price, scaled by beginning-of-year total assets (Compustat annual data6). $ReportingLag_i$ is the number of trading days between the exercise date and the SEC filing date of the i^{th} option exercise. The industry indicator variables are based on the Fama-French (1997) 48-industry classification. Decile rankings of all variables used in this study are based on the distribution of the variable in the prior 12 months, and are scaled to range between zero and one.

Table 11
Abnormal Stock Returns in the Seven-Day Window Around Earnings Announcements
Before and Following SEC Filings of CEO Stock Option Exercises,
By Option Value Forgone

Forgo Quintile	N	Buy-and-Hold Abnormal Returns			
		EA _{q-2}	EA _{q-1}	EA _{q+1}	EA _{q+2}
<i>Panel A: Full Sample</i>					
All	4,894	0.0132 (10.01)	0.0210 (16.07)	-0.0007 (-0.53)	-0.0021 (-1.56)
<i>Panel B: By Quintiles of Option Value Forgone</i>					
Low Forgo	1,020	0.0088 (3.42)	0.0238 (10.72)	0.0062 (2.42)	0.0068 (2.72)
2	945	0.0019 (0.60)	0.0088 (2.96)	0.0034 (1.23)	0.0029 (1.03)
3	1,026	0.0115 (4.40)	0.0140 (5.17)	-0.0081 (-2.76)	-0.0017 (-0.58)
4	973	0.0134 (4.92)	0.0160 (5.98)	-0.0017 (-0.65)	-0.0047 (-1.56)
High Forgo	930	0.0310 (8.68)	0.0430 (11.29)	-0.0031 (-0.90)	-0.0146 (-3.83)
High Forgo – Low Forgo		0.0222	0.0192	-0.0093	-0.0214
<i>t-statistic</i>		(4.59)	(3.55)	(-2.22)	(-4.70)

Notes:

This table presents buy-and-hold abnormal stock returns for the seven-day window, [-3; +3], where day zero is the quarterly earnings announcement dates, for the two quarters prior to the SEC filing date of CEO stock option exercises, q_{-1} and q_{-2} , and two quarters following the SEC filing date of CEO stock option exercises, q_{+1} and q_{+2} . The sample covers the period August 29, 2002 to July 5, 2007. *t*-statistics are in parenthesis. Abnormal returns are measured using Carhart's (1997) four factor model. For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio. Sample observations are classified into quintiles from smallest values of *Forgo* (Low Forgo) to largest values of *Forgo* (High Forgo), where *Forgo* is the total value forgone due to the early exercise of stock options, computed as the Black-Scholes value of the options on the exercise date less the intrinsic value of the options on the exercise date (i.e., the stock price less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). The classification into quintiles is based on the distribution of *Forgo* in the 12 months prior to the SEC filing date of CEO stock option exercises.

Table 12
Abnormal Stock Returns in the Seven-Day Window Around Earnings Announcements
Before and Following SEC Filings of CEO Stock Option Exercises,
By Firm Size and Option Value Forgone

Panel A: Small Firms

Forgo Quintile	N	Buy-and-Hold Abnormal Returns			
		EA _{q-2}	EA _{q-1}	EA _{q+1}	EA _{q+2}
All	1,951	0.0203 (8.50)	0.0276 (11.15)	-0.0022 (-0.94)	-0.0048 (-1.88)
Low Forgo	310	0.0107 (1.95)	0.0300 (6.05)	0.0195 (3.38)	0.0236 (3.94)
2	272	0.0030 (0.47)	0.0142 (2.28)	0.0051 (0.97)	0.0030 (0.52)
3	450	0.0130 (3.01)	0.0122 (2.80)	-0.0102 (-2.04)	-0.0090 (-1.85)
4	396	0.0187 (4.09)	0.0169 (3.57)	-0.0054 (-1.18)	-0.0099 (-1.73)
High Forgo	523	0.0421 (7.65)	0.0544 (8.94)	-0.0095 (-1.88)	-0.0183 (-3.13)
High Forgo – Low Forgo		0.0315	0.0244	-0.0289	-0.0420
<i>t-statistic</i>		(5.47)	(5.15)	(-3.45)	(-4.72)

Panel B: Medium Firms

Forgo Quintile	N	Buy-and-Hold Abnormal Returns			
		EA _{q-2}	EA _{q-1}	EA _{q+1}	EA _{q+2}
All	2,046	0.0082 (4.37)	0.0159 (9.03)	0.0006 (0.32)	0.0006 (0.32)
Low Forgo	380	0.0122 (2.95)	0.0146 (4.64)	-0.0039 (-1.04)	0.0015 (0.46)
2	441	-0.0099 (-2.08)	0.0018 (0.41)	0.0027 (0.65)	0.0036 (0.86)
3	425	0.0103 (2.67)	0.0156 (3.74)	-0.0039 (-0.90)	0.0084 (1.94)
4	467	0.0121 (3.36)	0.0173 (4.99)	0.0018 (0.54)	-0.0001 (-0.03)
High Forgo	333	0.0197 (4.36)	0.0345 (8.49)	0.0070 (1.36)	-0.0132 (-2.59)
High Forgo – Low Forgo		0.0075	0.0199	0.0109	-0.0148
<i>t-statistic</i>		(0.90)	(3.12)	(1.71)	(-2.37)

Table 12 (cont'd)
Abnormal Stock Returns in the Seven-Day Window Around Earnings Announcements
Before and Following SEC Filings of CEO Stock Option Exercises,
By Firm Size and Option Value Forgone

Panel C: Large Firms

Forgo Quintile	N	Buy-and-Hold Abnormal Returns			
		EA q_{-2}	EA q_{-1}	EA q_{+1}	EA q_{+2}
All	897	0.0093 (3.69)	0.0181 (7.77)	-0.0003 (-0.14)	-0.0024 (-1.07)
Low Forgo	330	0.0032 (0.85)	0.0285 (8.28)	0.0053 (1.45)	-0.0028 (-0.82)
2	232	0.0232 (4.55)	0.0158 (3.31)	0.0025 (0.54)	0.0013 (0.30)
3	151	0.0107 (1.83)	0.0149 (2.60)	-0.0134 (-2.73)	-0.0081 (-1.32)
4	110	-0.0004 (-0.05)	0.0072 (0.99)	-0.0031 (-0.49)	-0.0060 (-0.91)
High Forgo	74	0.0039 (0.47)	0.0013 (0.15)	-0.0035 (-0.43)	0.0041 (0.44)
High Forgo – Low Forgo		0.0006	-0.0272	-0.0088	0.0069
<i>t</i> -statistic		(0.56)	(-7.03)	(-1.49)	(0.94)

Notes:

This table presents buy-and-hold abnormal stock returns for the seven-day window, [-3; +3], where day zero is the quarterly earnings announcement dates, for the two quarters prior to the SEC filing date of CEO stock option exercises, q_{-1} and q_{-2} , and two quarters following the SEC filing date of CEO stock option exercises, q_{+1} and q_{+2} . The sample covers the period August 29, 2002 to July 5, 2007. *t*-statistics are in parenthesis. Abnormal returns are measured using Carhart's (1997) four factor model. For firms that delist during the return window, the remaining return is calculated by using the delisting return from the CRSP database, and then reinvesting any remaining proceeds in the appropriate benchmark portfolio. Sample observations are classified into quintiles from smallest values of *Forgo* (Low Forgo) to largest values of *Forgo* (High Forgo), where *Forgo* is the total value forgone due to the early exercise of stock options, computed as the Black-Scholes value of the options on the exercise date less the intrinsic value of the options on the exercise date (i.e., the stock price less the option's exercise price), scaled by beginning-of-year total assets (Compustat annual data6). The classification into quintiles is based on the distribution of *Forgo* in the 12 months prior to the SEC filing date of CEO stock option exercises. Sample observations are subsequently classified into small (Panel A), medium (Panel B), and large (Panel C) firms using the Fama-French size classification, where small (large) firms have a beginning-of-year market value of equity in the bottom (top) 30 percent of all NYSE, AMEX, and NASDAQ firms, and medium firms have a market value of equity in the middle 40 percent.