Are Executive Stock Option Exercises Driven by Private Information?

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Abstract

We examine the extent to which executive stock option exercises may be driven by private information. Contrary to the maintained assumption in prior literature that all shares acquired though exercises are immediately sold, we found that no shares are sold within thirty days following approximately half of the exercises. Generally speaking, we find strong evidence that executives are exploiting positive private information when they exercise the options but hold the shares beyond thirty days, and weaker evidence that they are exploiting negative private information when they exercise the options and sell the shares within thirty days. To increase the power of tests, especially on the negative side, we consider several factors that may be important to executives when making exercise decisions. Along with the exploitation of private information, these include dividend and tax incentives to exercise early, opportunity costs of early exercise due to the loss of time value in options, and reduction of diversifiable risk and concomitant disguise in potential law suits offered by claims of diversification when options are deeply in the money. We find strong evidence that executive's trading gains are positively correlated with time value and depth. Further findings support the conclusion that executives exploit positive private information by holding options as well as by exercising options and holding the shares.

1. Introduction

Several factors come to bear for executives in deciding when to exercise stock options and sell the stock acquired. Given that options represent a substantial portion of their compensation, they must exercise the options and sell the stock in order to consume. As well, executives are under-diversified with both their human capital and financial assets invested in the same company, implying a strong diversification incentive for exercise and sale. Countervailing the incentives to exercise and sell are the opportunity cost of losing the time value of options and dividends and tax effects available through exercise and hold.

Beyond these considerations, executives may seek to exploit private information. If private information consists of bad news, then similar to consumption and diversification they have incentive to exercise and sell before that news becomes public. For good news, executives may either hold options or exercise options and hold the stock until that news becomes public. Motivation for the latter is enhanced by the fact that options are generally not dividend protected and gains on the subsequent sale of shares from exercise, if held for a sufficiently long period, may be eligible for capital gains treatment.[1]

A further consideration in exploiting private information is exposure to liability for violating insider-trading regulations.[2] Plausibly, insiders are less exposed to liability from selling shares acquired through exercise of options deep in the money due to the

[1] Under reasonable assumptions, MacDonald (2003) has shown that the opportunity cost for funds used to purchase the stock outweighs the tax advantage *per se* implying that the tax aspect alone is insufficient to prompt early exercise. Hence, dividends must be part of the motivation.

[2] Under Section 10b-5 of the Securities and Exchange Act of 1934, insiders are prohibited from trading on "material" non-public information. Notwithstanding this restriction, there is considerable evidence (see Seyhun, 1998 and, more recently, Lakonishok and Lee, 2001) that insiders realize abnormal returns on their trades, though principally on open market buys.

presence of other incentives such as consumption and diversification that may serve as a defense. The deeper that options are in the money, then the stronger the diversification incentive to sell. Thus, if an executive elects to exercise and sell in order to exploit bad news, then greater depth may lessen exposure to liability under insider trading regulations. A similar, though less persuasive, argument can be made for a dividend incentive commingling with a strategy of exercise and hold in exploiting good news for higher yield stocks.[3] On one hand, the diversification and dividend incentives provide a measure of disguise for private information-based decisions to exercise and sell or exercise and hold, respectively. On the other hand, presence of these incentives is a source of noise in attempting to detect the exploitation of private information.

In this study, we examine whether executives exploit private information when exercising employee stock options while controlling for other factors that may be present. To the extent that executives consider the above mentioned factors in making decisions whether to exercise or hold their options, and, after exercise, whether to sell or hold the shares, data on the status of the options and factors that seemingly influence executives' decisions can be used to form more powerful tests by distinguishing option exercises that are more likely to be motivated by private information.

Results in prior research on this issue are mixed. Carpenter and Remmers (2001) found no evidence of private information for executive option exercises,[4] while Huddart and Lang (2003) found evidence that even employees, not limited to top ranked

[3] Generally speaking, prosecution under insider trading regulations is less evident for buys than for sells, suggesting that presence of other incentives for exercise and hold is not likely to be important as a defense.
[4] Like Carpenter and Remmers (2001), we also examine a large dataset of executive option exercises, including all transactions reported to SEC from 1996 to 2003 and collected by Thompson Financial. Unlike their study, which analyzes only option exercises under an assumption that sales immediately follow, we consider a broader set of factors that are likely to be important when executives make portfolio decisions made possible by more extensive data.

executives, appear to possess private information when exercising their companies' stock options.[5] Contrary to the maintained assumption in both studies, we find that not all shares acquired through option exercises are sold immediately. In fact, all shares are sold within thirty days of exercise for less than half of the firm-month observations in our sample; and for close to half of the firm-month observations, no shares are sold within thirty days.[6] It is reasonable to conjecture that the motives behind decisions in these two sub-samples that both feature executive option exercises should be quite different. Indeed, we find that if we only condition our analysis of abnormal returns on the exercise decision, consistent with Carpenter and Remmers (2001), then there is no trace of negative abnormal returns; some post-exercise months even feature positive abnormal returns. However, when we further partition the sample on whether the shares are immediately sold, we find strong evidence that the keep-all sub-sample is associated with positive private information, and weaker evidence that the sell-all sub-sample is associated with negative private information.

The strong positive results and weaker negative results are in line with general findings in the insider trading literature (e.g., Seyhun 1998, Ofek and Yermack 2000) that generally attributes the weak results for insider selling to insider's complementary incentives to consume and diversify; as we acknowledge represent noise as well as disguise.[7] Without additional information about either the insider's portfolio composition,

[5] The Huddart and Lang study raises a natural question as to why transactions by top executives do not entail private information if lower level employees do, since one naturally expects top executives to have more ready access to private information. A caveat of Huddart and Lang's study is that there are only seven firms in the sample, while the Carpenter and Remmers study employ a large dataset of executive option exercises.

[6] The remaining observations are where some but not all shares acquired through exercise are sold within thirty days.

[7] In keeping with the findings in these studies and the insider trading and employee stock options literature in general, we find significant lagged market reactions subsequent to reports of transactions to the SEC,

or the circumstances under which the open market transactions occurred, the insider trading literature did not offer a remedy to improve the power of the tests.[8] However, the additional data now available on the circumstances surrounding option exercise and sell decisions provides a potential means for addressing this power issue. Several hypotheses are amenable to testing making use of this data.

First, given that corporate executives must incur opportunity costs by giving up time value of options when they exercise early based on private information, we hypothesize that the intensity of incentives for executives exploiting private information through exercise and trading decisions should be positively correlated with the magnitude of the opportunity costs. Specifically, we hypothesize a larger magnitude of abnormal returns when the executives forgo a larger proportion of option values. This should be true when private news is either positive or negative. Next, to the extent that executives can justify their exercise and sell decisions as motivated by desires to consume and diversify when their options are deeply in the money, then as previously mentioned depth is likely to serve as a disguise when executives exploit private bad news. Therefore, we further hypothesize that the deeper the options are in the money, the more negative abnormal returns will be following exercise and sell decisions. Last, based on MacDonald's (2003) theoretical analysis, we hypothesize that the exercise and hold sub-sample should have high dividend yields and long stock holding periods so that it is optimal to exercise and hold to exploit positive private information.

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implying that the market may not be fully efficient in its reaction to public information. In our analysis, we distinguish abnormal returns that are only available to executives and abnormal returns available to the general public (after the reports). Following the literature, however, we do not examine the reasons for the lagged reactions.

[8] The power is low in *ex ante* tests. In *ex post* tests, however, there is evidence that insider selling is associated with bad news. For example, Ke, Huddart and Petroni (2004) found insiders sell company shares in the anticipation of a break in increasing earnings.

We find strong evidence supporting the above hypotheses. Conditioning on both option exercise and the time value to option value ratio, we find that abnormal returns and opportunity costs are negatively correlated for the sell-all sub-sample, and positively correlated for the keep-all sub-sample. Moving to whether depth serves as a disguise versus a source of noise, we find that for the sell-all sub-sample, abnormal returns following exercises are negatively correlated with the depth of options. This effect is more significant both statistically and economically as we move from exercises close to option expiration to exercises far from expiration. In the extreme case where the exercised options have more than seven years of remaining life and the depth is in the top quintile, the abnormal return is -2.3% for the period from the day of exercise to the end of the following month, and -16.1% for the 12 month period starting from the second post-exercise month. Negative returns with this kind of magnitude for sell transactions are in sharp contrast with the null results often found in the insider trading literature.

Consistent with MacDonald's (2003) theoretical analysis, we found that average dividend yields are significantly higher for the keep-all sub-sample than for the sell all sub-sample. In addition, the majority of shares (72.5%) acquired in the exercise and hold sub-sample are kept for more than one year, qualifying the transaction at a lower capital gains tax treatment. These results illustrate the importance of conditioning the analysis of post exercise abnormal returns on non-informational factors that might be important when executives make trading decisions.

Finally, recall that when executives receive positive private information, they could either exercise options and hold the shares or simply hold the options. To examine whether the non-exercise of options entails positive private information, we identify a

sub-sample of firms that have executive stock options outstanding, but no exercises in the prior calendar year, and track abnormal returns in the following calendar year. We find that the abnormal returns are significantly positive, with magnitudes similar to those obtained in the sub-sample where options are exercised but no shares are sold within thirty days. This result is a novel extension to the literature in that we observe abnormal returns after conditioning on the *absence* actions (i.e., non-exercise) by corporate insiders.

The rest of the paper is organized as follows: the next section describes our sample sources and selection criteria; section 3 describes our empirical analysis and discusses the results; section 4 concludes.

2. Sample

We obtain executive stock option exercise data from Thomson Financial database. The database contains all stock option exercise transactions made by corporate insiders and reported to the SEC from January 1985 through December 2003. We only use data from 1996 to 2003 because we need the information on the option expiration dates, which are necessary for our tests and only available after 1996. We identify 90,864 stock option exercises related to 5949 firms and 15,311 individuals made by senior officers of the firm (CEO, CFO, COO, President, and Chairman of the Board).[9] We focus our tests on the firms' senior officers because *a priori* we presume that they have the greatest ability to obtain private inside information. We deleted 3,277 officer exercise transactions that could not be located on the CRSP database and 10,542 transactions that were lacking an

[9] There are actually 105,000 exercise observations. However, options that have the same exercise price and expiration date but are classified as independent exercises because they have different vesting date, are considered as one observation.

expiration date thus prohibiting us from calculating the option's time value at the date of exercise. Our final sample consists of 77,045 transactions related to 5,225 firms and 13,670 individuals.

3. Results

3.1 Descriptive Statistics

Panels A of Table 1 presents the yearly distribution of executive stock option grants from 1996 to 2003. In the earlier half of the sample period, from 1996 to 1999, companies steadily increased stock option grants to executives in both the number of grants and the number of shares given per grant. The total number of shares peaked in 1999, when there were 9,496 grants and 145,971 shares per grant, yielding a total of 1.4 billion shares. In the second half of our sample period, from 2000 to 2003, companies gradually decreased the size of stock option grants, and in 2003, the total number of options granted was 877 million shares, roughly sixty percent of the 1999 level. The pattern of stock option grants closely mimics the pattern of market returns. It is consistent with the notion that in market booms, when investors are reaping substantial gains on their investments, they are more willing to reward the management with options as a means of sharing increased wealth; however, when the market turns down and investors start to lose money, they also reduce option compensation to managers.[10]

(Insert Table 1 about here)

Panel B presents the yearly distribution of option exercises. Although the number of option exercises is close to the number option grants, the number of shares in each exercise event is substantially fewer than the number of shares provided in each grant.

[10] As well, executives may prefer non-option compensation in such periods.

Assuming the eight years we examine are representative, large numbers of options appear to end up worthless and never exercised. The number of stock option exercises peaked in 2000 and 2003, coinciding with stock market peaks. Richardson and Ofek (2002) hypothesize that the stock market "bubble" burst in 2000 may have been prompted by the increased selling due the expiration of lock-up agreements in newly created public internet companies. More prevalent stock option exercises may be another factor that contributed to selling pressure.

Employee stock options are American-style call options, and closed form option pricing formulas are not available for these options when the underlying stock pays dividends. Following prior research (e.g., Huddart and Lang, 2003), we use the approximation technique of Barone-Adesi and Whaley (1987) to calculate option values.[11] The valuation results are reported in Panel C. To calculate the option values, we measured dividend yield as the sum of dividends paid in the previous twelve months divided by the stock price on the grant date, and stock volatility as the standard deviation of stock returns in the same twelve-month period. Average per share option values are reported in the last column. Over the eight years we examine, the average value ranges from $9.16 per share in 2003 to $17.47 per share in 2000. Multiplying the total number of shares granted by the average option value per share, we arrive at the total annual cost of executive stock option compensation. For example, in the peak year of 1999, this cost totaled $21 billion.

Executives tend to exercise their options early, with most options exercised after a holding period of between four and six years, far less than their full term of ten years. A question that arises in this setting is whether executives exercise "too early" in the sense

[11] We thank Steve Huddart for providing the algorithm used in their study.

they might be forgoing substantial time value in favor of the portion that is in the money. To investigate this possibility, we separately calculate the full option value and the depth at the time of exercise and report those amounts in columns 5 and 6 of Panel B. The average time value remaining at the time of exercise – the difference between full option value and depth – is reported in column 7.

We find that on a per share basis, executives realize profits between $20 and $40 when they exercise options. In addition, the exercise timing is slightly early in that between $1 and $4 of time value per share is lost due to the early exercise. On average between 1996 and 2000 executives surrendered 10.5% of option value by early exercise. In contrast, in 2001, a year of poor market-wide performance, executives surrendered 12.6% of option value. Interestingly, in 2002 and 2003 executives surrendered only 8.6% and 7.0% of option value, indicating that as the average option value and profit associated with each option drops, executives are less willing to forgo the time value of options.

We also observe an interesting pattern for the average year prior to expiration of options exercised. Specifically, in 2000 executives' exercised options with a remaining life of 6.06 years to expiration, significantly higher than any other year. This pattern suggests that executives had some knowledge about the upcoming market decline. Given that executives face a liquidity discount because they cannot sell company granted options (Kahl, Liu and Longstaff, 2003), and this discount is not captured in the Barone-Adesi and Whaley (1987) algorithm, our results indicate that on average executives' exercise timing may be close to optimal.

From descriptive statistics of the sample firms in Panel C, we note that firms in our sample are relatively large, with a median (mean) market capitalization of $1.1

($7.36) billion. Less than 75% of the sample firms pay any dividends, and the average dividend yield is 1%.

3.2 Abnormal Returns Following Option Exercises

In this section, we pursue our main interest by investigating the extent to which executive option exercises are motivated by private information. To begin, we replicate the analysis conducted by Carpenter and Remmers (2001) and examine whether executive option exercises are associated with significant subsequent returns. Carpenter and Remmers hypothesize that executive option exercises should be associated with sales of shares acquired implying negative subsequent returns if the exercises are motivated by private information. However, they found that this is not the case in their full-scale data analysis. Their data span twelve years from 1984 to 1995. Our data complement theirs by spanning from 1996 to 2003.

In order to remove repetition of observations, when a firm has multiple option exercises in a month, we treat each firm-month as one observation. We measure abnormal returns in two periods. The first period starts on the day after stock options are exercised and continues to the end of the following month. When a firm has multiple option exercises in a month, we use the first exercise for abnormal return measurement. The second period consists of 12 consecutive monthly returns starting in the second month following the stock option exercises. Since corporate insiders were required to report stock option exercises by the tenth day of the following month during the time span of our data, our first period is designed to capture returns available only to corporate insiders.[12] The second period is designed to capture the market's lagged reactions to

[12] Before the 2002 Sarbanes-Oxley act, corporate insiders were required to report their transactions by the tenth day of the following month. The act reduced the reporting delay to two business days.

executive option exercises since by the beginning the second period the stock option exercises are public information. The primary reason for this separation is that prior research on insider trading found substantial lagged market reactions, implying that the stock market can only gradually assimilate information contained in insider transactions (e.g., Lakonishok and Lee, 2001).

When calculating abnormal returns, we adjust for risk in two ways. First, we measure CRSP size adjusted abnormal returns as in prior literature and report the results in Panel A of Table 2. Second, as will be discussed at the end of this section, in order to verify whether our results are robust under alternative risk adjustments, we also conduct risk adjustment using the four-factor Fama-French model and present the results in Panel B.

(Insert Table 2 about here)

The second and the third columns of Panel A contain the results for the replication of Carpenter and Remmers (2001). The second column presents the monthly abnormal returns and the third column presents cumulative abnormal returns starting in the second month after option exercises. Our evidence is consistent with that of Carpenter and Remmers (2001).[13] Not only do we fail to find any significant negative abnormal returns following stock option exercises, all returns in the first period and the second period are positive. In the first period, the abnormal return is 1.4% with a t-statistic of 12.93. In the second period, three out of the twelve monthly abnormal returns are significantly positive, with t-statistics above two; the rest of the monthly returns are positive, but not statistically significant at conventional levels. Therefore, if anything, executive stock option exercises seem to be associated with good news, rather than bad news.

An underlying assumption of prior research is that shares acquired by exercising options are sold immediately, therefore predicting a negative abnormal return subsequent to exercise if exercise is based on private information. However, as mentioned earlier, it is evident that not all option exercise can be construed as sales of the shares acquired. In particular, dividend and tax incentives might prompt an exercise and hold strategy as a means, similar to a stock purchase, of exploiting private good news, leading to a prediction of positive abnormal returns subsequent to exercise. With this prospect in mind, we partition our sample based on the timing of subsequent disposition of the shares acquired as a proxy for whether an option exercise more closely resembles a stock sale or a stock purchase. Specifically, we classify exercises on a basis of whether all shares, some shares, or no shares acquired are sold within thirty days of exercise. Thirty days is appropriate for several reasons: It is sufficient time to sell given a consumption or diversification motive; by selling within a month an executive need only file one report of trades with the SEC; a month is the unit of time that we use to define our observations; and we measure returns on a monthly basis.[14]

We find that out of 30,054 firm-month exercise observations in our sample, only in 13,812 instances are the shares acquired sold within thirty days of option; in 14,690 cases no shares are sold within thirty days; and in 4,034 cases only some shares are sold. This finding starkly contradicts the maintained assumption in prior literature that all shares are immediately sold after exercise. Accordingly, we believe that more accurate predictions on the information content of the option exercises can be obtained by conditioning on the executives' decision to sell after exercises.

[14] Reducing the time frame from thirty days to five business days yields qualitatively similar results.

For the sub-sample where all shares are sold within thirty days, we expect that executives likely possess negative private information. For the sub-sample where no shares are sold within thirty days, we expect that executives may possess positive private information and find it optimal to exploit that information by exercising the stock options and achieving a more dividend and tax advantaged position.[15] Reinforcing the prospect that dividends provided incentive for exercise and hold the shares acquired, we find that average dividends are significantly higher for the exercise and keep-all sub-sample than for the exercise and sell-all sub-sample. Specifically, the average dividend yields are 1.42% and .60%, respectively, with a t-statistic of 5.66 on the difference. In addition, for this sub-sample, the majority (72.5%) of the shares acquired through option exercises are not sold within one year, suggesting that the lower capital gains tax treatment applies. For the sub-sample where some shares are sold and some are held, we expect the results will fall in between the two extreme sub-samples.

The third and the fourth columns in Panel A contain the results for the sub-sample where all shares are sold within thirty days. Although compared with the general results obtained form the whole sample abnormal returns are more negative for this sub-sample, in terms of absolute magnitude, we find only weak evidence that this sell-all sample is associated with negative private information. Of all the monthly abnormal returns that we examine, only the first (post reporting) month of the second period features significant negative abnormal returns. The abnormal returns in the first period and the remaining 11 months of the second return period are all statistically insignificant from zero.

[15] During our sample period gains to employee stock options were taxed as ordinary income and stock capital appreciation where stock is held for more than one year was taxed at a lower capital gains rate.

The results for the keep-all sub-sample (the last two columns) are consistent with our hypothesis that executives are exploiting good news. In the first return period, size adjusted abnormal return is 2.1% with a t-statistic of 12.54. In the second return period, five out of the twelve monthly abnormal returns are significantly positive. The cumulative abnormal return in the second period is 3.5%. Combining the two periods, the exercise-hold sub-sample is associated with a total of 5.6% cumulative abnormal returns over a 13-month period. This highly significant result reaffirms our earlier conjecture on the importance of further conditioning executive stock option exercises on the decision to sell. In fact, since the monthly returns for both the sell-all sub-sample and the sell-some sub-sample are in general insignificantly different from zero, we infer that the positive abnormal returns observed for the whole sample are basically driven by the keep-all sub-sample.

In order to verify whether the results we obtain in Panel A are robust under alternative risk adjustments. We sort stocks into calendar portfolios and run time series regressions based on the Fama-French four factor model:

$$R_{j,t} - R_{f,t} = \alpha_j + \beta_j \left(R_{m,t} - R_{f,t} \right) + \delta_j SMB_t + \sigma_j HML_t + \phi_j UMD_t + \varepsilon_{j,t}$$

where $R_{j,t}$ is firm *j*'s stock return; $R_{f,t}$ is the risk free rate, measured as one-month treasury bill rate; $R_{m,t}$ is the market portfolio return, measured using CRSP value weighted index; SMB_t, HML_t and UMD_t are the size, market-to-book, and momentum factor returns, respectively.[16] The momentum factor is included because past returns are positively correlated with both current period returns and the option exercise decisions. The intercept (Jensen's alpha) is the abnormal return unexplained by the risk factors.

[16] The factor returns are obtained from Ken French's website.

Portfolios are formed in calendar time according whether a firm is classified as exercise, exercise-sell, exercise-sell-some or exercise-hold. Firm and factor returns are then measured for the following one to thirteen months. Separate time series regressions are run for each portfolio-month configuration and the intercepts are reported in Panel B.

The results in Panel B are qualitatively similar to those in Panel A. In particular, we found null results for the whole sample (consistent with Carpenter and Remmers 2001) and the exercise-sell-some sub-sample, strong results for the exercise-hold sub-sample and weak results for the exercise-sell sub-sample. In general the regression alphas (Panel B) are very similar to the size adjusted returns in magnitude (Panel A), though the t-statistics for former are usually somewhat smaller. The strong consistency between the two panels suggests that risk adjustment is not a deciding issue in our study; therefore we adopt the simpler and more data preserving method of using size adjusted returns in analyses that follow.

The reason that we find weak evidence of informed trading for the sell-all sub-sample could be that the power of our test is reduced by executives' consumption and diversification motivations to sell shares acquired. A finding of insignificant abnormal returns for sell transactions is a robust phenomenon in the insider trading literature (Seyhun 1998, Lakonishok and Lee 2001). One unique contribution of this study is that we can design more powerful tests to distinguish the information incentive from simply consumption and diversification incentives by conditioning on more characteristics of the stock options that are being exercised, which is infeasible with data only on open market transactions. To pursue this advantage, we now turn to the next section.

3.3 Opportunity Costs and Legal Disguise

As discussed earlier, when corporate executives make a decision on whether to exercise the options, and after the exercise, whether to sell the shares, they must consider many factors. We identify two factors for which options data serve as proxies: the opportunity cost associated with early option exercises and the potential liability exposure that could arise with respect to violation of insider trading regulations. The opportunity costs arise because corporate executives cannot sell their company granted stock options in open markets; hence, they lose the time value remaining in the options when they exercise early to exploit private information. To the extent that they tradeoff potential gains to informed trades against opportunity costs, then in equilibrium the intensity of executive's transactions private information should be positively correlated with the proportion of option value lost. This hypothesis should apply to both positive and negative private information. We explore this possibility in Table 3.

(Insert Table 3 about here)

We measure opportunity cost of early option exercises as the ratio between time value (the difference between option value and intrinsic value) forgone and total option value on the exercise day. Because our analysis is conditional on option characteristics, and in each month multiple options could be exercised for some firms, we can only conduct analysis at the transactions level. This is in contrast with Table 2, where the analysis is at the firm level and multiple transactions in a month are regarded as one observation. In Panel A, we sort option exercises into five equally weighted quintile portfolios based on the time value to option value ratio and measure size adjusted abnormal returns following option exercises. Abnormal returns are further divided into two periods in the same way as in Table 2. We only examine the sell-all sub-sample and

the keep-all sub-sample because we do not have unambiguous predictions on the direction of abnormal returns for the sell-some sub-sample.

The results in Table 3 strongly support our hypothesis that the magnitude of abnormal returns following option exercises are positively correlated with the opportunity cost of options. For the sell-all sub-sample, the average time value to option value ratio varies from 0.2% to 37.5% from portfolio 1 to portfolio 5. The abnormal returns in the first period are significantly negative for all portfolios except portfolio 2. As we move from portfolio 1 to portfolio 5, the general trend is for abnormal returns to become increasingly negative. Moreover, for the 12-month abnormal returns starting from the second month following the exercises, all the portfolios except portfolio 1 are negative. To further verify this relationship, in Panel B we report the results of regressing abnormal returns on the ranks of time value.[17] The coefficients are significantly negative for both the first period returns (-0.002, t-statistic -2.05) and the second period returns (-0.010, t statistic -3.76), implying that gains (or avoidance of losses) from executives' sell transactions are positively correlated with their opportunity costs.

Similar results are found for the keep-all sub-sample. In Panel A, as we move from portfolio 1 to portfolio 5, abnormal returns increase monotonically: for the first period, they increase from 1.5% in portfolio 1 to 2.7% in portfolio 5; for the second period, they increase from 1.1% to 7.0%. Regression results reported in Panel B are consistent, with estimated coefficients of 0.003 (t-statistic 2.69) for the first period and 0.014 (t-statistic 3.92) for the second period, implying that gains to executives' buy transactions are positively correlated with the opportunity costs associated with exercising the options.

[17] The independent variable is ranked from 0 to 4 in pooled population.

Turning to liability exposure, we note that when executives exercise the options and sell the shares, if the trade reflects good timing in the sense that the stock price declines after the transaction, there is a possibility that they will be accused of illegal insider trading. However, in defending their actions, executives could point to the fact that by holding company securities as well as fully investing their human capital in the firm, they are under-diversified and by receiving compensation in the form of options, they must exercise in order to consume. Thus, as the option goes deeper in the money these motives, especially the diversification incentive, can be used as a disguise for trades based in part on negative private information. Therefore, for the sell-all sub-sample, we hypothesize that the depth in the money of the stock option is negatively correlated with post-exercise abnormal returns. We further hypothesize that this effect would be more pronounced when the options are exercised early because late exercises are explainable by the pending expiration of the option contract. For the keep-all sub-sample, however, the diversification and consumption incentives do not apply. This is unlike the opportunity cost consideration that applies in situations with either positive or negative private information. The results are presented in Table 4.

(Insert Table 4 about here)

Similar to Table 3, in Panel A of Table 4 we first sort option exercises into three age groups: "early" if options are expiring in more than 6 years, "late" if less than 4 years, and medium if in between. Within each age group, we further sort exercises into equally weighted quintile portfolios based on the depth in the money of options scaled by the stock price and measure post-exercise abnormal returns. In Panel B, we report the

results of regressing abnormal returns on the depth ranks of options within each age portfolio.

The results are consistent with our predictions. For the sell-all sub-sample, from the regression results in Panel B, we see that the coefficients on the depth of options are significantly negative for both the first period and the second period, with estimates being -0.003 (t-statistic -2.19) for the first period and -0.037 (t-statistic -6.78) for the second period. As we move to the medium age group, the coefficient for the first period is no longer significant, while the magnitude in the second period is reduced to -0.017, but still statistically significant. In the late group, the coefficient for the first period continues to be insignificant, and it reverses sign for the second period. In addition to the general results that are consistent with our predictions, the magnitude of the sell-all abnormal returns is also worth mentioning. Moving back to Panel A, we note that for portfolio 5 within the early group, the abnormal returns are -2.3% (t-statistic 3.63) for the first period and -16.1% (t-statistic 7.45) for the second period, which is in sharp contrast with findings in the insider trading literature that provides no evidence of negative abnormal returns for sell transactions.

Moving to the keep-all sub-sample, we find that the results are mixed, which is reasonable since the diversification-disguise explanation more strongly applies to situations where executives exploit negative private information. Although regression coefficients are significantly positive for all three age groups in the first period, they are negative for all three age groups in the second period. To gauge the cumulative effect, we sum the returns in the two periods and run regressions on cumulative returns. We find that the coefficients on the depth rank are no longer significant.

3.4 Abnormal Returns to Non-exercise Decisions

As discussed earlier, when executives receive positive private news, they could exploit their private information by either exercising the options and holding the shares or simply holding the options. While the former strategy is more dividend and tax advantaged, the latter strategy requires less capital and offers higher leverage. Which method is a preferred strategy is an empirical issue. Recall in Table 2 we found that the keep-all sub-sample is associated with significant positive abnormal returns post option exercises. In this section, we investigate whether the decision not to exercise any stock options also entails positive private information.

To construct the non-exercise sample, for each firm-year, we first identify firms in our sample universe that have executive options outstanding;[18] then we identify those firms that had no option exercises in the current calendar year. We measure monthly size adjusted abnormal returns in the year following the non-exercise year and report the results in Table 5.

(Insert Table 5 about here)

In order to compare the two trading strategies executives could adopt to exploit positive private information, we repeat the analysis for the exercise-and-keep-all sub-sample and report the results in the second and third columns of Table 5. Results for the non-exercise sub-sample are reported in the fourth and fifth columns. We omit the first period because there is no comparable first period for the non-exercise sub-sample.

Our evidence is consistent with the notion that some insiders hold on to their

[18] To make sure that a company has options, we use option grant data and option holding data reported in SEC form 3, 4 and 5. For option grants, we first collect all option grant data and select the time for the earliest option grant for each firm. We assume that the company has executive options outstanding after this date.

options when they have positive private information. In six out of the twelve months, abnormal returns are significantly positive; and most of the positive abnormal returns are concentrated in the first half the year. There are three months where the abnormal returns are significantly negative, a weaker result than for the exercise-and-keep-all sub-sample. However, the cumulative abnormal return for the full year is 3.4%, remarkably similar to the 3.5% for the exercise-and-keep-all sub-sample. Therefore, based on publicly available information, investors would make the same amount of abnormal returns by buying firms whose executives exercised options but did not sell any shares within thirty days, or those firms whose executives did not sell any shares in the previous calendar year.[19]

Our results raise a natural question as to what determines the executives' choice between holding on to their options or exercising the options but holding the acquired stocks, when they have positive private information. Preliminary analysis suggests that dividends play a significant role: the average dividend yield for the non-exercise sub-sample is 20% less than that for the exercise-and-keep-all sub-sample with a t-statistics of 2.98. This is reasonable, because stock options are not dividend protected. Another consideration is whether the private information is of short-term or long-term nature. Because executives can only realize the capital gains tax benefits if they hold the stocks for a sufficiently long period of time, they are more likely to exercise and hold when their private information is relatively long-term; recall that for the exercise-and-keep-all sub-sample 72.5% shares were held for over a year. Finally, opportunity cost is an important issue to consider since time value of options is foregone once the options are exercised. A

[19] We note, however, from the executive's point of view, the total return available to them is the sum of first period return and the second period return, which is 5.6% for the exercise-and-keep-all sub-sample.

complete analysis of these issues is clearly beyond the scope of this paper, and we leave it to future research.

4. Conclusion

In this paper, we find evidence that executive option exercises are partly motivated by private information. Departing from the maintained assumption in prior literature that executives sell all shares acquired through option exercises immediately, we find that about fifty percent of option exercises are followed by no share sales within thirty days. Partitioning the option exercises on whether the shares are sold within thirty days, "keep-all" if no shares are sold and "sell-all" if all shares are sold, we found strong evidence that the keep-all sub-sample is associated with positive private information, and weaker evidence that the sell-all sub-sample is associated with negative private information.

To enhance the power of tests and identify situations where it is more likely to find private information motivated options exercises and subsequent trades, we consider several factors that may be important when executive make portfolio decisions. We identify two factors for which we can create proxies from options data. First, given that corporate executives must incur opportunity costs by giving up time value of options when they exercise early to exploit private information, we hypothesize that in equilibrium gains to informed trading should be weighed against opportunity costs, measured as the ratio between time value lost and total option value. Second, to the extent that executives can justify their exercise and sell decisions as motivated by consumption or diversification when their options are deeply in the money, the depth of the options (deflated by the stock price) can be said to proxy for disguise when

executives exploit negative private information. Therefore, we hypothesize that the higher the depth of the options, the more negative abnormal returns will be following exercise and sell transactions. We find strong evidence in support of these two hypotheses. In particular, for the group of exercises that have more than seven years of remaining life and within the top quintile rank of depth, the abnormal returns in the thirteen months following exercises are as low as –18%. This is in sharp contrast with the general null result for sell transactions in the insider trading literature.

Finally, we note that when executives receive positive private news, they could exploit their private information by either exercising the options and holding the shares or simply holding the options. While the former strategy offers dividend and tax advantages, the latter strategy requires less capital and offers higher leverage. We find that the former strategy is associated with positive abnormal returns subsequent to option exercises. Empirical analysis of the latter is a novel extension to the literature since the analysis is conditional on the absence of actions by corporate insiders. We find that in a sample of firms with executive stock options outstanding but no exercise of options in a calendar year, significant positive abnormal returns follow in the subsequent year. This evidence is consistent with the notion that executives exploit positive private information by holding on to their options and the stock market only slowly recognizes this fact in the subsequent year.

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Table 1
Sample Descriptive Statistics

In Panel A, a grant is counted once per strike price/individual/firm/year. *Term* is the time to expiration (in years) for an option grant. *Option Value* (*Voption*) is the value of a dividend-paying American call option on the exercise date calculated following Barone-Adesi and Whaley (1987). In Panel A both the number of shares granted and the option values are calculated on the grant date. In Panel B, *Profit* is the difference between spot price and strike price on the exercise date. *Time Value* is the difference between *Option Value* (calculated at the exercise date) and *Profit*. All per share numbers are calculated on the exercise date. In Panel C, each firm is counted once in a year in calculating market value, dividend yield, and volatility. *Mkt. Cap.* is the market capitalization on the exercise date, in billions of dollars; *Dividend* is the dividend yield, calculated as cash dividends in the previous 12 months over the stock price on exercise dates; *Volatility* is the yearly stock return standard deviation; *Depth* is the extent to which the options are in the money on exercise dates, *i.e., 1-strike price/stock price*.

Panel A: Distribution of option grants.

Year	*#Grants*	*Avg. Shares Granted*	*Avg. Term*	*Avg. Option Value*
1996	6,300	89,032	8.56	11.84
1997	8,792	71,667	8.70	13.24
1998	11,357	103,252	8.32	13.39
1999	9,496	145,971	9.62	15.65
2000	9,335	111,659	9.58	17.47
2001	9,186	132,150	9.15	13.25
2002	8,717	113,147	9.98	9.52
2003	8,490	103,338	9.16	9.16

Panel B: Distribution of option exercises.

Year	*# Exercises*	*Avg. Shares Exercised*	*Avg. Maturity*	*Avg. Profit Made*	*Avg. Option Value*	*Avg. Time Value*
1996	4,466	40,911	4.42	21.91	24.51	2.58
1997	7,427	26,576	4.27	23.61	26.36	2.71
1998	7,637	30,606	4.02	25.01	27.94	2.92
1999	7,525	34,238	2.91	31.53	35.21	3.68
2000	8,955	42,135	6.06	38.03	42.58	4.55
2001	8,032	40,533	4.85	22.06	25.25	3.18
2002	7,562	33,571	4.42	18.42	20.17	1.73
2003	10,196	34,451	4.25	18.37	19.76	1.38

Panel C: Sample characteristics.

	Mean	*Std. Dev.*	*1st percentile*	*25th percentile*	*Median*	*75th percentile*	*99th percentile*
Mkt. Cap.	7.35	23.97	0.02	0.37	1.09	3.98	111.02
Dividend	0.01	0.02	0.00	0.00	0.00	0.01	0.08
Volatility	0.53	0.31	0.15	0.31	0.45	0.67	1.47
Depth	0.63	0.24	0.04	0.46	0.66	0.82	1.00
Voption	21.62	33.40	1.31	9.19	16.07	26.28	91.23
Profit	19.49	32.25	0.38	7.48	13.97	24.03	85.36

Table 2
Abnormal Returns Following Option Exercises

Panel A: *Monthly returns* are size-adjusted (abnormal) monthly returns and *Acc. returns* are accumulated size-adjusted (abnormal) monthly returns. The sample is partitioned into 3 portfolios based on the number of shares sold immediately by executives after the exercises. Sell-all (sell-some, keep-all) type exercise means that executives sold all (some of, none of) the shares from exercises within 30 days after the exercises. Abnormal returns for the first period are from the date of exercises to the end of the next month. The second period includes 12 monthly abnormal returns starting from the second month following exercises.

	Returns after all firm-months (N=30,054)		*Returns after sell-all type exercises (N=13,812)*		*Returns after sell-some type exercises (N=4,304)*		*Returns after keep-all type exercises (N=14,699)*	
Month	*Monthly returns*	*Acc. returns*	*Monthly returns*	*Acc. Returns*	*Monthly returns*	*Acc. returns*	*Monthly returns*	*Acc. returns*
1st period	0.014		0.000		0.004		0.021	
	(12.93)		(0.15)		(1.51)		(12.54)	
2nd period 1	0.001	0.001	-0.003	-0.003	0.003	0.003	0.004	0.004
	(0.80)	(0.80)	(-2.49)	(-2.49)	(1.36)	(1.36)	(3.29)	(3.29)
2	0.001	0.001	-0.002	-0.006	0.000	0.002	0.004	0.007
	(1.08)	(0.57)	(-1.37)	(-3.24)	(-0.09)	(0.58)	(3.40)	(4.04)
3	0.001	0.001	0.000	-0.007	-0.001	0.000	0.002	0.009
	(0.65)	(0.49)	(-0.31)	(-3.01)	(-0.30)	(0.05)	(1.59)	(3.78)
4	0.001	0.001	0.000	-0.009	0.002	0.001	0.002	0.010
	(1.30)	(0.48)	(0.04)	(-3.05)	(0.69)	(0.20)	(1.80)	(3.85)
5	0.002	0.003	0.003	-0.007	0.000	0.002	0.002	0.012
	(2.16)	(1.28)	(1.92)	(-1.94)	(0.18)	(0.27)	(1.15)	(3.79)
6	0.001	0.005	-0.001	-0.007	0.001	0.003	0.002	0.015
	(1.06)	(1.88)	(-0.90)	(-1.65)	(0.63)	(0.44)	(1.46)	(4.08)
7	0.002	0.006	0.003	-0.007	-0.002	0.002	0.001	0.016
	(2.03)	(1.92)	(1.79)	(-1.70)	(-0.84)	(0.34)	(1.01)	(3.58)
8	0.003	0.009	0.001	-0.006	-0.001	-0.002	0.004	0.022
	(3.10)	(2.93)	(0.81)	(-1.38)	(-0.57)	(-0.27)	(2.80)	(4.58)
9	0.002	0.013	0.000	-0.004	0.000	-0.002	0.003	0.025
	(1.62)	(3.47)	(-0.05)	(-0.69)	(-0.09)	(-0.25)	(1.86)	(4.76)
10	0.002	0.013	0.003	-0.004	0.002	-0.002	0.003	0.027
	(2.33)	(3.48)	(1.95)	(-0.70)	(0.84)	(-0.27)	(2.11)	(4.95)
11	0.001	0.016	0.000	-0.002	0.003	0.005	0.003	0.032
	(1.16)	(3.91)	(-0.30)	(-0.29)	(1.15)	(0.54)	(1.96)	(5.21)
12	0.001	0.018	-0.002	0.000	0.001	0.004	0.002	0.035
	(0.68)	(4.16)	(-1.22)	(0.02)	(0.24)	(0.47)	(1.37)	(5.26)

Table 2 continued
Abnormal Returns Following Option Exercises

Panel B: *Monthly returns* are the estimates of alphas obtained by regressing calendar-time equally weighted portfolio returns on the four factor returns, i.e., SMB, HML, UMD and Market. The sample is partitioned into 3 portfolios based on the number of shares sold immediately by insiders after the exercises. Sell-all (sell-some, keep-all) type exercise means that insiders sold all (some of, none of) the shares from exercises within 30 days after the exercises. Returns for the first period are from the date of exercises to the end of the next month. For this period, the factor returns are compounded two-period returns. The second period includes 12 monthly returns starting from the second month following exercises.

	Returns after all firm-months (N=34,204)		*Returns after sell-all type exercises (N=14,698)*		*Returns after sell-some type exercises (N=4,564)*		*Returns after keep-all type exercises (N=14,942)*	
Month	*Monthly returns*	*Acc. returns*	*Monthly returns*	*Acc. Returns*	*Monthly returns*	*Acc. returns*	*Monthly returns*	*Acc. returns*
1st period	0.010		0.001		-0.007		0.021	
	(3.10)		(0.08)		(-1.55)		(5.19)	
2nd period 1	-0.001	-0.001	-0.008	-0.008	0.003	0.003	0.004	0.004
	(-0.54)		(-1.63)		(0.63)		(1.32)	
2	0.002	0.001	-0.009	-0.017	-0.001	0.002	0.008	0.012
	(1.06)		(-1.60)		(-0.22)		(3.19)	
3	0.003	0.004	0.012	-0.005	0.006	0.008	0.005	0.016
	(1.59)		(1.78)		(1.05)		(1.78)	
4	0.001	0.005	0.001	-0.004	0.005	0.013	0.002	0.018
	(0.47)		(0.23)		(1.52)		(1.10)	
5	0.002	0.007	0.003	-0.001	0.005	0.018	0.003	0.022
	(1.17)		(0.42)		(1.29)		(1.36)	
6	0.002	0.009	-0.006	-0.007	0.005	0.023	0.004	0.025
	(0.79)		(-1.18)		(1.15)		(1.54)	
7	0.004	0.013	0.000	-0.007	-0.002	0.021	0.007	0.032
	(1.62)		(-0.11)		(-0.64)		(2.20)	
8	0.006	0.019	0.000	-0.008	0.002	0.023	0.007	0.040
	(2.04)		(-0.04)		(0.48)		(2.39)	
9	0.006	0.025	-0.001	-0.009	-0.004	0.019	0.008	0.049
	(2.96)		(-0.17)		(-0.80)		(3.95)	
10	0.006	0.030	0.013	0.004	0.006	0.025	0.006	0.055
	(2.59)		(1.55)		(1.08)		(2.92)	
11	0.005	0.035	-0.001	0.003	0.003	0.028	0.007	0.062
	(1.66)		(-0.20)		(0.78)		(2.35)	
12	0.001	0.036	0.014	0.016	0.001	0.028	0.002	0.064
	(0.52)		(2.12)		(0.14)		(0.61)	

Table 3
Partition on Time Value

Time value is calculated as *1-(stock price-strike price)/option value*, where option value is calculated following the approximation in Barone-Adesi and Whaley (1987). Sell-all and keep-all option exercises are partitioned into quintiles based on option time value and future size-adjusted (abnormal) returns are calculated for each quintile. Abnormal returns for the first period are from the date of exercises to the end of the next month. The second period includes 12 monthly abnormal returns starting from the second month following exercises.

Panel A: Portfolio analysis

Type	*T.V. rank*	*N*	*Avg. T.V. %*	*1st period returns*	*T*	*2nd period returns*	*T*
Sell-All	1	7,174	0.002	-0.005	(-2.44)	0.040	(4.49)
	2	7,175	0.019	-0.002	(-0.79)	-0.025	(-3.09)
	3	7,175	0.062	-0.012	(-5.10)	-0.078	(-10.42)
	4	7,175	0.146	-0.011	(-4.63)	-0.014	(-1.67)
	5	7,174	0.375	-0.008	(-3.25)	-0.015	(-1.75)
Keep-All	1	4,398	0.001	0.015	(6.26)	0.011	(1.19)
	2	4,398	0.017	0.020	(6.92)	0.010	(0.81)
	3	4,399	0.077	0.021	(6.46)	0.017	(1.57)
	4	4,398	0.208	0.022	(6.88)	0.033	(2.89)
	5	4,398	0.557	0.027	(8.18)	0.070	(5.47)

Panel B: Regression analysis

	Dependent Variable	*Intercept*	*Time Value Rank*
Sell-All	*1st period returns*	-0.005	-0.002
		(-2.52)	(-2.05)
	2nd period returns	0.001	-0.010
		(0.22)	(-3.76)
Keep-All	*1st period returns*	0.016	0.003
		(6.75)	(2.69)
	2nd period returns	0.000	0.014
		(-0.00)	(3.92)

Table 4
Partition on Depth

An option exercise is an early (late) age exercise if the option expires in more than 6 years (less than 4 years). Depth is calculated as stock price minus strike price, deflated by stock price. Sell-all and keep-all type exercises in each age group are partitioned further into quintiles based on their depth. Size-adjusted (abnormal) returns for the first period are from the date of exercises to the end of the next month. The second period includes accumulated monthly abnormal returns for 12 months starting from the second month following exercises.

Panel A: Portfolio analysis

Type	*Option age*	*Depth rank*	*N*	*Avg. depth*	*1st period returns*	*T*	*2nd period returns*	*T*
Sell-All	*Early*	1	2,078	0.320	-0.008	(-2.39)	0.013	(1.05)
		2	2,079	0.532	-0.005	(-1.10)	-0.022	(-1.76)
		3	2,079	0.683	-0.004	(-0.72)	-0.015	(-0.81)
		4	2,079	0.810	-0.009	(-1.75)	-0.042	(-2.27)
		5	2,079	0.933	-0.023	(-3.63)	-0.161	(-7.45)
	Medium	1	3,259	0.366	-0.004	(-1.70)	0.039	(4.24)
		2	3,259	0.589	-0.008	(-3.33)	-0.033	(-2.98)
		3	3,259	0.725	-0.011	(-3.44)	-0.046	(-4.40)
		4	3,259	0.838	-0.003	(-0.95)	-0.032	(-2.84)
		5	3,259	0.950	-0.011	(-2.35)	-0.047	(-2.99)
	Late	1	1,836	0.279	-0.005	(-1.67)	-0.010	(-0.80)
		2	1,837	0.542	-0.009	(-2.92)	0.012	(0.87)
		3	1,837	0.696	0.001	(0.22)	-0.033	(-2.51)
		4	1,837	0.819	-0.002	(-0.64)	-0.014	(-0.95)
		5	1,837	0.943	-0.009	(-1.69)	0.151	(6.89)
Keep-All	*Early*	1	1,218	0.119	0.006	(1.34)	0.055	(3.30)
		2	1,219	0.311	0.003	(0.78)	0.015	(1.21)
		3	1,218	0.473	0.012	(2.27)	0.060	(2.46)
		4	1,219	0.654	0.023	(3.52)	0.020	(0.88)
		5	1,218	0.886	0.034	(3.37)	-0.078	(-2.31)
	Medium	1	1,787	0.212	0.020	(5.25)	0.031	(2.85)
		2	1,786	0.431	0.017	(4.11)	0.052	(2.89)
		3	1,786	0.586	0.016	(4.24)	0.034	(2.46)
		4	1,787	0.733	0.031	(6.46)	0.004	(0.27)
		5	1,786	0.904	0.041	(6.27)	0.016	(0.75)
	Late	1	1,393	0.199	0.016	(3.14)	0.061	(2.78)
		2	1,394	0.448	0.014	(3.46)	0.036	(1.23)
		3	1,393	0.615	0.021	(4.48)	0.068	(3.81)
		4	1,394	0.752	0.017	(4.07)	0.036	(2.22)
		5	1,393	0.898	0.034	(6.27)	0.005	(0.25)

Table 4 continued
Partition on Depth

Panel B: Regression analysis					
Dependent Variable		*1st period returns*		*2nd period returns*	
		Intercept	*Depth Rank*	*Intercept*	*Depth Rank*
Sell-All	*Early*	-0.003	-0.003	0.029	-0.037
		(-0.74)	(-2.19)	(2.13)	(-6.78)
	Medium	-0.006	-0.001	0.011	-0.017
		(-2.14)	(-0.94)	(1.16)	(-4.61)
	Late	-0.004	0.000	-0.038	0.030
		(-1.51)	(-0.20)	(-3.11)	(5.95)
Keep-All	*Early*	0.000	0.008	0.067	-0.026
		(0.03)	(3.80)	(3.72)	(-3.57)
	Medium	0.014	0.006	0.043	-0.008
		(3.74)	(3.78)	(3.44)	(-1.53)
	Late	0.012	0.004	0.063	-0.011
		(3.41)	(2.67)	(3.86)	(-1.66)

Table 5
Abnormal Returns Following Non-Exercise Years

At the end of each calendar year, a firm-year is defined as a non-exercise firm-year if no options were exercised by its top executives during the previous year. Return for month *i* is the size-adjusted (abnormal) monthly or accumulated size-adjusted (abnormal) returns during or up to the ith month after recognizing non-exercise firm-years. Abnormal returns after keep-all type exercises are accumulated from the end of the month after the exercise month.

	Returns after keep-all type exercises (N=14,245)		*Returns after none-exercise years (N=58,147)*	
Month	Monthly returns	Accumulated returns	Monthly returns	Accumulated returns
1	0.004	0.004	0.009	0.009
	(3.20)	(3.20)	(7.89)	(7.89)
2	0.004	0.007	0.004	0.013
	(3.22)	(3.78)	(4.67)	(8.34)
3	0.002	0.009	0.006	0.014
	(1.49)	(3.59)	(7.88)	(9.13)
4	0.002	0.010	0.004	0.017
	(1.87)	(3.77)	(5.57)	(9.27)
5	0.002	0.012	0.005	0.021
	(1.34)	(3.83)	(6.98)	(10.23)
6	0.002	0.015	-0.003	0.021
	(1.31)	(4.04)	(-4.13)	(9.16)
7	0.001	0.016	0.001	0.023
	(0.84)	(3.50)	(1.78)	(9.17)
8	0.004	0.022	0.000	0.025
	(2.78)	(4.52)	(-0.31)	(8.97)
9	0.003	0.026	-0.003	0.026
	(1.88)	(4.77)	(-4.11)	(8.55)
10	0.003	0.027	0.002	0.029
	(2.11)	(4.97)	(1.89)	(8.65)
11	0.003	0.033	0.005	0.033
	(2.22)	(5.31)	(5.06)	(8.96)
12	0.002	0.035	-0.011	0.034
	(1.12)	(5.25)	(-12.16)	(8.06)