Executive Stock Option Exercises, Insider Information and Earnings Management

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Abstract

In this study I examine whether insiders exercise employee stock options based on private information, and furthermore, whether the private information is associated with earnings management within firms. Using a unique sample of over 30,000 option exercises by top executives at 2,741 firms from 1996 to 2002, I document strong evidence of insider trading by top managers who exercise large option holdings 1) highly deep in the money and, 2) abnormally early relative to what is predicted by an empirical model of exercise decision. I show that the above mentioned exercise pattern is associated with reliable negative abnormal stock returns in the post-exercise period, and that the poor stock performance is systematically related to deteriorating earnings performance relative to consensus analyst forecasts as well as market expectations. Furthermore, I provide evidence of aggressive earnings management within these firms in the pre-exercise period that reverses significantly following option exercises. Taken together, the evidence suggests that in some cases top executives manage earnings prior to option exercises and use the private information of poor future earnings performance to time option exercises.

1. Introduction

The last two decades have witnessed an enormous increase in stock- and option-based executive compensation. The average stock option grant for top executives was a small fraction of CEOs' total wages in the early 1980s, but has today become an important component of executive compensation (e.g., see Hall and Liebman (1998) and Murphy (1999)). Although traditionally it has been argued that stock-based compensation is necessary to align the interests of managers and shareholders, recent arguments, in light of the corporate scandals involving WorldCom, Enron, and others, have called into question the efficacy of stock-based compensation. Specifically, it is suggested that, rather than aligning the interests of managers and shareholders, large option grants have instead provided CEOs with incentives to act opportunistically to manipulate the firm's stock price in order to benefit from appreciation in the value of their stock and option portfolios — An issue that is currently at the forefront of public debate regarding corporate governance reforms (e.g., see *BusinessWeek 2002, 2003; The Wall street Journal 2003*).

This study contributes to this debate by examining whether corporate executives systematically use private information to time the exercises of employee stock options (ESOs), and if so, whether the private information is associated with earnings management by executives. Several recent papers examine different aspects of this issue with mixed results. Nearly all of these papers use annual data on option exercises detailed in the Execucomp database. In contrast, in this study I use a unique database of insider option exercises across a broad sample of 4,254 firms during the period 1996 through 2002. In contrast to the annually aggregated data provided in Execucomp, my data

contains details on the timing of exercise relative to the option's expiration date and the exercise price of the options, which allows me to more carefully distinguish option exercises that are likely to be associated with private information. By doing so I provide strong evidence that is consistent with the view that some insiders exercise options to profit from information regarding poor future earnings performance. In addition, I find that abnormal returns following option exercises are systematically related to evidence of aggressive earnings management.

Prior evidence on whether insiders exercise their options prior to poor future stock price performance is mixed. Carpenter and Remmers (2001) investigate a large sample of option exercises by corporate insiders from 1984 to 1990 and 1992 to 1995. They find little evidence that option exercises are timed to take advantage of private information and instead conclude that option exercises appear to be driven primarily by diversification or liquidity needs. In contrast, Huddart and Lang (2003) examine option exercises from seven firms, and find evidence that stock returns are lower following periods of intense exercise behavior compared to periods when option exercises are low. Neither of these studies attempts to link option exercise behavior and incentives for earnings management.

Recent papers by Safdar (2003) and Bartov and Mohanram (2004) provide some evidence on the association between option exercise behavior, stock price performance following exercise, and earnings management. Safdar uses a large sample of option exercises from the insider trading data and finds some evidence of negative abnormal returns following option exercises in firms with high abnormal accruals. He concludes, however, that the magnitude of earnings management related to stock options is limited.

Bartov and Mohanram use the Execucomp dataset to identify firm years with abnormally large option exercises. They find evidence that, compared to control firms, firms with large option exercises exhibit negative abnormal returns and that these firms exhibit abnormally positive earnings performance in the pre-exercise period that reverses in the post-exercise period. A puzzling result in their study is that although post-exercise stock-returns are lower than those of the control firms, they remain significantly positive (averaging 16%) in the post-exercise period. Moreover, alphas from Carhart's (1997) four-factor regressions in the post-exercise period are positive for firms with abnormally large exercises, indicating that these firms exhibit positive risk-adjusted post-exercise performance.

To provide additional evidence on the relation between option exercise behavior, stock-price performance and incentives for earnings management, this study employs a unique database that contains detailed information on more than 140,000 option exercises by corporate executives of all levels at 4,254 firms from 1996 to 2002. I focus my study on around 32,000 of these exercise events by top managers – i.e., CEOs and Chairmen of the Board, Presidents and COOs — since these are executives that are most likely to have valuable inside information as well as the ability to affect accounting policies. Bettis, Bizjak, and Lemmon (2004) use similar data and develop an empirical model to predict the points in time at which exercise occurs. It has been documented by various previous studies that early exercise of ESOs is widespread. Carpenter (1998), Hall and Murphy (2002), Bettis, Bizjak, and Lemmon (2004) provide theoretical arguments and/or empirical evidence that risk-averse and undiversified employees may rationally exercise ESOs prior to expiration in order to diversify their holdings. In this study I rely on the

empirical model in Bettis, Bizjak, and Lemmon (2004) to identify option exercises that occur earlier than would be predicted by existing firm and individual characteristics. I hypothesize and find reliable evidence that, large option exercises that 1) occur earlier than predicted and 2) are cashed out highly deep in the money (hereafter referred as the Early/High option-exercise group) are associated with strong negative post-exercise abnormal stock performance. I measure large exercises by the profits obtained via option exercise, and test for the presence of negative post-exercise abnormal return in detecting information-related option exercises. By doing so I implicitly assume that shares acquired through option exercises were sold immediately subsequent to exercises. This assumption is justified by both prior literature and a robustness check in this study. Ofek and Yermack (2000) find that managers typically sell nearly all the shares acquired through option exercise. Using the data on insider selling activities, I document in this study the similar pattern that managers typically sell a large fraction of the exercised shares (median value of around 85%) within 2 months upon option exercises. The profit-weighted market-adjusted buy-and-hold returns of stocks in the Early/High exercise group are average –19.77% over the 18-month post-exercise period. Similar results are obtained after controlling for firm size and book-to-market and based on calendar time regressions.

Moreover, the negative post-exercise abnormal performance I document appears with an approximately 6 months lag following option exercises. This observed trading pattern is consistent with the interpretation that insiders trade on private information sufficiently early prior to bad news to avoid legal scrutiny. Similar evidence is also presented in Ke, Huddart and Petroni (2003). They find little evidence of abnormal insider trading in the

two quarters immediately before negative corporate earnings news was released to the public, though they document that insiders trade more aggressively three to nine quarters prior to bad earnings news. Studies on the effects of firm level regulations on insider trading also provide corroboration for this view. Bettis, Coles and Lemmon (1997) find that companies are successful in suppressing insider trading prior to quarterly earnings announcements.

Next, I examine whether the poor post-exercise abnormal returns are associated with earnings management by corporate executives. To test this prediction I compare the earnings performance (surrounding option exercises) of firms in the Early/High group with that of firms in the Normal group – i.e., all other exercise events excluding the Early/High group. I provide three pieces of evidence that support the earnings-management hypothesis. First, I find evidence that in the four quarters prior to option exercises, firms in the Early/High group (in contrast with those in the Normal group) are significantly more likely to meet or exceed analyst earnings expectations (MEE) and do so by a significantly larger amount. Compared to normal exercise firms, consistent with the earnings management hypothesis, the earnings performance of the Early/High firms exhibits a significant reversal following option exercises. Second, I document that large exercises of Early/High options are preceded by aggressive use of discretionary accruals. Similar to the results from earnings performance relative to analyst expectations, I find that discretionary accruals exhibit a significant reversal in the post exercise period. Finally, I investigate market reactions to earnings announcements. Evidence from announcement period abnormal returns is generally consistent with the prediction that some insiders exercise their options prior to disappointing earnings news. Focusing on

the Early/High group, I document that market reacts positively to earning announcements by these firms during the 4-quarter pre-exercise period, but react negatively to earnings announcements in the post-exercise period. In contrast, abnormal returns around earnings announcements are similar in the pre- and post-exercise periods for firms in the Normal group. To summarize, the results of this study provide strong evidence that some insiders use private information to time their option exercises prior to poor performance and that this exercise behavior is related to earnings management behavior by corporate executives.

The remainder of this paper is organized as follows. Section 2 reviews related literature and develops hypotheses regarding inside information, option exercises and earnings management. Section 3 introduces the data and constructs portfolios to describe option exercise patterns. Section 4 presents analysis of abnormal stock performance in the pre- and post-exercise periods. Section 4 tests for earnings management surrounding option exercises. Section 5 summarizes and concludes.

2. Literature Review and Hypotheses Development

2.1 Exercises of Employee Stock Options

Evidence on option-related insider trading is limited and mixed. The broad literature of insider trading has focused largely on purchases and sales of common stock. Although insider purchases appear to forecast positive abnormal returns, sales of stock by insiders are generally viewed as driven by diversification or liquidity needs unrelated to inside information. Lakonishok and Lee (2001) conclude in their study that substantial increases

in selling activities resulting from equity-based compensation obscure the informativeness of insider selling. Though strong buy signals indeed convey some private information, "strong sell signals remain useless in predicting stock returns". Carpenter and Remmers (2001) use a large sample of option exercises by corporate insiders and find little evidence that option exercises are based on private information, except for those by top managers in small firms. Huddart and Lang (2003), however, examine option exercises from seven firms and provide evidence that that stock returns are lower following periods of intense exercise behavior compared to periods when option exercises are low. Safdar (2004) uses insider trading data and documents significant but small negative abnormal returns following option exercises in firms with high abnormal accruals (-1.45% and -1.18% relative to the Fama-French 3-factor model over the 2nd and 3rd quarters subsequent to option exercises). Bartov and Mohanram (2004) use the Execucomp dataset to identify firm years with abnormally large option exercises. They find evidence that, compared to control firms, firms with large option exercises exhibit negative abnormal returns and that these firms exhibit abnormally positive earnings performance in the pre-exercise period that reverses in the post-exercise period. A puzzling result in their study is that although post-exercise stock-returns are lower than those of the control firms, they remain significantly positive (averaging 16%) in the post-exercise period. Moreover, the intercepts from Carhart's (1997) 4-factor regressions in their study do not indicate that firms with abnormally large option exercises experience negative abnormal stock price performance in the post-exercise period. In fact, the four factor alphas are positive indicating that firms associated with large option exercises actually perform abnormally well in the post-exercise period. Bergstresser and Philippon

(2003) use the Execucomp dataset and find that periods of high accruals coincide with large option exercises and high stock returns. These periods are then followed by return reversals – average returns to shareholders in the post-accrual period are smaller but remain positive. Collectively, previous literature does not provide unambiguous evidence on information-related insider option-exercises.

One explanation for the mixed results on abnormal returns following option exercises may be that there are multiple economic forces underlying executive option exercise decisions and that the data available for careful studies has been limited. Compared with ordinary exchange-traded options that are generally exercised at expiration, employee stock options have several features that make the option exercise decision more complicated. In particular, employee stock options are non-transferable, non-hedgeable, and have vesting restrictions (forfeitable). Moreover, employees tend to be relatively undiversified relative to outside shareholders. As a result, risk-averse, wealth-constrained employees may rationally exercise their options early for diversification or liquidity needs. The optimality of early exercise has important implications for both the valuation and incentive effects of ESOs, and a variety of theoretical/empirical papers have discussed different aspects of this issue. Huddart (1994), Marcus and Kulatilaka (1994), Carpenter (1998), Hall and Murphy (2002) and BBL (2004) develop binomial models that account for the exercise policy that maximizes the expected utility of risk-averse and undiversified option holders. [1] These papers identify factors that are associated with exercise behavior in a utility maximizing framework.

[1] Other examples of papers that examine the issue of ESO valuation include, Lambert, Larcker, and Verrecchia (1991); Ingersoll (2002); Hull and White (2003) and Ju, Leland, and Senbet (2002).

Bettis, Bizjak, and Lemmon (2004) develop an empirical model of exercise behavior based on several firm and individual attributes suggested by the utility-based model. They document that exercise occurs earlier when: 1) stock price volatility is higher; 2) the abnormal stock price run-up is larger in the pre-exercise period; 3) dividend yield is higher; and 4) executive position in the firm is lower. They also find that option exercise decisions are significantly affected by macroeconomic conditions. In the absence of private information, early exercise occurs when the benefits of diversification outweigh the costs associated with early exercise. To the extent that the empirical model of option exercise developed by Bettis, Bizjak, and Lemmon (2004) captures factors associated with early exercise for liquidity and diversification reasons, I hypothesize that exercises that occur earlier than predicted by the empirical model of exercise behavior are more likely to be associated with material information regarding future stock price performance.

Additionally, I also expect that the profits obtained from exercise are likely to signal insiders' private information. The value of deep in the money options is more sensitive to changes in the firm's stock price, which suggests that the value of private information is higher for options that are deep in the money. Thus I predict that executives who exercise options highly deep in the money are more likely to have valuable private information that the firm is overvalued by the market. This is especially true if insiders also possess the ability to potentially manipulate the market's expectations through the use of earnings management.

In short, my first hypothesis is as follows:

H_1: Firms whose managers unload large option holdings (i.e., a large number of shares) 1) earlier than would be predicted for diversification reasons, and 2) highly deep in the money are more likely to experience poor future stock price performance.

2.2 Executive Compensation and Earnings Management

The accounting literature provides significant evidence regarding the incentives of top management to enhance their wealth by manipulating accounting information (Healy 1985, Matsunaga and Park 2001, Guidry et al (1998), Balsam (1998), Holthausen et al (1995), etc.). Given the fact that stock options represent a significant portion of executive compensation, it is likely that managers have incentives to opportunistically manipulate stock price through accounting adjustments in order to maximize the value of their stock options.

Prior literature has suggested evidence of opportunistic behavior related to executive stock option grants. Yermack (1997) investigates the timing of CEO stock option awards, based on the fact that ESOs are typically granted with a fixed exercise price equal to the stock price on the award date. He provides evidence that CEOs receive stock option awards shortly before significant positive abnormal returns, and argues that managers might be able to time their option awards in advance of favorable corporate news. Aboody and Kasznik (2000) explore a similar issue by investigating firms' voluntary information disclosure. They document that managers delay the announcement of good news and rush forward the announcement of bad news before option awards in order to maximize the value of their option grants.

I investigate whether option-based compensation provides incentives for managers to window-dress the firm's earnings performance prior to option exercises. Following the logic in hypothesis 1, my second hypothesis is as follows:

H_2: Firms whose managers unload large option holdings 1) earlier than what would be predicted for diversification reasons, and 2) highly deep in the money, are more likely to be engaged in earnings management.

More specifically, I examine two aspects of earnings management surrounding option exercises. First, I predict that if managers use earnings management in an attempt to inflate the firms' stock price prior to exercising their options, then the firms should be more likely to meet or exceed (MEE) analysts' earnings forecasts before the managers unload large option holdings. Existing literature indicates that analyst earnings forecasts represent important performance thresholds that corporate management attempts to meet or exceed (e.g., Degeorge, Patel and Zeckhauser 1999; Burgstahler and Eames 1998). Missing analyst expectations generally leads to negative publicity for companies, and firms exhibit negative abnormal returns when they surprise the market with unfavorable earning news (e.g., see Skinner and Sloan 2001). Meeting or beating analyst expectations (MBE), on the other hand, results in a positive response by market participants. For example, Bartov, Givoly and Hayn (2002) finds that firms that meet or beat current analyst quarterly earning's expectations enjoy higher quarterly returns. Based on these arguments I predict that firms in which managers unload large option holdings (a large number of shares exercised deep in the money) earlier than would be predicted for diversification reasons are morel likely to manage earnings to meet or exceed analyst expectations so as to inflate the stock price in the pre-exercise period. Following the

option exercises, I expect this set of firms to be more likely to disappoint relative to both analyst forecasts and market expectations. Second, I provide more direct evidence of earnings management surrounding option exercises by examining the pattern of accruals. I hypothesize that firms in which large option holdings are cashed out abnormally early will exhibit evidence of aggressive earnings management through the use of discretionary accounting accruals in the pre-exercise period, and that the accrual measures will reverse following exercises.

3. Data

3.1 Descriptive Statistics

The dataset used for this study consists of option exercises by corporate insiders that were reported to SEC between 1996 and 2002. The data comes from Bettis, Bizjak, and Lemmon (2004) and contains more than 140,000 option exercises by Section 16 corporate insiders at 4,254 firms. The data cover a number of executive levels within the firm. Specifically, the taxonomy for executive position consists of 1) CEOs and Chairmen of the Board, Presidents and COOs; 2) non-management board members; and 3) other insiders which include executives such as Vice Presidents, CFOs and Divisional Managers. In this study, I focus on 32,519 of these option-exercise events that were taken by top managers at 2,741 firms. I use the term "top managers/ top executives" to refer to CEOs, chairmen of the board, presidents and COOs. The exercise events are recorded with detailed information in my data, which includes the number of shares exercised, the strike price, the stock price upon exercise, the transaction date, and the option's vesting and expiration dates. For inclusion in the data I also require matched stock-price data

from CRSP. I exclude firms with a market capitalization less than $50 million at the end of the year prior to option exercises.

Table 1 describes the option exercise pattern for top managers. To avoid outlier effects I focus the discussion around median values. As shown in the table, options for CEOs typically have an exercisable lifespan (number of years between option vesting and expiration) of 7.03 years. Consistent with prior research I document that early exercise of options is quite pervasive. Top managers typically exercise their options 4.04 years prior to expiration and 2.21 years subsequent to vesting.

Table 1 also provides statistics on the option's moneyness upon exercise (denoted as *INMON*); the number of shares exercised (denoted as *SHARE*); the dollar value of exercise cost, i.e., option strike price multiplied by *SHARE* (denoted as *COST*); and the profits realized from option exercise, measured as the spread between market stock price (at the time of option exercise) and strike price multiplied by *SHARE* (denoted as *PROFIT*). Table 1 shows that CEOs typically exercise options at the INMON of 2.61. It also shows that the *SHARE, COST* and *PROFIT* variables are strongly skewed towards large values. For example, the median value of *PROFIT* is $151,650, while the mean value of *RPOFIT* is $590,373. To avoid outlier effects, throughout the study I winsorize the *SHARE, COST* and *PROFIT* variables at 99%.

Another piece of information provided in the data is insider-selling activities through 1996 to 2003. When testing the post-exercise stock performance in detecting information-related insider option-exercises, it is important to know whether the shares acquired through option exercises were sold or not. The data in this study provides information on

the number of shares sold by employees on specific transaction dates. I use the data to match shares sold with shares exercised within a specific time framework. Specifically, I first aggregate shares exercised by each employee within a given month, and then match them with the aggregate shares sold by the same person in the same month and the successive month. If the successive month has records of new option exercises, I exclude that part from the shares sold aggregated in that month. Table 1 reports statistics on the shares sold as a fraction of shares exercised (denoted as *PSALE*) within this 2-month matching window. It shows that insiders typically sell majority of the shares acquired through option exercises within two months upon exercise (median value of 85%). This finding is generally consistent with what Ofek and Yermack (2000) find in their study.

3.2 *Multivariate Analysis of Exercise Behavior*

In this section I use the empirical model in Bettis, Bizjak, and Lemmon (2004) to examine how early an option is exercised prior to prediction. I hypothesize that earlier-than-predicted option-exercise implies additional information. Bettis, Bizjak, and Lemmon (2004) suggests that option-exercise decisions vary systematically with firm and individual characteristics. Following their approach, I use an OLS regression model to predict the points in time at which exercise would occur. The regression is performed with the 32,519 option exercises by top managers. The independent variable – the number of years between exercise and expiration (EXT) – is regressed on measures of price volatility (stdRET), unexpected price run-up (abRET), dividend yield (DivYd),

dummy variables for insider position levels, and indicator variables for each sample year, as indicated in equation (1).

$$EXT_i = \alpha_0 + \alpha_1 stdRET_i + \alpha_2 abRET_i + \alpha_3 DivYd_i + \alpha_t Year\ Dummy + \varepsilon_i \quad (1)$$

The price volatility is measured as the annualized standard deviation of stock returns calculated using monthly stock returns over the three years prior to option exercises; unexpected price run-up is measured as the intercept from a market model using monthly stock returns relative to the CRSP value-weighed index over the three year period prior to option exercises; dividend yield is the annual dividend yield measured at the end of the latest fiscal year prior to option exercises. Table 2 reports the estimated coefficients for the regression. Consistent with Bettis, Bizjak, and Lemmon (2004), I document that the more volatile the firm's stock price and the larger the stock price run-up, the earlier the option would be exercised. Earlier exercise is also significantly driven by higher dividend payments. All the sample-year indicator variables load significantly in the regression, implying that exercise behaviors are affected by macroeconomic conditions and are varying across time. In Bettis, Bizjak, and Lemmon (2004)'s study, executive position is used to proxy for employee's risk preference and political constraint. Since my data consists of exercises only by top managers, this is not an issue here.

3.3 Portfolio Construction

The primary purpose of this section is to construct portfolios that characterize option exercise patterns according to two independent sorts: 1) the degree of early exercise and 2) the degree of option's moneyness upon exercise.

The first sorting is based on the residual from the regression analysis in section 3.2. In 3.2 I use a regression model to predict the point in time at which the option would be exercised prior to expiration. I use the residual (denoted as *ExerResi*) from the regression to proxy for the degree of early exercise. A positive (negative) residual indicates that the option is exercised earlier (later) than predicted.

The second sorting is based on the option's moneyness upon exercise. The purpose of this sorting is to disaggregate option-exercise events that are abnormally low or deep in the money. I predict that insiders exercise options abnormally low or deep in the money based on private information of the firm's prospects. Theoretically, to discern an "abnormal moneyness" exercise event requires knowledge of the option holder's risk preference and degree of liquidity constraint. Again, since my sample consists of option exercises by top managers, it is plausible that these people have similar risk preferences and face similar wealth constraints, and noise attributes are likely to be washed out at the portfolio level. Therefore, I hypothesize that option-exercises in the highest moneyness portfolios are more likely to be associated with insider information.

Another important issue in this study is to aggregate option exercise events within a specific framework. Thus far my analysis is based on the 32,519 individual option exercise events by top managers. It is quite common that one executive exercises several batches of option holdings in the same month, but with different degrees of early exercise

/moneyness. To mitigate the multicollinearity across individuals, I aggregate exercise events at the employee-month level. Specifically, for each employee-month I calculate a *SHARE*-weighted *ExerResi* and a *SHARE*-weighted *INMON*. By doing so I construct a sample of 12,995 employee-month exercise observations. I then form portfolios according to the aggregated *ExerResi* and *INMON*. Table 3 reports related summary statistics.

Panel A of Table 3 presents three portfolios ranked by the degree of early exercise. Portfolio with highest (lowest) employee-month *ExerResi*s is labeled as the "Early Exercise" ("Late Exercise") group; portfolio with medium employee-month *ExerResi*s is labeled as the "Normal Exercise" group. As shown in the table, options in the "Late Exercise" portfolio are typically exercised 3.08 years later than predicted, while those in the "Early Exercise" group are typically exercised 2.96 years earlier than predicted. Options in the "Normal Exercise" portfolio are exercised close to prediction. Table 3 also reports statistics on the exercise profits, moneyness and the percentage of sales at the employee-month level. It is suggested that option's moneyness slightly decreases with the degree of early exercise, with the median *INMON*s of 3.00, 2.82 and 2.23 respectively for the Late, Normal and Early Exercise group. The table also shows that Late, Normal and Early Exercise groups are typically associated *PSALE*s of 58%, 89% and 100%, suggesting that the earlier the option is exercised, the larger the tendency that the exercised shares will be sold immediately.

Panel B of Table 3 provides summary statistics for three portfolios ranked each sample year according to *INMON* aggregated at the employee-month level. The three portfolios are characterized by the median INMON value of 1.54, 2.66 and 5.70

respectively, and are denoted as the "Low INMON", "Medium INMON" and "High INMON" groups accordingly. The table shows that shares cashed out deep in the money are more likely to be sold immediately – the median value of *PSALE* for the "High INMON" group is 100%, while those for the "Medium INMON" and "Low INMON" groups are 80% and 82% respectively.

Panel C of Table 3 describes nine portfolios sorted independently by the above-mentioned two sorts. For convenience, the nine portfolios so obtained are denoted as described in Figure 1. Panel C details the option exercise patterns and related firm characteristics for each of the portfolios. It shows that, control for moneyness, early exercise is more likely to occur at growth firms; control for degree of early exercise, moneyness exercise is more likely to occur at high growth firms. The nine portfolios represent a careful description of option-exercise patterns. According to my hypotheses, the Early/High exercise pattern is most likely to be associated with insider trading and earnings management. My next step is to test for abnormal stock performance associated with each of the portfolios in detecting information-related option exercises.

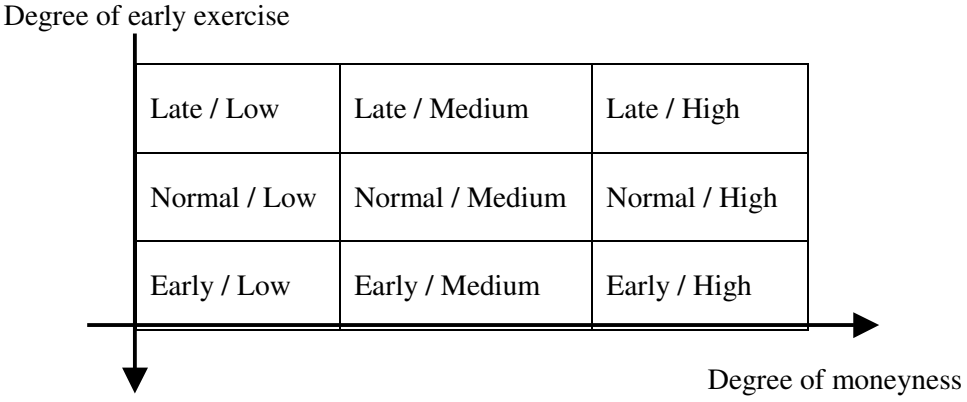

Figure 1: 9 portfolios constructed according to two independent sorts:
1) the degree of early exercise and 2) the degree of moneyness

4. Measure of Abnormal Stock Performance

In this section I test for post-exercise stock performance in detecting information-related option exercises. The general premise underlying insider trading is that insiders buy before abnormal stock price increase and sell before abnormal stock price decrease. As illustrated before, option exercises are supported by empirical evidence as the "selling" activities, hence, information-related option-exercises should be manifested by negative post-exercise abnormal stock returns.

Prior literature suggests that measure of abnormal long-run stock performance is sensitive to the methodologies adopted (e.g., Barber and Lyon (1997), Mitchell and Stafford (1997)). In this study I employ two estimators to test for the stock performance – the buy-and-hold abnormal return and the calendar-rebalancing monthly abnormal return. The latter one (calendar-rebalancing approach) is conducted to mitigate the potential misspecification problem due to cross-correlations of firm stock returns overlapping in the calendar time.

4.1 Buy and Hold Abnormal Return

I define the month at which the exercise occurs as the event month (month 0). For each portfolio, Table 4 reports the average buy-and-hold market-adjusted stock return[2]

[2] The buy-and-hold market-adjusted return (BHARm) is computed as follows:

$$BHARm_i = \prod(1+ r_{it}) - \prod (1+ r_{mt})$$

(hereafter refers as *BHARm*) and the related statistic significance over the 6-month pre-exercise period, 6-month, 12-month and 18-month post-exercise period. Studies on insider trading typically concentrates on six to twelve months following insiders' buying or selling activities. In this study I expend the investigation period to a longer horizon (18 months) in light of recent studies that document insiders tend to trade earlier prior to bad news to avoid legal/regulation scrutiny.

To gain more perspective on the possible link between exercise profits and the extent of trading on private information, I include both the equal-weighted and profit-weighted portfolio returns in Panel A and Panel B separately. The profits used to weight portfolio returns are the exercise profits aggregated at the employee-month level. Table 4 shows that option exercises are generally preceded by strong stock performance – a phenomenon that has been documented by various previous studies. This pattern is especially highlighted in the Early/High group with the equal- (profit-) weighted 6-month *BHARm* of 45.99% (48.60%). The strong stock performance is observed even after I control for the 3-year pre-exercise monthly abnormal return in the regression model that is used to predict the exercise occurring-time. However, it may still be consistent with the rational argument that large unexpected stock price run-up would induce executives to exercise options earlier.

To test for trading on insider information I need to investigate post-exercise stock performance. Table 4 shows that average portfolio *BHARMs* tend to be substantially smaller but remain positive following option exercises. This pattern is consistent with what Carpenter and Remmers (2001) found in their study. One extreme exception is the

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where r_{it} is the monthly stock return and r_{mt} is the return on CRSP value-weighted market index.

stock performance of the Early/High portfolio. The profit-weighted *BHARm*s of stocks in this group are average -5.58%, -12.41% and -19.77% over the 6-month, 12-month and 18-month post-exercise period, and all are significant at 1% level. The corresponding equal-weighted portfolio *BHARms* are insignificantly different from zero over various post-exercise time horizons, suggesting that trading volume has import implication for the value of insider information.

In my view the performance pattern of the Early/High portfolio is the leading finding in Table 4. It has several implications for further empirical analysis. First, it suggests that insiders in the Early/High group are most likely to be engaged in exploration of price-relevant insider information. Second, it suggests that dollar value of insider trading is largely related to the value of insider information. Third, it indicates a persistence of abnormal stock performance over a relatively longer period (at least 18 months).

4.2 Regression Results

Table 5 reports a regression of 18-month post-exercise *BHARm* on an indicator variable for the Early/High group after controlling for firm size and book-to-market ratio. Equation (2) describes the regression model. In consistent with previous finding that trading volume is highly related to the value of insider information, the regression is weighted by the exercise profits aggregated at the employee-month level.

$$\mathrm{BHARM}_i = \alpha_0 + \alpha_1 \mathrm{EH}_i + \alpha_2 \mathrm{Size}_i + \alpha_3 \mathrm{BM}_i + \varepsilon_i \qquad (2)$$

$BHARM_i$ is the 18-month post-exercise market-adjusted buy-and-hold return for employee-month exercise observation i. EH is the indicator variable that takes the value of one (zero) if the employee-month exercise observation is (not) in the Early/High group. Firm size and book-to-market ratio (BM) are measured at the end of the year prior to option exercises. Since some firms do not have complete return information from CRSP over the 18-month post-exercise period, there are 9,344 employee-month observations included in the regression. The regression results in Table 5 indicate that, after controlling for firm size and book-to-market ratio, stocks in the Early/High group on average underperform stocks associated with all else exercise patterns by 18.51% over the 18-month post-exercise period. This result confirms the prediction that the degree of early exercise / moneyness forecast future abnormal stock performance.

4.3 Calendar-Rebalancing Monthly Abnormal Return

Analysis of buy-and-hold abnormal return so far provides strong evidence that some insiders time large option exercises based on material private information. In the aforementioned analysis the significance of abnormal stock return is based on an ordinary t-test that assumes independence of sample observations. Since option exercises are frequent events, the event firm returns in my study are very likely to overlap in the calendar time so are cross-sectional correlated. The t-statistic in the *BHARMs* analysis thus may overestimate the significance of portfolio abnormal returns. As a robustness check I now report statistics on monthly abnormal returns for each portfolio from calendar-rebalancing regressions. The calendar-rebalancing estimator is strongly

advocated by researchers to mitigate the misspecification problem caused by cross-sectional correlations of stock returns (e.g., Lyon et al. (1999), Mitchell and Stafford (1997), Loughran and Ritter (1995) etc.).

In light of the evidence presented in the *BHARm* analysis, I focus the calendar tests on the profit-weighted portfolio returns. From 1996 to 2003 I create a calendar time series of monthly portfolio returns. The portfolios are rebalanced monthly to include all option exercise events in the preceding N months, where 'N' denotes the specific number of months in interest. The profit-weighted monthly portfolio returns are regressed on the Fama and French three-factors (hereafter denoted as FF 3-factors) as indicated in equation (3). The three factors include a market return factor (MktRf), a size factor (SMB) and a value-growth factor (HML). The data on monthly factor returns are obtained from Ken French's data library. Calendar months within which the number of event firms is less than five are excluded from the regressions. The intercept (alpha) from the regression provides a measure of abnormal stock performance that is not explained by the Fama and French three factors. Panel A of Table 6 reports the FF 3-factor adjusted monthly returns and t-statistics for each of the nine portfolios over the pre- and post-exercise periods.

$$Rp_t = \alpha + \beta_1 MktRf_t + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t \quad (3)$$

The results in Panel A of Table 6 suggest the similar pattern documented in the *BHARm* analysis. Option exercises are preceded by dramatic price run-up, with the average profit-weighted portfolio monthly abnormal returns range from 0.95% to 5.44%. The post-exercise stock performances diminish substantially. In the first 6 months

following option exercises, the FF 3-factor adjusted portfolio returns range from -0.26% to 0.74%, none of them are significantly negative. Carpenter and Remmers (2001) reports similar evidence that the size-adjusted monthly returns are average 0.13% (insignificantly different from zero) over the first 6-month post-exercise period. The same pattern continues in the next 12-month post-exercise period, with the exception that stocks in the Early/High group experience dramatic and significant stock-price drops. The average profit-weighted monthly returns of this portfolio are –1.16% after adjusting for FF 3-factors, which transforms to a 12-month cumulative abnormal return of –13.92%.

It has been shown that option exercises are preceded by strong stock performance. Hence, momentum factor could be an important factor in explaining post-exercise stock performance. Equation (4) indicates a 4-factor regression model, where, in addition to the FF 3 factors, a momentum factor (UMD) is added in. The momentum factor returns are also obtained from Ken French's data library. Panel B of table 6 reports monthly abnormal returns for each portfolios after adjusting for the 4 factors.

$$Rp_t = \alpha_t + \beta_1 MktRf_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + \varepsilon_t \quad (4)$$

The 4-factor adjusted portfolio returns exhibit similar pattern as documented in the 3-factor analysis. Focusing on the Early/High portfolio, I document that the monthly 4-factor adjusted portfolio return over the first 6-month post-exercise period is insignificantly different from zero, but becomes significantly negative over the next 12 months (-0.75%).

To summarize, evidence from the analysis of post-exercise stock performance is consistent with the prediction that early exercises and large moneyness exercises are associated with trading on material insider information.

5. Measure of Earnings Management

The analysis of stock performance provides strong evidence that some insiders time large option exercises based on private information. In this section I further explore this issue by investigating whether the private information is systematically related to corporate earnings performance following option exercises.

In line with the results presented in the analysis of abnormal stock performance, I focus the study of earnings performance on the Early/High group, and expend all else exercise events into the Normal group. I then compare the earnings performance of these two groups surrounding option exercises. I predict that firms in the Early/High group are more likely to be engaged in earnings management prior to large option exercises.

I perform the study from three aspects. The first empirical investigation focuses on the earnings performance relative to analysts' expectations. I hypothesize that firms in the Early/High group are more likely to meet or exceed analyst earnings expectations. The second test employs accrual measures to detect earnings management. The third test emphasizes on stock price responses to earnings announcements surrounding option exercises.

5.1 Earnings Performance relative to Analysts' Forecasts

My first test investigates changes of earnings performance relative to analysts' forecasts. To do that I measure the earnings performance in two aspects: 1) the MEE intensity and 2) the magnitude of analyst forecast error (Err). I compare the MEE and Err performances between the Early/High group and the Normal group over the pre- and post-exercise periods.

I collect both the forecasted quarterly earnings per share (EPS) and the reported EPS from IBES to ensure the data consistency. To avoid including uninformative forecasts, I restrict the forecasts of EPS to be made or revised following the previous quarter's earnings announcement. An indicator variable MEE_{it} – referring to 'meeting or exceeding analysts' expectation' – takes the value of one (zero) if the reported EPS of firm i for quarter t (EPS_{it}) is equal to or greater than the consensus (mean) forecasted $EPS_{i,t}$. I then calculate the profit-weighted portfolio MEE intensity over various investigation periods. Equation (4) describes this computation process. Similarly, I define the earnings forecast error (Err_{it}) for firm *i* and quarter *t* as the difference between reported EPS_{it} and the mean forecasted EPS_{it}, and calculate profit-weighted Err (as indicated in equation (5)) for the Early/High and Normal group over various time horizons.

$$MEE_{p,t} = \sum_i \frac{profit_i}{\sum profit_i} (\sum_t MEE_{i,t}) \quad (4)$$

$$Err_{p,t} = \sum_i \frac{profit_i}{\sum profit_i} (\sum_t Err_{i,t}) \quad (5)$$

Panel A and Panel B of Table 7 presents statistics on MEE and Err for the Early/High group and Normal group over the 4-quarter pre-exercise period (-4,-1); 1-2 quarter post-exercise period (1,2); 3-6 quarter post-exercise period; and the 1-6 quarter post-exercise period (1,6). Table 7 also reports the MEE and Err reversals following option exercises. A mean difference test between the two groups is then performed. The table shows that in the four quarters prior to option exercises, firms in the Early/High group are very likely to meet or exceed analyst's expectations. The mean value of MEE for the Early/High group is around 85%, which significantly exceeds that of the firms in the normal exercise group by more than 10%. This performance level, though remained relatively stable during the first two quarters following option exercises, dropped dramatically by more than 22% over the next four quarters. In contrast, firms in the Normal group exhibit significantly smaller corresponding MEE reversal of 6%. The very similar pattern is also documented in the magnitude of analyst earnings forecast error. Panel B of Table 7 shows that, in the 4 quarters prior to option exercises, the mean value of Err of the Early/High group is 1.60 cents, which significantly exceeds that of the Normal group by 0.87 cent; however, in the 3^{rd}-to-6^{th}-quarter post-exercise period, the mean Err of the Early/High group is -1.64 cents (significant at 1% level), while that of the Normal group is insignificantly different from zero.

5.2 Accrual Measure

In this section I test whether firms use aggressive accounting adjustments (or the *accrual*s) to inflate earnings prior to option exercises. Corporate financial statement

reports earnings as the sum of two components: cash flow from operations and total accruals. The accrual adjustment reflects accounting flexibility in reporting profits from business transactions. However, the accruals are also the component of earning that is most sensitive to managerial discretions. The extent accounting literature has focused accrual measure in measuring earnings management (Jones (1991), Dechow et al. (1995), Kothari (2002) etc.). Following the traditional methodology in accounting literature, I proxy for earnings management by discretionary accruals estimated from the modified version of the Jone's model (Dechow et al (1995). The estimating model is detailed in equation (6).

$$TA_{i,t} = \beta_0 + \beta_1/Assets_{i,t-1} + \beta_2 (\Delta REV - \Delta REC)_{it} /Assets_{i,t-1} + \beta_3 PPE_{it} /Assets_{i,t-1} + \varepsilon_{it} \quad (6)$$

Total accruals (TA) is defined as the change in non-cash current assets minus the change in current liabilities excluding the current portion of long-term debt minus depreciation and amortization, scaled by lagged total assets. Explanations for other variables are as follows:

Assets : the lagged total asset;

ΔREV: change of revenues in current quarter;

ΔAR: change of receivables in current quarter;

PPE: gross property plant and equipment in current quarter

I estimate the modified Jone's model cross-sectional each quarter using all the firm-quarter observations in the same two-digit SIC code. The residual from the regression represents the discretionary part of the accruals that are not dictated by industry business conditions.

Table 8 reports the results of accrual measures in the pre- and post-exercise periods. Focusing on the Early/High group, I document that the mean value of discretionary accruals (*DA*s) shows a peak at the two quarters prior to option exercises (0.77% of assets), which significantly exceeds that of the Normal group by 0.44%. The mean value of *DA*s then declined significantly to 0.07% over the 3rd-to-6th-quarter post-exercise period. The 0.71% accrual reversal is significant at 1% level. In contrast, the time-varying accrual adjustments surrounding option exercises are significantly less volatile for firms in the Normal group, with the accrual reversal of 0.11%.

In short, evidence from the discretionary accrual measure is consistent with the interpretation that top managers in the Early/High group manage earnings aggressively prior to option exercises, and the discretionary accrual adjustments reverse dramatically following option exercises.

5.3 Price Response to Earnings Announcement

To complete the analysis related to earnings performance, in this section I investigate market response to earnings announcement. I collect quarterly earnings announcement dates from COMPUSTAT, and compute earnings announcement abnormal returns over the (-1,1) 3-day event window relative to the earnings announcement dates. The abnormal return is computed as the 3-day buy-and-hold market-adjusted return, where the CRSP value-weighted index is used as the benchmark market index. Table 9 reports the profit-weighted earning-announcement abnormal returns for the two exercise groups over various pre- and post-exercise periods.

I document that firms in the Early/High group significantly positively surprised the market during the 4-quarter pre-exercise period, with the average 3-day market-adjusted earnings-announcement return of 1.65%. However, in the 6-quarter post-exercise period, stock price on average dropped – 0.75% (net of market movements) in response to earnings announcements. In contrast, firms in the normal exercise group show an average pre-exercise earnings-announcement abnormal return of 1.31% and a corresponding post-exercise return of 0.45%. This pattern, combined with the evidence from earnings performance (relative to analyst expectations) and the managers' discretion on accrual adjustments, suggests that Early/High firms are successful in misleading investors by strategically reporting company financial information to the public. Investors revalue the firm down when the strong pre-exercise earnings performance is not sustained in the post-exercise period.

In sum, evidence from investigation of earnings management confirms the prediction that some top executives manage earnings prior to option exercises and use the private information of poor future earnings performance to time option exercises.

6 Conclusion

Previous literature has produced mixed evidence on the association between option exercise behavior of corporate executives, stock-price performance, and earnings management behavior. By using a unique database of option exercise I am able to shed new light on these issues by more carefully disaggregating option exercises that are likely to be associated with private information.

I find strong evidence of poor post-exercise stock returns following option exercises by top-executives that 1) occur earlier than predicted and 2) are cashed out deep in the money. My further investigation of earnings performance indicates that the poor post-exercise stock returns are systematically related to insiders' private information on company's future earnings. I also provide evidence that the pre-exercise high earnings performance relative to analyst expectations was more likely achieved through earnings managements, and this performance reversed substantially following option exercises. The evidence is consistent with managers engaging in earnings management behavior prior to option exercises. My results contribute to the ongoing debate about whether stock options provide managers with incentives to manipulate market perceptions of firm performance.

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Table 1: Descriptive Statistics on Option Exercise Patterns and Option Characteristics

The data consists of 32,519 option exercise events by corporate insiders at 2,741 firms that were reported to SEC between 1996 and 2002. This table reports summary statistics on option exercise patterns and option characteristics for corporate top managers (CEOs and Chairmen of the Board, Presidents and COOS). ***EXT*** is the number of years between exercise and expiration. ***EXV*** is the number of years between option vesting and expiration; ***TXV*** is the number of years after vesting options were exercised; ***INMON*** is the ratio of stock price to strike price when the option were exercised; ***SHARE*** is the number of shares acquired through option exercises; ***COST*** is the strike price multiplied by the number of shares exercised; ***PROFIT*** is measured as the spread between stock price and strike price multiplied by the number of shares exercised; ***PSALE*** is the shares sold as a fraction of shares acquired through option exercises. Summary statistics provided include the variables' mean, 1%, 50% and 99% values. ***SHARE, COST*** and ***PROFIT*** are winsorized at 99%.

	Mean	***1%***	***50%***	***99%***
EXT	3.97	0.01	4.04	8.98
EXV	6.82	0.50	7.03	9.84
TXV	2.85	0.01	2.21	8.99
INMON	3.72	1.02	2.61	16.61
SHARE	25,316	169	7,500	384,871
COST	$332,534	$537	$86,973	$4,991,000
PROFIT	$590,373	$1,500	$151,650	$9,438,750
PSALE	61%	0	85%	100%

Table 2 Exercise Occurring Time Prediction Model

This table provides OLS regression results. The dependent variable is the number of years prior to option expiration. The independent variables include: 1) ***stdRET:*** the annualized standard deviation of stock returns calculated using monthly stock returns over the three years prior to option exercises; 2) ***abRET***: the abnormal stock return measured as the intercept from a market model using monthly stock returns relative to the CRSP value-weighed index over the three year period prior to option exercises; 3) ***DivYd***: the annual dividend yield measured at the end of the latest fiscal year prior to option exercises; 4) ***Year Dummy***: indictor variables for each sample year.

	# of Yeas Prior to Expiration	
	Coefficient	*t-statistics*
Intercept	2.47	48.53
StdRET	1.28	18.85
AbRET	13.46	20.42
DivYd	6.43	7.06
Year Dummy	Yes	
Number of Observations	32,519	
Adjusted R^2	4.18%	

Table 3 Descriptive Statistics on Portfolios formed on Option Exercise Pattern

This table provides statistics on 12,995 employee-month option exercise observations. Panel A provides descriptive statistics on option exercise pattern for three portfolios constructed according to ***ExerResi;*** Panel B provides descriptive statistics on option exercise pattern for three portfolios constructed according to ***INMON;*** Panel C provides descriptive statistics on option exercise pattern and firm characteristics for nine portfolios constructed according to two independent sorts: 1) ***ExerResi*** and 2) ***INMON***. ***ExerResi*** is the share-weighted residual from the exercise occurring time prediction model aggregated at the employee-month level; ***INMON*** is the share-weighted ratio of stock price to strike price upon option exercise aggregated at the employee-month level; ***profit*** is the exercise profits aggregated at the employee-month level; ***PSALE*** is the shares sold as a fraction of shares acquired through option exercises; ***SIZE*** is the market capitalization ($million) of the firm measured at the end of the year prior to option exercises ; ***BM*** is the firm's book-to-market ratio measured at the end of the fiscal year prior to option exercises. Portfolio median (mean) value is reported.

Panel A: Portfolios constructed on *ExerResi*

	# of obs	*ExerResi*	*INMON*	*profit*	*PSALE*
Late Exercise	4331	-3.08	3.00	$29,325	58%
		(-2.96)	(4.15)	($1,143,684)	(53%)
Normal Exercise	4332	-0.05	2.82	$445,718	89%
		(0.00)	(4.10)	($1,854,764)	(61%)
Early Exercise	4332	2.96	2.23	$362,800	100
		(3.06)	(3.20)	($1,433,561)	(69%)

Panel B: Portfolios constructed on *INMON*

	# of obs	*ExerResi*	*INMON*	*profit*	*PSALE*
Low INMON	4329	0.82	1.54	$140,219	82%
		(0.61)	(1.55)	($704,775)	(60%)
Medium INMON	4334	-0.07	2.66	$4,639,199	80%
		(0.00)	(2.74)	($1,379,899)	(61%)
High INMON	4332	-0.63	5.79	$783,951	100%
		(0.51)	(7.15)	($2,346,923)	(61%)

Panel C: Portfolios constructed on *ExerResi* and *INMON*

	Low	Medium	High
Number of observations			
Late	*1,161*	*1,478*	*1,692*
Normal	*1,309*	*1,415*	*1,608*
Early	*1,859*	*1,441*	*1,032*
ExerResi			
Late	*-3.20 (3.01)*	*-3.06 (-2.95)*	*-3.02 (-2.93)*
Normal	*-0.05 (0.01)*	*-0.04 (0.02)*	*-0.08 (-0.03)*
Early	*3.25 (3.30)*	*2.95 (3.01)*	*2.56 (2.69)*
INMON			
Late	*1.53 (1.54)*	*2.72 (2.79)*	*5.83 (7.13)*
Normal	*1.55 (1.55)*	*2.65 (2.73)*	*5.92 (7.38)*
Early	*1.54 (1.55)*	*2.62 (2.71)*	*5.61 (6.84)*
PROFIT ($)			
Late	*73,125 (269,609)*	*278,743 (967,642)*	*695,931 (1,897,227)*
Normal	*151,763 (837,518)*	*443,238 (1,519,567)*	*948,819 (2,977,823)*
Early	*209,113 (883,079)*	*395,850 (1,665,593)*	*763,969 (2,101,187)*
PSALE (%)			
Late	*65 (52)*	*60 (55)*	*50 (52)*
Normal	*84 (60)*	*78 (59)*	*100 (64)*
Early	*88 (66)*	*100 (70)*	*100 (74)*
Size (Million $)			
Late	*772 (3,391)*	*1,078 (11,586)*	*1,518 (14,045)*
Normal	*1,510 (8,631)*	*1,316 (9,568)*	*1,202 (12,533)*
Early	*2,065 (9,592)*	*1,183 (7,535)*	*866 (7,819)*
Book to Market Ratio			
Late	*0.57 (0.64)*	*0.42 (0.49)*	*0.32 (0.38)*
Normal	*0.48 (0.57)*	*0.39 (0.45)*	*0.25 (0.31)*
Early	*0.47 (0.54)*	*0.33 (0.40)*	*0.18 (0.26)*

Table 4 Time-series Profile of Portfolio Return

Panel A (B) provides equal- (profit-) weighted market-adjusted buy-and-hold return for nine portfolios constructed according to two independent sorts: 1) ***ExerResi*** and 2) ***INMON***. ***ExerResi*** is the share-weighted residual from the exercise occurring time prediction model aggregated at the employee-month level; ***INMON*** is the share-weighted ratio of stock price to strike price upon option exercise aggregated at the employee-month level; the profits used to weight portfolio returns are exercise profits aggregated at the employee-month level; The market-adjusted buy-and-hold return is calculated using monthly stock return relative to the CRSP value weighted index over six-month period preceding option exercises (-6,-1); six-month period following option exercises (+1,+6); twelve-month period following option exercises (+1,+12) and eighteen-month period (+1,+18) following option exercises. Mean values and t-test significance are reported. (***, **, * significant at 1%, 5% and 10% level)

Panel A: Equal-Weighted Market-adjusted Buy-and-Hold Return				
Pre-Exercising Period (-6, -1) month				
		Low	Medium	High
	Late Exercise	1.07	6.24***	14.67***
	Normal Exercise	7.41***	13.46***	28.83***
	Early Exercise	7.67***	21.30***	45.99***
Post-exercising Period 1: (+1,+ 6) month				
	Late Exercise	1.14	0.47	-0.18
	Normal Exercise	1.79	2.43**	0.04
	Early Exercise	0.21	1.80	-0.40
Post-exercising Period 1: (+1, +12) month				
	Late Exercise	3.06**	0.49	0.01
	Normal Exercise	2.56	5.86***	0.82
	Early Exercise	1.04	0.24	-3.25
Post-exercising Period 2: (+1, +18) month				
	Late Exercise	8.95***	1.24	-4.08**
	Normal Exercise	5.44**	5.23**	3.70
	Early Exercise	4.17**	-4.13**	-1.49
Panel B: Profit-Weighted Market-adjusted Buy-and-Hold Return				
Pre-Exercising Period (-6, -1) month				
		Low	Medium	High
	Late Exercise	4.79***	8.56***	17.20***
	Normal Exercise	14.07***	18.17***	31.92***
	Early Exercise	10.28***	21.97***	48.60***
Post-exercising Period 1: (+1, +6) month				
	Late Exercise	1.48	1.21	0.33
	Normal Exercise	3.87***	-0.26	4.62***
	Early Exercise	-3.03***	4.44***	-5.58***
Post-exercising Period 1: (+1, +12) month				
	Late Exercise	4.59***	0.22	3.83**
	Normal Exercise	4.52***	9.01***	4.53***
	Early Exercise	-2.60***	4.00**	-12.41***
Post-exercising Period 2: (+1, +18) month				
	Late Exercise	12.49***	-0.22	-2.69*
	Normal Exercise	12.87***	7.15***	-0.63
	Early Exercise	3.92**	-4.57***	-19.77***

Table 5 Regression of post-exercise return on portfolio group

This table provides profit-weighted least square regression results. The profits are exercise profits aggregated at the employee-month level. The dependent variable is the 18-month post-exercise market-adjusted buy-and-hold return. The independent variables include: 1) ***Early/High:*** indicator variable that takes the value of 1 (0) if the employee-month exercise observation is classified into the Early/High group; 2) ***SIZE*** is the market capitalization ($million) of the firm measured at the end of the year prior to option exercises; ***BM*** is the firm's book-to-market ratio measured at the end of the fiscal year prior to option exercises.

	18-month post-exercise market-adjusted buy-and-hold return	
	Coefficient	*t-statistics*
Intercept	-9.18	-2.50
Early/High	-18.51	-8.16
SIZE	0.66	1.69
BM	15.42	5.00
Number of Observations	9,344	
Adjusted R^2	1.14%	

Table 6 Calendar Time-series Mans and t-statistics of Portfolio Abnormal Return

Panel A reports the ***profit***-weighted calendar time series mans (t-statistics) for monthly Fama French 3-factor adjusted returns on nine portfolios over six-month preexercise period (-6,-1); 1-6 month postexercise period (+1,+6); 7-18 month postexercise period (+7,+18). Portfolios are constructed according to two independent sorts: 1) ***ExerResi*** and 2) ***INMON***. ***ExerResi*** is the share-weighted residual from the exercise occurring time prediction model aggregated at the employee-month level; ***INMON*** is the share-weighted ratio of stock price to strike price upon option exercise aggregated at the employee-month level; ***Profit*** is the exercise profits aggregated at the employee-month level; Fama French three factors include a market return factor, a size factor and a value-growth factor. Panel B reports the results when the monthly portfolio returns are adjusted for Carhart (1997) 4-factors, i.e., the Fama French three factors and a momentum factor. The factor returns are obtained from Ken French's data library.

Panel A: Profit-weighted monthly return adjusted for Fama French 3 factors

	Low	*Medium*	*High*
Pre-Exercise Period (-6, -1) month			
Late Exercise	*0.95 (2.21)*	*1.61 (3.96)*	*2.33 (5.65)*
Normal Exercise	*2.17 (4.67)*	*2.62 (6.39)*	*4.25 (10.59)*
Early Exercise	*1.66 (4.79)*	*2.94 (7.89)*	*5.44 (9.30)*
Post-Exercise Period (+1, +6) month			
Late Exercise	*-0.19 (-0.45)*	*0.22 (0.52)*	*-0.15 (-0.41)*
Normal Exercise	*0.20 (0.56)*	*-0.11 (-0.33)*	*0.74 (2.12)*
Early Exercise	*-0.26 (-0.96)*	*0.47 (1.20)*	*-0.11 (-0.21)*
Post-Exercise Period (+7, +18) month			
Late Exercise	*0.45 (1.37)*	*-0.03 (-0.07)*	*-0.42 (-1.03)*
Normal Exercise	*0.32 (1.10)*	*0.51 (1.42)*	*-0.56 (-1.50)*
Early Exercise	*-0.14 (-0.57)*	*-0.52 (-1.26)*	***-1.16 (-2.40)***

Panel B: Profit-weighted monthly return adjusted for Carhart (1997) 4 factors

	Low	*Medium*	*High*
Pre-Exercising Period (-6, -1) month			
Late Exercise	*1.17 (2.72)*	*1.39 (3.44)*	*2.09 (5.12)*
Normal Exercise	*2.37 (4.95)*	*2.59 (6.12)*	*4.02 (10.12)*
Early Exercise	*1.58 (4.44)*	*2.86 (7.48)*	*5.05 (8.84)*
Post-Exercise Period (+1, +6) month			
Late Exercise	*0.09 (0.23)*	*0.49 (1.17)*	*-0.18 (-0.48)*
Normal Exercise	*0.17 (0.46)*	*-0.22 (-0.64)*	*0.71 (1.98)*
Early Exercise	*-0.32 (-1.13)*	*0.35 (0.89)*	*-0.08 (-0.14)*
Post-Exercise Period (+7, +18) month			
Late Exercise	*0.70 (2.22)*	*0.28 (0.68)*	*-0.09 (-0.23)*
Normal Exercise	*0.46 (1.56)*	*0.85 (2.54)*	*-0.21 (-0.62)*
Early Exercise	*-0.11 (-0.44)*	*-0.33 (-0.80)*	***-0.75 (-1.67)***

Table 7 Time-series profile of Earnings Performance relative to Analyst Forecasts

Panel A reports time-series profile of ***profit-***weighted ***MEE*** intensity and ***MEE*** reversal ***(*Δ*MEE***) for Early/High group and Norma group, over the 4-quarter pre-exercise period (-4,-1); 1-2 quarter post-exercise period (+1,+2) and 3-6 quarter post-exercise period (+3,+6). The Early/High group includes employee-month exercise observations that are in the "Early Exercise" and the "High INMON" group. The Normal group includes all employee-month exercise observations excluding those in the Early/High group. ***Profit*** is the exercise profits aggregated at the employee-month level; ***MEE*** takes the value of 1 (0) if the actual firm-quarterly earnings per share (EPS) is equal to or greater than (lower than) the consensus forecasted firm-quarter EPS. **Panel B** reports time-series profile of profit-weighted average earnings forecast error (***ERR***) and the ERR reversal ***(*Δ*ERR***) for the Early/High group and Normal group, over the over the over the 4-quarter pre-exercise period (-4,-1); 1-2 quarter post-exercise period (+1,+2) and 3-6 quarter post-exercise period (+3,+6). The ***ERR*** is the difference between actual reported EPS and consensus forecasted EPS. Mean values and t-test significance are reported (***,**,* significant at 1%, 5% and 10% level).

Panel A: Mean MEE intensity

Quarter	Early/High	Normal	Mean Difference
(-4,-1)	85.39%***	74.82%***	10.57%***
(+1, +2)	81.39%***	74.66%***	6.73%***
(+3, +6)	63.01%***	68.67%***	-5.66%***
$\Delta MEE_{1:}$ [$MEE_{(+1,+2)} - MEE_{(-4,-1)}$]	-4.01%***	-0.16%	-3.85%***
ΔMEE_2:[$MEE_{(+3,+6)} - MEE_{(-4,-1)}$]	-22.38%***	-6.15%***	-16.23%***
Number of observations	938	10,413	

Panel B: Mean ERR (cent)

Quarter	Early/High	Normal	Mean Difference
(-4,-1)	1.60***	0.73***	0.87***
(+1, +2)	0.91***	0.45***	0.46**
(+3, +6)	-1.64***	-0.05	-1.59***
ΔERR_1 : [$ERR_{(+1,+2)} - ERR_{(-4,-1)}$]	-0.69***	-0.28***	-0.41*
ΔERR_2 [$ERR_{(+3,+6)} - ERR_{(-4,-1)}$]	-3.24***	-0.73***	-2.51***
Number of observations	938	10,413	

Table 8 Time-series Profile of Asset-scaled Discretionary Accruals

This table reports ***profit***-weighted discretionary accruals (***DAs***) and DA reversals ***(*Δ*DAs***) for the Early/High group and Normal group, over the 4-quarter pre-exercise period (-4,-3) and (-2,-1); 1-2 quarter post-exercise period (+1,+2) and 3-6 quarter post-exercise period (+3,+6). The Early/High group includes employee-month exercise observations that are in the "Early Exercise" and the "High INMON" group. The Normal group includes all employee-month exercise observations excluding those in the Early/High group. ***Profit*** is the exercise profits aggregated at the employee-month level; ***DA***s for each firm are measure from the modified Jones model and scaled by beginning-period total assets. Mean values and t-test significance are reported (***,**,* significant at 1%, 5% and 10% level).

Discretionary Accrual			
Quarter	Early/High	Normal	Mean Difference
-4, -3	0.30*	0.28***	0.02
-2, -1	0.77***	0.33***	0.44***
+1, +2	0.33**	0.28***	0.05
+3, +6	0.07	0.21***	-0.14**
ΔDA_1 : $[DA_{(+1,+2)} - DA_{(-2,-1)}]$	-0.44**	-0.04	-0.40***
ΔDA_2 : $[DA_{(+3,+6)} - DA_{(-2,-1)}]$	-0.71***	-0.11*	-0.60***
Number of observations	885	8,285	

Table 9 Time-series Profile of Earnings Announcement Abnormal Return

Table 9 reports the ***profit***-weighted earnings announcement abnormal returns for the Early/High group and the Normal group over the 4-quarter pre-exercise period (-4,-1); 1-2 quarter post-exercise period (+1,+2); 3-6 quarter post-exercise period (+3,+6); and the 1-6 quarter post-exercise period (+1,+6). The earnings announcement abnormal return is measured as the market-adjusted buy-and-hold return over the 3-day earnings announcement window (-1,1) relative to the CRSP value weighted index. The Early/High group includes employee-month exercise observations that are in the "Early Exercise" and the "High INMON" group. The Normal group includes all employee-month exercise observations excluding those in the Early/High group. ***Profit*** is the exercise profits aggregated at the employee-month level; Mean values and t-test significance are reported (***,**,* significant at 1%, 5% and 10% level).

Mean Earnings Announcement Abnormal Return			
Quarter	Early/High	Normal	Difference
-4, -1	1.65***	1.31***	0.34***
+1, +2	-0.95***	0.49***	-1.44***
+3, +6	-0.58***	0.44***	-1.02***
+1, +6	-0.74***	0.45***	-1.19***
Number of observations	951	11,072	