

Taxes and the Backdating of Stock Option *Exercise* Dates

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Abstract: We investigate whether stock option *exercises* are backdated. Before SOX, we find evidence that exercise dates were backdated to days with low closing stock prices. Consistent with a tax-based motivation for backdating, suspect exercises are more likely when the personal income tax savings from such backdating are larger. We estimate that suspect exercises generate average tax savings for CEOs of only \$67 thousand. These tax savings appear modest in comparison to the potential tax penalties and other costs the executive and firm could face from such behavior.

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1.0 INTRODUCTION

Recently, the backdating of employee stock option grants has become the subject of intense scrutiny and analysis in the financial press as well as research by the academic community. The outcome of this attention has resulted in criminal investigations by the U.S. Department of Justice, executive and director departures, and accounting restatements. While the focus to date has been on manipulation of stock option grant dates, namely the backdating of option *grant* dates to days with low stock prices, little attention has been given to the manipulation of option *exercise* dates. Executives can realize economic benefits through the manipulation of option exercise dates, and following recent research related to option grant backdating (i.e. Collins et al. 2005 and 2006, Lie 2005, Narayanan and Seyhun 2005, Bebchuk et al. 2006a and 2006b, Heron and Lie 2006a and 2006b) we investigate whether option exercises show similar evidence of backdating.¹

A primary reason for manipulating the option exercise date, from the perspective of an option holding executive, is to reduce personal income tax liability. Specifically, the executive can reduce his/her income tax liability by exercising the option when stock price is low (a strategy which could include both ex ante timing and ex post backdating).² But this benefit arises only in those situations in which the executive plans to hold the underlying stock after the exercise (referred to as exercise-and-hold transactions). For exercises followed by an immediate divestiture of all or part of the acquired stock (referred to as exercise-and-sell transactions), the executive's wealth is maximized by exercising when the stock price is high.

Prior to the effective date of the Sarbanes-Oxley Act (hereafter SOX) on August 29, 2002, insiders were required to report stock option exercises to the SEC by the tenth day following the month in which the options were exercised. This reporting lag created a potential

¹ We are aware of three contemporaneous research projects related to our study: one by Jie Cai (Drexel), a second by David Cicero, (Georgia), and a third by Randall Heron (Indiana), Erik Lie (Iowa), and David Yermack (NYU).

² The total tax liability is the product of taxable income generated by the exercise and the income tax rate faced by the insider. Taxable income is equal to the market value of the acquired shares on the exercise date less the exercise price of the underlying options (i.e., the spread on exercise). The tax rate is the sum of state and federal ordinary income tax rates plus any payroll tax rate. Exercising at a low stock price reduces the executive's current taxable income and current tax liability.

ability to backdate an exercise to the most advantageous stock price during a given month. However SOX required the reporting of option exercises (as well as most other transactions, including option grants) to the SEC by the second business day following the transaction date. This SOX mandated reporting change reduces the potential window over which an executive can backdate an option exercise.

We focus our investigation of backdating on exercise-and-hold transactions. We do so because exercise-and-hold transactions are usually accomplished “in-house” in a transaction between the firm and the insider, whereas exercise-and-sell transactions are often done in coordination with a third party broker who may be unable or unwilling to participate in a transaction involving backdating.³ Throughout the paper we refer to the results for exercise-and-sell transactions as a comparison to the results for exercise-and-hold transactions.

We first investigate stock returns surrounding stock option exercises by four groups of insiders (the CEO, non-CEO executives, other officers, and non-officer directors). Prior research typically assumes that option exercises are followed by a sale of shares (e.g. Carpenter and Remmers, 2001). This assumption leads to the prediction that option exercises occur at relative stock price highs. But this prediction should depend on whether or not the insider disposes of the acquired shares immediately, and empirical specifications can be improved by partitioning the data accordingly. Our data indicate that approximately one-third of CEO exercises do not appear to involve a concurrent sale or divestiture of shares, and we designate these transactions as exercise-and-hold.

For all insider groups, exercise-and-hold transactions are preceded by significantly negative abnormal returns over the 21 days leading up to and including the exercise date and are followed by significantly positive abnormal returns in the five days following the exercise. After SOX, these stock price patterns are substantially mitigated. Following Heron and Lie (2006a), we interpret this evidence to be consistent with the existence of backdated stock option *exercises* prior to SOX. By comparison, exercise-and-sell transactions are preceded by positive abnormal returns and followed by negative abnormal returns both before and after SOX, which suggests that SOX had less effect on the timing of exercise-and-sell transactions.

³ Of the two firms in which executives have been publicly implicated in exercise backdating – Symbol Technologies and Mercury Interactive – both appear to involve exercise-and-hold type transactions between the insider and the firm. However, it is possible that exercise-and-sell transactions which do not involve a sale of shares on the open market (such a stock swap with the firm) could also be backdated. We find some evidence consistent with this conjecture, but not to the extent observed in exercise-and-hold transactions.

We then analyze the characteristics of stock option exercises most likely to be backdated, which we term “suspect” exercises. An insider minimizes the tax cost of an exercise-and-hold transaction by exercising when the current stock price is as low as possible. Accordingly, we define a suspect exercise as one that occurs on the day with the lowest closing stock price during the month. 13.84% of CEO exercise-and-hold transactions before SOX are classified as suspect, which is nearly three times the expected frequency if exercises occur at random throughout the month. After SOX, the frequency of suspect exercise-and-hold transactions falls to 7.25%. Other insider groups experienced a qualitatively similar change in the frequency of suspect exercise-and-hold transactions after SOX. By comparison, exercise-and-sell transactions occur at the *highest* stock price during the month 10.22% of the time for CEOs before SOX. This frequency drops to 9.26% after SOX. The larger reduction in the frequency of well-timed exercise-and-hold transactions reinforces the interpretation that SOX had a significant impact on backdating in exercise-and-hold transactions.

We assess the present value of tax savings realized by insiders with suspect exercise-and-hold transactions between January 1996 and August 2002 and estimate that for 769 suspect exercises, CEOs saved an average of \$67 thousand per option exercise and over \$50 million in total relative to exercising at the average stock price during the month.⁴ The \$67 thousand in average estimated tax savings is equivalent to about 5% of the taxable income on the exercise, and about 3.8% of the total value of the option position at exercise – both metrics indicate relatively modest tax benefits arising from backdating option exercises.⁵ An average tax savings of \$67 thousand realized in suspect option exercise transactions is surprisingly small in comparison to the potential costs of engaging in such behavior. For example, backdating option exercise dates to reduce one’s income tax liability could constitute a felony, and the tax penalties for such actions can exceed \$100 thousand.⁶ The economic ramifications for the firm of illegal actions on the part of a firm’s executives can obviously be quite large.

⁴ Clearly, not all exercises at the lowest price of the month are due to backdating. If we assume that 4.69% of options, which is the percentage of options expected to be exercised on any given day if exercises are random, are appropriately executed ex ante, and that the average tax savings is the same for all suspect exercises, then only about \$33.57 million of the savings can be attributed to backdating [$((13.84\% - 4.69\%)/13.84\%) \times \$50.77 \text{ million} = \33.57 million].

⁵ Other insider groups also obtain similar tax savings at the exercise date, though of a smaller average magnitude than the CEO.

⁶ See for example Internal Revenue Code Sections 7201, 7206 and 7207. If the corporation is accused of violating these provisions of the tax law, the penalties can exceed \$500 thousand.

At the same time that suspect option exercises reduce the executive's taxable income and tax liability, the option granting corporation's income tax deductions are also reduced. That is, the issuing corporation receives fewer tax benefits from the option exercise than they would have otherwise received. We estimate that foregone corporate tax benefits associated with the 769 suspect exercises by CEOs exceed \$42 million.⁷ Thus, while suspect option exercises reduce the tax liability of the executive, they result in an economic cash cost to the corporation in the form of a higher tax liability.

In multivariate analyses, we find that the likelihood of a suspect exercise prior to SOX is increasing in the potential tax savings from backdating. For example, we find that for the CEO, increasing the potential tax savings from the first to the third quartile increases the probability of a suspect exercise by 5.47%. However, we find no evidence that the tax status of the firm influences the likelihood of a suspect exercise before SOX. We also find that suspect exercises for all insider groups are more likely in smaller firms. To the extent firm size proxies for the strength of internal controls (Ashbaugh-Skaife et al. 2006 and Doyle et al. 2006), this is consistent with the interpretation that an insider's ability to backdate an exercise is greater in firms with weaker internal control environments. Specifically, a movement from the third to the first quartile of firm size increases the likelihood of a suspect exercise-and-hold transaction by 5.44%. We also find that the insider's potential tax savings and firm size generally have insignificant or opposite effects on the likelihood of a suspect option exercise after SOX.

Finally, we analyze the results for the subset of firms currently under scrutiny for option *grant* backdating as tracked by the Wall Street Journal. We find stronger evidence of exercise backdating for this subsample. For example, over 23% of exercise-and-hold transactions by CEOs of firms under scrutiny occur on the day with the lowest stock price of the month, compared to 13.84% for the entire sample of CEOs. 23% of exercises represents more than five times as many exercises on that date than would be expected if exercises occur randomly during the month. Overall, the evidence is consistent with the conclusion that executives' personal income tax incentives affect the decision to manipulate option exercise dates before SOX, when regulations required less timely disclosure of option exercise information.

⁷ As noted previously, some of the \$42 million estimate is fairly ascribed to exercises that randomly occurred on the day with the monthly low stock price.

This study provides new evidence on executive behavior and contributes to the growing literature on the role of private information and opportunism in option compensation (e.g., Bebchuk et al. 2002; Heron and Lie 2006a). First, we provide evidence based on returns and relative stock prices surrounding the exercise date that is consistent with the conclusion that some insiders backdated the effective date of the option exercise in exercise-and-hold transactions before SOX. After SOX, the frequency of suspect option exercises decreases significantly. This suggests that the provisions of the Sarbanes-Oxley Act, which tightened the reporting requirements for insider transactions, reduced the frequency of option exercise backdating. Second, we provide evidence that personal income taxes influence executive behavior. Specifically, we find that the potential tax savings achieved by exercising at the lowest closing price of the month is positively associated with the likelihood of a suspect exercise. That is, we find evidence consistent with the conclusion that executives who can save the most in personal income taxes are more likely to backdate exercise dates. Further, we find that suspect exercises are more likely when the firm has weaker internal controls and is under scrutiny for option *grant* backdating.⁸

The remainder of the study is organized as follows. In section 2, we review the literature on option grant backdating and the role of private information in option exercises, provide institutional background on the mechanics of stock option exercises, and provide a simple model of the tax benefits resulting from backdating option exercise dates. In section 3, we describe the sample, empirical methodology, and present results. In section 4 we conclude.

2.0 BACKGROUND AND LITERATURE REVIEW

We begin this section with a short discussion of option *grant* backdating. We follow with a brief review of prior literature on the role of private information in stock option exercises and highlight the empirical implications of the assumption that all exercises are followed by an immediate sale of the acquired shares. We then discuss the mechanics of an option exercise

⁸ In addition, and contrary to the assumptions in prior literature, our evidence suggests that many executives do not immediately sell all the shares acquired from the option exercise. The systematic difference between short-run stock price patterns in exercise-and-hold and exercise-and-sell transactions is consistent with the conclusion that exercise-and-sell and exercise-and-hold transactions are different events subject to differing incentives. This observed difference may explain the inconsistent results found in prior studies that focus on the private information contained in option exercises.

which leads to a potential for backdating. Finally, we discuss the tax consequences of a stock option exercise to the option holder and the firm, and derive empirical predictions.

2.1. The timing of stock option grants

Yermack (1997) and Aboody and Kasznik (2000) provide evidence that executives consistently receive stock option grants on days with relatively low prices. Yermack (1997) argues that CEOs time the option grant dates *ex ante* to precede the release of positive information or follow the release of negative information. Aboody and Kasznik (2000) argue that this pattern is unlikely to hold for scheduled awards in which there is little *ex ante* discretion. In those cases, CEOs appear to time disclosures to minimize the stock price on the grant date. The implication of both studies is that option grant dates are likely to occur at relative stock price lows. An interesting feature of the time period studied by Yermack (1997) and Aboody and Kasznik (2000) was that option grants were not typically reported to the public until after the fiscal year-end on SEC Form 5. This created a substantial lag between the actual grant date and the date when insiders actually had to disclose it. Lie (2005) proposes that the systematic return pattern surrounding option awards documented in these earlier studies is so pronounced that it could be caused by executives exploiting the lenient reporting requirements to retroactively time these stock option awards.

As a result of SOX, and effective August 29, 2002, the SEC required most option awards to be reported on Form 4 within two business days of the grant. This accelerated filing deadline eliminated many opportunities to retroactively manipulate option grants. Collins et al. (2005) and Heron and Lie (2006a) find that the systematic share price movements surrounding option grant dates are largely mitigated after SOX, and interpret the evidence to be consistent with the existence of grant backdating before SOX.⁹ In recent months, over 120 firms have come under scrutiny by authorities for alleged stock option grant backdating. To date, nearly four dozen executives and directors have been terminated or resigned in connection with the issue, with many facing civil and/or criminal charges. Heron and Lie (2006b) attempt to quantify the prevalence of backdating during this time, and estimate that 23% of unscheduled option awards were retroactively dated. In a related study, Bebchuk et al. (2006a) estimate that 12% of firms

⁹ Interestingly, Heron and Lie (2006a) and Narayanan and Seyhun (2005) find evidence that grants are backdated after SOX for transactions filed after the two-day reporting deadline.

provided backdated grants to their CEO and that the backdating increased the CEO's total compensation by more than 10%, on average.

It has been argued that stock option incentives are inefficient because executives have significant control over the composition, amounts, and timing of their pay (e.g. Bebchuk et al. 2002). The evidence to date on backdating appears to reinforce this position. That many insiders have been accused of backdating option grant dates leads naturally to the question of whether other aspects of stock option plans have been manipulated to benefit insiders.¹⁰ Recent coverage in the financial press suggests that they have (Dash 2006) and Senate testimony by SEC authorities indicates that the SEC is actively investigating whether option exercise dates were also manipulated.¹¹ The primary reason for backdating an exercise to a date on which the firm's stock price was low is to minimize the option holder's income taxes. This incentive is present only if the executives plan to hold the acquired shares for sale at a later date. And the incentive to backdate these exercises is increasing in the potential tax savings from doing so. Because the firm loses valuable tax deductions if the exercise occurs on a day with a low stock price, shareholders are likely to be adversely affected when insiders can backdate exercise dates.

2.2 Stock option exercises and private information

Prior studies investigate the information content of insider stock option exercises for future stock returns. Consistent with the evidence in Ofek and Yermack (2000), these studies often assume that insiders sell the acquired shares immediately. If this is the case, insiders should time option exercises when stock prices are relatively high. Huddart and Lang (1996 and 2003) and Carpenter and Remmers (2001) find that insider exercises are preceded by positive stock returns in the weeks prior to the exercise. If insiders have private information about future returns, then exercise-and-sell transactions should be followed by negative returns. Carpenter and Remmers (2001) find that option exercises by executives preceded *positive* abnormal returns prior to May 1991, when these executives were required to hold the acquired shares for at least six months. After this date, however, they find no evidence that exercises are associated with future stock returns. However, Huddart and Lang (2003) do find that insider exercises are

¹⁰ Some (e.g., Bar-Gill and Bebchuk 2003) have alleged that the increased use of stock options in the mid and late 1990s created an incentive to commit accounting fraud. However, Erickson, Hanlon and Maydew (2006) do not find such an association.

¹¹ U.S. Senate Committee on Finance, *Testimony Concerning Executive Compensation and Options Backdating Practices* by Linda Thomsen, 109th Congress, 2nd Session, September 6, 2006.

followed by negative stock returns for a broad sample of exercises by employees at various ranks in several organizations.

Because insiders do not always sell the acquired shares immediately, conflicting results on the association between insider exercises and future returns are not surprising when the research design does not control for the disposition of the acquired shares.¹² For example, insiders who plan to sell the shares immediately clearly want to do so at the highest price. But what about insiders who plan to hold the shares? In the absence of taxes, the timing of these exercises should depend very little on short-run price movements. But with taxes, the option holder faces an immediate ordinary income tax on the spread between the stock price on the exercise date and the exercise price of the option. Subsequent appreciation in the underlying stock will be taxed at the long term capital gains rate at the time the shares are sold, provided the insider holds the stock at least 12 months. Given the decision to exercise, these insiders can minimize taxes by exercising when the firm's stock price is at a low point.¹³

2.3 The mechanics of stock option exercises

Unlike the decision to grant a stock option, the decision to exercise an option is ultimately up to the insider.¹⁴ While the gain to backdating an exercise-and-hold transaction may be less than the gain to backdating the actual grant, the ability of the insider to backdate these exercises may in fact be greater.¹⁵ An exercise is initiated when the option holder gives notice to the grant administrator of the decision to exercise, the specific options to be exercised and the number of each. The exercise date is typically considered to be the date the notice is given, at which point the option holder is required to pay the corporation the exercise price of the option plus any withholding taxes. The option holder reports the spread between the market value of shares acquired on the exercise date and the exercise price of the options as ordinary income in the year of exercise. In the Appendix, we provide an excerpt from a stock option grant notice and

¹² See Aboody et al. (2006) for an exception.

¹³ See McDonald (2003) and Scholes et al. (2005) for a discussion on the optimality of exercising early to start the clock on capital gains treatment. In general, a strategy of borrowing funds to buy additional shares dominates one where the option holder exercises early, borrows funds to pay the exercise price and holds onto the acquired shares.

¹⁴ This assumes that vesting schedules are met and no other restrictions are in place.

¹⁵ That is, the after-tax increase in wealth achieved by reducing the *grant-date* stock price (the exercise price for at-the-money grants) by a dollar exceeds the taxes saved by reducing the *exercise-date* stock price by the same amount. Further, as a result of the reporting requirements in place before SOX, the window over which a grant could be backdated was significantly larger than the window over which an exercise could be backdated.

agreement between Northrop Grumman Corporation and its CEO Kent Kresa to illustrate language typically used by firms to specify the exercise procedure.

The option agreement specifies the allowable forms of financing the option exercise. The cash method is typically the default form where the option holder delivers the exercise notice along with the cash required to pay the exercise price plus withholding taxes (in total, the exercise cost). The acquired shares are delivered by the company to the option holder, and the option holder takes a tax basis in the shares equal to their fair market value at the exercise date. However, because the cash required at the exercise is likely to be significant, other methods of financing the exercise cost are often available, including a stock swap, a cashless exercise, and an insider loan.

2.4 Tax consequences of stock option exercises

To the option holder

Personal tax savings are likely to be the primary driver of an option holder's incentive to manage the reported date of an exercise-and-hold transaction. We take the decision to exercise options and hold or sell the acquired shares as given. That is, we do not focus on the optimality of the exercise decision and instead investigate the determinants and consequences of the choice of exercise date, given that the decision to exercise has been made. We illustrate the tax effects and the potential magnitude of tax savings using a simple model. Let P_{GRT} be the exercise price of the options, which is set at the grant date, P_{EX} be the stock price at the exercise date, and P_{SALE} be the price at which the CEO expects to sell the acquired stock in the future. Further, let t_{ord} represent the tax rate faced at the exercise date and t_{cg} represent the expected tax rate faced at the future sale of the acquired stock. All options are assumed to be non-qualified stock options (NQSO).¹⁶ The present value of the total tax incurred as a function of the insider's option exercise decision can be expressed as:

¹⁶ Stock options are non-qualified unless they meet the criteria for an incentive stock option (ISO) established in IRC §422. The stock acquired via an ISO must be held for at least two years after the ISO grant date and at least 12 months after the exercise date. An ISO cannot be granted in-the-money, and the stock value covered by the ISO cannot exceed \$100,000 per employee per year. For a valid ISO, the employee is taxed at the long-term capital gains rate at the time the acquired stock is sold on the spread between the stock price on the sale date and the exercise price of the ISO. Further, the corporation gets no tax deduction at ISO exercise. See Scholes et al. (2005) for further detail and analyses of the differences between an ISO and NQSO.

$$\text{Tax} = N \left[(P_{\text{EX}} - P_{\text{GRT}})t_{\text{ord}} + \frac{(P_{\text{SALE}} - P_{\text{EX}})t_{\text{cg}}}{(1+r)^n} \right] \quad (1)$$

N is the number of options exercised, r is the after-tax discount rate of the insider, and n is expected holding period for the acquired shares.

For exercise-and-hold transactions, the tax savings that can be achieved by exercising on a day with a low stock price is the first derivative of Tax with respect to P_{EX} , or:

$$\frac{\partial \text{Tax}}{\partial P_{\text{EX}}} = N \left(t_{\text{ord}} - \frac{t_{\text{cg}}}{(1+r)^n} \right) > 0 \quad (1a)$$

The term $[t_{\text{ord}} - t_{\text{cg}}/(1+r)^n]$ can be viewed as the present value of converting \$1 of ordinary income into capital gains to be taxed at a later date. Thus, equation (1a) captures the expected tax savings by reducing P_{EX} by a dollar. Note that P_{GRT} is not relevant to calculating the tax savings, and hence the incentive to backdate. As long as there is taxable income on the option exercise, the insider gets the same tax savings per dollar movement in P_{EX} independent of the exercise price.

To formalize the relation between tax savings and the exercise price implied by equation (1a), let P^* be the price at which the insider would have exercised at on an ex ante basis (i.e. no backdating), and P_{MLOW} be the lowest price at which the insider *could have* exercised during the month. $P^* - P_{\text{MLOW}}$ is the largest potential reduction in taxable income per share achieved by exercising at P_{MLOW} . Accordingly, we define the potential total tax savings for any exercise-and-hold transaction as:

$$\text{Potential tax savings} = N \left(t_{\text{ord}} - \frac{t_{\text{cg}}}{(1+r)^n} \right) (P^* - P_{\text{MLOW}}) \quad (2)$$

We argue that the *potential tax savings* provides the direct tax-based incentive to backdate a given exercise to a date on which the firm's stock price was low. Note that the potential tax savings is the product of three components: 1) the number of options exercised, 2) the present value of converting \$1 of ordinary income into capital gains, and 3) the magnitude of the price difference between the price at which the insider would have otherwise exercised and the lowest price of the month.

To empirically estimate the potential tax savings defined in (2), we assume that the exercise was equally likely on all days during the month and use the average closing price during the month to proxy for P^* . We assume that t_{ord} is equal to the top marginal tax rate on ordinary income, t_{cg} is equal to the current top marginal tax rate on long-term capital gains, the holding period is five years, and the executive's after-tax discount rate is 10%. With current rates of 35% for t_{ord} and 15% for t_{cg} , the present value of tax savings approach \$0.257 per dollar decrease in P_{EX} $[0.35 - 0.15/(1.1)^5]$. Obviously, the total potential tax savings we estimate are very sensitive to the assumed discount rate, the choice of holding period, as well as the choice of P^* .

In Figure 1, we present hypothetical tax savings from changing the firm's stock price on the date of exercise across recent tax regimes, while holding other factors constant. We assume that the number of options exercised is 100,000, the average stock price during the month of exercise is \$25, an after-tax discount rate of 10%, and a holding period of five years. Using equation (2), we calculate the tax savings at various exercise points which represent discounts between 2% to 22% from the average stock price. These discounts put our estimates in the range of the actual price discounts at which exercises on the day with the lowest price of the month took place.¹⁷

Prior to 1993, ordinary income tax rates were equal to capital gains tax rates and the potential tax savings for an exercise-and-hold transaction is driven entirely from the value of the deferral. At a price discount of 6%, or a stock price of \$23.50, the tax savings would be approximately \$15,921. At a discount of 18%, the estimated tax savings climb to \$47,764. The tax regime from 1993 through 1997 generates larger tax savings from backdating as a result of the increase in the ordinary income tax rate to 39.6% following The Omnibus Budget Reconciliation Act of 1993 (OBRA). During the post-1993 period, the tax savings estimates are more than double those of the pre-OBRA regime. The maximum long-term capital gains tax rate was reduced to 20% as part of the Taxpayer Relief Act effective in May 1997, and the potential tax savings from timing an exercise-and-hold transaction increased again. The Jobs and Growth Tax Relief Reconciliation Act of 2003, which became effective after the Sarbanes-Oxley Act, lowered the ordinary income tax rate to 35% and the maximum long-term capital gains rate to

¹⁷ The discount is calculated as the difference between the average stock price during the month and the actual stock price on the exercise date divided by the average stock price. The actual discounts observed in suspect exercise-and-hold transactions prior to August 29, 2002 averaged 11.86% with a median of 9.42%. The discount at the 10% percentile is 2.89% and the discount at the 90th percentile is 23.99%.

15%. This tax rate change reduced the estimated tax savings for a given exercise by about 5.5%.¹⁸

We note that our tax savings estimates are likely to be conservative for two reasons. First, the immediate actual tax savings to the CEO is the sum of all taxes avoided, which includes state and federal income taxes as well as FICA taxes. Second, a backdating insider would technically have until the filing date to select the date on which the option is deemed to be exercised. If the potential tax liability is based on price at the filing date, and that price is larger than the average price during the exercise month, then the aforementioned tax savings are understated.

To the firm

For non-qualified stock options, the spread between the stock price on the exercise date and the exercise price of the option is treated as deductible compensation expense to the option granting corporation. For each dollar reduction in current stock price on an exercise-and-hold transaction, the corporation loses a potential deduction by that amount. In other words, tax savings to the option holder are offset by a tax cost to the corporation. The total corporate tax benefit arising from an option exercise is

$$\text{Tax benefit} = N(P_{\text{EX}} - P_{\text{GRT}})t_c \quad (3)$$

where t_c is the marginal corporate tax rate on an additional dollar of deductions.¹⁹ The effect of a change in the exercise-date stock price on the corporate tax benefit is:

$$\frac{\partial(\text{Tax benefit})}{\partial P_{\text{EX}}} = Nt_c > 0$$

For firms facing the top marginal tax rate, the increase in federal tax liability per option is approximately \$0.35 per dollar decrease in P_{EX} , and backdating results in a wealth transfer from shareholders to insiders.

2.5 Summary and predictions

¹⁸ The 5.5% estimate is obtained by taking the difference in estimated taxes saved for a given exercise over the two regimes, divided by the estimated taxes saved in the pre-2003 tax regime.

¹⁹ During the period in question, nearly all firms recognized stock option tax savings directly in shareholders' equity (see Hanlon and Shevlin (2002) for a discussion of the financial accounting and tax treatment of employee stock options). For that reason, we don't estimate the GAAP earnings consequences of backdated option exercises.

We anticipate that stock price patterns surrounding option exercises are substantially different for insiders who divest some or all of the acquired shares relative to those who hold them. If insiders time the option exercise date to maximize the value of the award, then exercise-and-sell transactions should take place on dates with high stock prices and exercise-and-hold transactions should take place on dates with low stock prices. If the relative ability to backdate an exercise was greater under the more lenient reporting requirements prior to SOX, any systematic stock price pattern existing prior to the change in the reporting rules should be mitigated after the SOX mandated two-day reporting rule went into effect.

For exercise-and-hold transactions, we expect that the incentive to backdate an option exercise to dates with low stock prices is increasing in the magnitude of the potential taxes saved by exercising on such dates, where potential tax savings is a function of the size of the exercise, the relative tax rates on ordinary income and capital gains, and the magnitude of the exercise-date stock price discount achieved by exercising on the day with the lowest closing price of the month. We also make predictions with respect to firm characteristics. First, if executives take the firm's tax position into account when deciding whether to backdate the option exercise to a date with a low stock price, the likelihood of observing suspect exercises should be greater for firms with smaller potential tax benefits from the deduction (i.e., low tax rate firms). Second, the exercise decision is made by the option holder, but the actual exercise is coordinated through the option plan administrator. Therefore, the ability to backdate is likely related to the strength of the internal control environment of the firm. Ashbaugh-Skaife et al. (2006) and Doyle et al. (2006) find that smaller firms as measured by market capitalization have weaker internal control environment. To the extent firm size captures the strength of internal controls in our setting, we expect that backdating is more likely in small firms.

3. DATA, SAMPLE, METHODOLOGY

We obtain our sample of insider stock option exercises from the Thomson Financial Insider Filing database. We identify stock acquisitions arising from option exercises as reported on SEC Form 4 with transaction code M ("Exercise of in-the-money derivative security acquired pursuant to a Rule 16b-3 plan"). We limit the sample to exercises between January 1, 1996, when data on exercise-related sales were first available, and November 30, 2005.

Prior to SOX, insider transactions for a given calendar month, including shares acquired via option exercises, were required to be reported on Form 4 by the tenth day following the end of the month in which the transaction occurred. We exclude transactions in which the insider exercised options on more than one day during the month (about 35% of exercises) to improve the ability of the tests to identify transactions most likely to reflect ex post opportunistic timing. After merging with CRSP and Compustat, we obtain 138,927 insider-exercise observations. To deal with concerns of including firms with relatively illiquid and thinly traded equity in the analysis, we eliminate 5,668 observations in which the firm's market capitalization is less than \$10 million or the average stock price during the exercise month is less than \$3. Finally, we eliminate 2,465 observations in which the firm was engaged in a stock split during the month, as that confounds our estimate of the potential tax savings from exercising at the lowest closing price of the month.²⁰ After these filters, we obtain a total of 23,310 exercises for CEOs, 18,683 for non-CEO executives, 58,017 for other officers, and 30,784 for non-officer directors.²¹

To complete our analysis, we need to identify those option exercises in which some or all of the shares acquired are immediately sold by the insider and those in which the insider holds the shares. Exercise-related sales are likely to occur on the same day the option is exercised (or very soon after). We identify all dispositions of shares occurring from the date of exercise through the end of the calendar month as reported in the database and classify them as sales of shares acquired from the exercise. We classify an exercise followed by any such disposition as an exercise-and-sell transaction. Otherwise, we classify it as an exercise-and hold transaction. For the entire sample period, Table 1 (column 3) reports that 67% of all exercises by CEOs are followed by a divestiture of at least some exercise-acquired stock by the end of the month. 70% of exercises by non-CEO executives and 77% of exercises by other officers are followed by share divestitures before the end of the month. This lower frequency of selling by CEOs is not surprising if CEOs have greater stock ownership requirements or less need for liquidity than other insiders. Interestingly, CEOs of small firms (market capitalization less than \$500 million)

²⁰ We eliminate observations where the firm had a stock split because we rely on average actual daily prices in order to calculate measures of potential taxable income and tax savings in the analysis.

²¹ The insider classifications are made using the role codes reported by insiders and provided on the insider trading database. Following Heron and Lie (2006b), the CEO classification includes all insiders where the primary role code is CEO, President, or Chairman of the Board. Non-CEO executives include insiders where the primary and secondary role codes indicate the person is a CFO, COO, or both an officer and director. The other officer category includes all other officers who are not also directors. Non-officer directors include all other insiders where the primary role code is director.

are less likely to exercise-and-sell (49% of the time) than are CEOs at mid and large-size firms (70% and 81%, respectively). The frequency of exercise-and-sell transactions increased from 63% before SOX to 73% after SOX.

3.1 Abnormal returns surrounding option exercises

To provide preliminary evidence on the presence of exercise backdating, we examine the cumulative abnormal returns over a 41 day window centered on the reported option exercise date. Unlike prior studies which focus on longer window returns following exercise (e.g. Huddart and Lang 2003), we are interested in the insider's ability to manipulate the exercise date within a concentrated window, similar to the work on stock option backdating by Lie (2005) Heron and Lie (2006a), and Narayanan and Seyhun (2005). Because insiders other than the CEO have the potential to backdate, we include the CEO, non-CEO executives, other officers, and non-officer directors.²²

For each insider-exercise, we estimate a three-factor model based on the risk factors identified in Fama and French (1993) using daily returns for the year ending 50 days prior to the exercise date. The daily abnormal returns surrounding each insider exercise equal the actual returns less the predicted returns based on the estimated model. We cumulate abnormal returns beginning 20 days before the exercise and ending 20 days after. In Figure 2, we plot the average cumulative abnormal returns surrounding all option exercises by CEOs during the period prior to SOX. The cumulative abnormal returns through the exercise date are 0.57% ($t = 3.84$) but reverse in the following weeks with average abnormal returns of -1.18% ($t = -9.86$) over the next twenty days. This is consistent with the general evidence of a run-up in stock prices prior to the exercise date as well as with the evidence that exercises precede negative stock returns in Huddart and Lang (2003).

In the same figure, we partition CEO exercises conditional on whether or not the insider divested at least some shares immediately (i.e. by the end of the month) after exercise. When doing so, we observe markedly different return patterns for exercise-and-sell and exercise-and-hold transactions (data tabulated in panels A and B of Table 2). As expected, exercise-and-sell transactions tend to occur after a price run-up (3.10%, $t = 17.12$). The negative abnormal stock

²² In a recent working paper, Bebchuk et al.(2006b) found that directors also received option grants that were backdated. The results of our analysis of directors with suspect option exercise dates is consistent with their grant date results.

returns over the twenty days following the exercise (-2.52% , $t = -17.84$) imply that exercise-and-sell transactions contain information about short run price movements, consistent with the findings over longer windows documented in Huddart and Lang (2003) but contrary to the findings in Carpenter and Remmers (2001).

In contrast, exercise-and-hold transactions by the CEO tend to occur after a period of significant *negative* abnormal returns (-3.72% , $t = -14.86$). However, abnormal returns average 1.12% ($t = 9.89$) over the five days following the exercise which is consistent with CEOs timing exercises on dates with low stock prices. When the insider plans to hold the shares, and personal taxes are not a consideration, the choice of exercise date within a window should depend very little on short-run price movements. Thus, the results in Figure 2 are consistent with CEOs timing their exercise-and-hold transactions to minimize the amount of income currently subject to income taxes.

In Figure 3a, we plot average cumulative abnormal returns surrounding exercise-and-hold transactions before SOX for all four groups of insiders. For all insider groups, the returns are significantly negative through the exercise date. Over the five days following the exercise, average abnormal returns are significantly positive and range from 0.43% ($t = 4.79$) for directors to 1.12% ($t = 9.89$) for the CEO. After that, abnormal returns level off or decrease through the remainder of the observation window. The weaker return pattern observed in the window surrounding exercises by other officers and non-officer directors is not surprising if this broader group of insiders has less ability or less tax incentive to backdate an exercise.

The stock return patterns surrounding exercise-and-hold transactions are consistent with insiders timing option exercises to minimize their tax liabilities. However, the observed patterns could arise if insiders time their trades *ex ante* based on private information. To examine the issue, we follow Heron and Lie (2006a) and test for the existence of backdating based on a comparison of stock price patterns before and after SOX. Specifically, if exercise decisions are driven entirely by *ex ante* utilization of private information, the return patterns should be similar before and after SOX. However, if some insiders exploited lenient reporting requirements before SOX to backdate option exercises to dates with low stock prices, the documented patterns should be substantially mitigated after SOX.

In Figure 3b, we plot the average cumulative abnormal returns for the exercise-and-hold transactions after SOX. For the CEO, the returns tend to be negative leading up to the exercise

date, with a magnitude of -1.55% ($t = -6.01$), and insignificant over the first five days following the exercise. The patterns are qualitatively similar for the remaining three groups of insiders, with the exception of non-CEO executives. For that group, abnormal returns over the five days post-exercise is positive 0.57% ($t = 3.31$). Comparison of Figures 3a and 3b indicates that after-SOX, the pre-exercise date negative returns are substantially smaller.

In panel A of Table 2, we provide formal comparisons of returns over various intervals surrounding the exercise date for exercise-and-hold transactions before and after SOX. For the CEO, the abnormal returns in the period leading up to and including the exercise date are 2.17% more negative before SOX than after SOX ($t = -5.15$). For the remaining three insider groups, the returns leading up to an exercise-and-hold transaction are always more negative prior to SOX, with statistically significant differences ranging from -1.35% to -2.24% . In addition, the abnormal returns for CEOs over the twenty days *following* the exercise date are 1.09% ($t = 4.29$) before SOX and -0.45% ($t = -2.09$) after SOX. As indicated in the third column of panel A, the difference in the returns following the exercise before and after SOX occurs primarily over the first five days post-exercise (0.99% , $t = 5.18$). For the remaining three groups of insiders, the returns over the first five days after the exercise are significantly larger before SOX than after SOX. Because the tax incentives were generally similar before and after SOX, the returns-based evidence is consistent with the conclusion that: i) prior to SOX, insiders backdated option exercises and ii) SOX's accelerated reporting requirements appear to have limited insider's ability to backdate stock option exercises.

Figure 4a plots the returns surrounding exercises-and-sell transactions before SOX for the four groups of insiders, and in panel B of Table 2, we report abnormal returns leading up to the exercise date. In exercise-and-sell transactions, we find that in the days leading up to the option exercise, abnormal returns range from 3.10% for CEOs to 4.45% for other officers. Over the twenty days following the exercise, the abnormal returns range from -2.52% for CEOs to -3.27% for non-CEO executives, with returns for all groups statistically significant at the 1% level. This latter finding supports prior evidence that insiders use private information about future short-run price movements to time exercise-and-sell transactions. For comparative purposes, we plot the returns after SOX in Figure 4b. Again, abnormal returns peak at the exercise date, although the average magnitude of the run-up is smaller before SOX for all insiders. Further, abnormal returns

following exercise-and-sell transactions are about 0.51% to 0.93% smaller after SOX, with differences significant at the 5% level.

3.2. The frequency of suspect option exercises

Our examination of stock price patterns surrounding exercise-and-hold transactions before and after SOX suggests that some insiders may have backdated exercise dates. Thus, our results are similar to the recent evidence on option grant backdating. In this section, we focus on a group of exercises most likely to be backdated. Within a given firm-month, we rank each trading day by its relative closing price, where the trading day with the lowest closing price has a rank of 1, the next lowest day 2, and so on. When multiple days have the same price, the lowest rank is assigned. We define an exercise occurring on the day with the lowest closing price of the month as “suspect,” and all others as “non-suspect.”²³

In Figure 5, we plot the frequency of all exercise-and-hold transactions occurring on each trading day ranked by lowest closing price within the month, for exercises occurring both before and after SOX. If the exercise date during the month was chosen at random, we would expect to see about 4.69% of exercises on any given day during the month.²⁴ Prior to SOX, 13.84% of CEO exercise-and-hold transactions occur on the day with the lowest closing stock price of the month (reported in panel A, of Table 2), which is significantly greater than 4.69% ($t = 19.62$). In other words, CEOs exercise on the day of the month with the lowest price at almost three times the frequency expected if exercise dates were random. Interestingly, the frequency of exercises on the day with the second lowest closing price during the month is only 7.04%, which is also significantly greater than 4.69% ($t = 6.80$), but nearly half of the frequency observed on the day of the month with the lowest stock price.

After SOX, these suspect exercises by CEOs make up only 7.25% of all exercise-and-hold transactions (see Figure 5). While this exceeds the expected frequency if exercises were random, it represents a statistically significant 48% reduction (13.84% before SOX to 7.25% after SOX) in the frequency of suspect exercise-and-hold transactions after SOX, and is

²³ We recognize that our classification of suspect exercises captures backdating with error. First, many of the suspect exercises are likely legitimate. Second, backdaters may intentionally choose dates other than the lowest price in order to obfuscate their actions. For example, the executives at Symbol Technologies were accused of backdating an option exercise to the *second* lowest stock price of the month.

²⁴ Assuming 256 trading days during the year, the average number of trading days in a given month is $21 \frac{1}{3}$. Therefore the expected frequency of a trade occurring at random on any given day within a month is $[1 / (21 \frac{1}{3})]$ or 4.6875%.

consistent with SOX-mandated reporting requirements reducing insiders' ability to backdate option exercise dates. Table 2 also reports the frequency of suspect exercise-and-hold transactions before and after SOX for other insiders. Non-CEO executives exercise on the day with the lowest price of the month 13.77% of the time before SOX, but only 8.42% after SOX (t -stat for difference = 5.65). Reductions in the frequency of suspect exercises after SOX for other officers and non-officer directors are quantitatively smaller, but still significant.

For comparative purposes, we also provide evidence for exercise-and-sell transactions in Figure 6. Here, we rank exercise dates according to the *highest* closing price. The economic gain from timing these exercises on the highest price day is likely to exceed the tax gain from timing an exercise-and-hold transaction on the lowest price date during the month. The largest number of exercises in a given month occurs on the highest price day (10.22% for the CEO), and the frequency gradually declines as the relative closing price falls. For example, the frequency of exercises on the second highest price day is 7.83%. This distribution trend differs from the sharp drop in exercise frequency from the lowest price to the next lowest price observed in exercise-and-hold transactions.

While abnormal returns surrounding exercise-and-sell transactions are smaller after SOX, panel B of Table 2 reveals that the relative frequency of exercises on the highest price days by the CEO changed little. For example, CEO exercise-and-sell transactions at the highest price dropped by less than 1% after SOX (10.22% before SOX to 9.26% after SOX, $t = 1.99$). The frequency of exercises on days with the highest price during the exercise month before and after SOX suggests that insiders' desire and ability to use private information in an exercise-and-sell transaction was not significantly affected by SOX.²⁵ This is markedly different from the results for exercise-and-hold transactions in which the frequency of suspect exercises fell by a significant magnitude after insiders were required to report their transactions within two days.

²⁵ Because we count all share divestitures, including stock swaps with the company, as share sales, exercise-and-sell transactions may be influenced by backdating. When the sample of exercise-and-sell transactions is constrained to those with open-market sales (which are least likely to be backdated), the frequency of exercise-and-sell transactions on the highest price day are of similar magnitude to the total sample, but *do not* decrease after SOX. For example, panel B of Table 2 reveals that the frequency of exercise-and-sell transactions with open-market sales occurring on the day with the highest closing price of the month went from 9.60% before SOX to 9.68% after SOX. Qualitatively similar patterns occur in the other three groups. Thus, the observed reduction in frequency of exercises on the day with the highest closing price of the month for the full exercise-and-sell sample is likely due to the inclusion of non-open-market sales which are more likely to be affected by SOX.

3.3. The characteristics of well-timed option exercises

For exercise-and-hold transactions, the insider's ability and incentive to time the exercise date are likely to vary cross-sectionally. We predict that the likelihood of a suspect exercise-and-hold transaction is increasing in the potential tax savings from doing so. However, from the option holder's perspective, the gains from backdating must be weighed against expected litigation costs, including tax penalties, which could mitigate the presence of backdating. Second, the corporation forgoes a deduction when the insider backdates to a day with a low stock price. If the firm's tax status affects the ability of the insider to backdate the exercise, then suspect grants should be more likely when the marginal tax rate of the firm is lower. Finally, if an insider can persuade the plan administrator to apply a different effective date to the exercise than the actual date the exercise notice was delivered, then the likelihood of backdating should be associated with factors related to the firm's internal control environment.

In panel A of Table 3, we provide evidence on firm and CEO attributes associated with exercise-and-hold transactions classified as suspect or non-suspect. We define the potential tax savings of exercising on the day with the lowest closing price of the month for both suspect and non-suspect exercises as in equation (2): P^* is equal to the average monthly closing stock price (i.e. P_{MAVG}), P_{MLOW} is the lowest closing price of the month, t_{ord} and t_{cg} are the top individual ordinary income and capital gains tax rates, the holding period (n) is five years, and the after-tax discount rate (r) is 10%. Comparing columns (1) and (2), the average potential tax savings generated by suspect exercise-and-hold transaction of \$66,892 is significantly larger than the average potential tax savings by non-suspect exercises of \$39,590 (p -value of difference = 0.004). Similarly, the median potential tax savings for suspect exercises is \$7,832 which is greater than the median for non-suspect exercises of \$4,360 (p -value of difference < 0.001).

We estimate the marginal tax rate of the firm using the trichotomous rate described in Shevlin (1990). Specifically, t_c is equal to the top corporate marginal tax rate (35% during our sample period) if the firm has no net operating losses (NOLs) and positive earnings before extraordinary items (EBEI), one-half the top marginal tax rate if the firm has either positive NOLs or negative EBEI, but not both, and zero otherwise. Using this method, most of the firm-year observations (66%) face the top marginal tax rate.²⁶ Panel A reveals that the average

²⁶ The remainder are assigned a marginal tax rate of 17.5% (28% of the sample) or 0% (6% of the sample).

marginal tax rate faced by firms with suspect option exercises is significantly lower than the tax rate for the sample of firms with non-suspect option exercises (26.67% vs. 28.13%; p -value = 0.001).

Finally, we find that suspect exercises occur in firms with significantly smaller market capitalization at both the mean and median. The average market value of firms with suspect exercise (\$2.76 billion) is significantly less than the average for firms with non-suspect exercises (\$4.67 billion). The difference in medians is qualitatively similar and suggests that backdated exercises are more likely to occur in smaller firms. To the extent firm size captures the strength of the internal control environment, this finding is consistent with the prediction that backdating is more likely in firms with weaker internal controls. Even though firms with suspect exercises are significantly smaller than those with non-suspect exercises, the potential tax savings to option holding CEOs tends to be larger at those firms.

In panel B of Table 3, we quantify the estimated tax savings of suspect exercises by the four groups of insiders and the associated tax cost to the firms. For suspect exercises, the estimated tax savings equals the potential tax savings described earlier. We also estimate the tax cost to the firm of the option holder's exercise decision as the difference between the average closing stock price during the month and the actual stock price on the exercise date, multiplied by the number of shares acquired and the firm's marginal tax rate.

$$\text{Tax Cost} = N t_c (P_{\text{MAVG}} - P_{\text{MLOW}}) \quad (5)$$

N , P_{MAVG} , and P_{MLOW} are defined as before and t_c is equal to the firm-specific trichotomous tax rate described earlier.

As reported in panel A and repeated in panel B of Table 3, the average (median) tax savings to the CEO is approximately \$67 (\$8) thousand for suspect exercise-and-hold transactions. This estimate of tax savings is surprisingly small. Filing false tax returns can be a felony, and the tax penalties can exceed \$100 thousand for an individual. If the corporation is accused of filing a false or fraudulent tax return, the penalty can exceed \$500 thousand.²⁷ Moreover, the litigation and reputation costs arising from accusation and conviction of an illegal act could be substantial for both the executive and the firm. In light of these significant potential costs, we find the tax savings that appear to motivate the backdating of option exercises remarkably small.

²⁷ See Sections 7201, 7206 and 7207 of the Internal Revenue Code for example.

As a group, suspect exercises by CEOs before SOX resulted in estimated tax savings of \$50.771 million (column 1).²⁸ This represents about 5% of the total expected taxable income generated by suspect CEO exercises of \$1.014 billion (\$1.337 million taxable income, untabulated, multiplied by 759 suspect exercises). In panel B, we also find that the tax savings to CEOs exceed the incremental tax costs to the corporation. For example, in column (1) we find that the total tax costs to firms with suspect exercises equals \$42.518 million, compared to estimated tax savings for executives of \$50.771. This suggests that on average, the tax gain to the CEO is almost entirely offset by a cost to shareholders in the form of reduced cash flows to the firm. Non-CEO executives saved an average of \$29 thousand per suspect exercise-and-hold transaction, and \$20.699 million as a group, while other officers saved \$31 thousand per suspect exercise and \$26.649 million as a group. Non-officer directors achieved tax savings of \$14 thousand on average, and only \$11.052 million in total.²⁹

Multivariate results

The univariate results indicate that relative to non-suspect exercises, suspect exercise-and-hold transactions as associated with larger potential tax savings, and occur in smaller firms and in firms with lower marginal tax rates. Given these univariate associations, we investigate the role of these factors on the likelihood of a suspect exercise in a multivariate setting. Specifically, we estimate the following logit model:

$$\begin{aligned} \text{Pr}(\text{Suspect Exercise}) = & \alpha_0 + \alpha_1 \ln(\text{Potential tax savings}) \\ & + \alpha_2 \text{Marginal tax rate} \\ & + \alpha_3 \ln(\text{Market value of firm equity}) + e \end{aligned} \quad (6)$$

where Suspect Exercise equals 1 if the option exercise date is on the day of the lowest stock price of the month and zero otherwise. Again, we define potential tax savings for both suspect and non-suspect exercises as in equation (2): P^* is equal to the average monthly closing stock price (P_{MAVG}), P_{MLOW} is the lowest closing price of the month, t_{ord} and t_{cg} are the top individual ordinary income and capital gains tax rates, the holding period (n) is five years, and the after-tax

²⁸ The \$50 million figure is for *all* exercises on the low stock price day of the month. If we assume that 4.69% of options, which is the percentage of options expected to be exercised on any given day if exercises are random, are appropriately executed ex ante, and that the average tax savings is the same for all suspect exercises, then only about \$33.57 million of the savings can be attributed to backdating [$((13.84\% - 4.69\%)/13.84\%) \times \50.77 million = \$33.57 million].

²⁹ The same caveat noted in footnote 28 applies to these estimates.

discount rate (r) is 10%. The marginal tax rate of the firm is the trichotomous tax rate described by Shevlin (1990) and the market value of firm equity is measured at the end of the year.

Consistent with our earlier predictions, we anticipate that the coefficient on potential tax savings will be positive, and that the coefficients on the marginal tax rate of the firm and the market value of firm equity will be negative. We take logs of market value and the potential tax savings because we expect that they influence the likelihood of a suspect exercise at a decreasing rate. Further, we anticipate that if these factors capture the ability and incentive to backdate, their ability to explain the likelihood of a suspect exercise should be mitigated after SOX.

We report the results of estimating the logit regression models by insider group before and after SOX in Table 4. Controlling for other factors, the likelihood of a suspect exercise by the CEO before SOX is increasing in the potential tax savings ($t = 7.70$). The average marginal effect is reported in square brackets, and indicates that a 1% increase in potential tax savings increases the likelihood of a suspect exercise by 0.019%. Alternatively, the marginal effect implies that a move from the first to the third quartile of potential income tax savings (equivalent to about \$19,000) increases the probability of a suspect exercise by 5.46%.³⁰ However, we find no evidence that the marginal tax rate of the firm is associated with the likelihood of a suspect exercise (coeff. = -0.405, $t = -1.16$). Finally, the negative coefficient on market value implies that suspect exercises are less likely in larger firms ($t = -7.52$). The marginal effect of -0.021 suggests that a move from the third to the first quartile of firm size (\$1.69 billion to \$127 million) increases the likelihood of a suspect exercise by 5.44%.

In the adjacent column of Table 4, we report the results estimated for CEO exercises occurring after SOX. The explanatory power of the model drops substantially, and the coefficient on potential tax savings is not positively associated with the probability of a suspect exercise after SOX. Taken together, the results support the conclusion that SOX reduced the propensity of CEOs to backdate their option exercises.

In the remaining columns, we report the results for the non-CEO executives, other officers, and non-officer directors. For all three groups, the potential tax savings from exercising on the day with the lowest closing price of the month is positive and significantly associated with the likelihood of a suspect exercise before SOX, with marginal effects similar to those discussed

³⁰ The 25th (75th) percentile of potential tax savings is 1,147 (20,332). Therefore, the increase in probability is calculated as: change in probability = $0.019 * [\ln(20,332/1,147)] = 5.46\%$.

above for CEOs. After SOX, the coefficient on potential tax savings is insignificant for non-CEO executives and directors, and negative and significant for other officers. Again, this evidence supports the conclusion that a backdated exercise-and-hold transaction is more likely when the tax savings from doing so are greater. The coefficient on the marginal tax rate of the firm is generally insignificant for the other three groups. Finally, the effect of firm size on the likelihood of a suspect exercise is negative and significant for all groups before SOX and insignificant for all groups after SOX. Results are qualitatively the same when the non-suspect observations are limited to those exercises occurring on the second through tenth lowest prices of the month, when suspect exercises are defined as those occurring at the lowest two prices of the month, or when fixed year effects are included.

In sum, the results are consistent with: i) insiders backdating option exercise dates, ii) individual income taxes being a significant determinant of such backdating, and iii) the likelihood of backdating increasing for firms with weaker internal controls. We find that these associations in general disappear after SOX, which supports the interpretation that SOX mitigated executives' propensity to backdate option exercises.

3.4. Additional analysis

In this section, we analyze the evidence of option exercise backdating for the subset of firms under scrutiny for option *grant* backdating. We identify the sample of firms tracked by the Wall Street Journal in their "Options Scorecard" from November 28, 2006 (hereafter, the Wall Street Journal sample).³¹ Of the 5,485 exercise-and-hold transactions by CEOs in our sample, 200 were by CEOs from the Wall Street Journal sample of firms under scrutiny for option *grant* backdating. We expect that insiders at firms which are more likely to backdate option grants are also more likely to backdate exercises because the ability and incentive to employ questionable granting practices are likely to carry over to other aspects of the compensation plan.

Figure 7 plots the cumulative abnormal returns around exercise-and-hold transactions for those CEO's in the Wall Street Journal sample, both before and after SOX. As reported in panel A of Table 5, abnormal returns leading up to the exercise average -9.24% ($t = -6.10$) for CEOs in the Wall Street Journal sample before SOX. Over the five days following the exercise, abnormal

³¹ <http://online.wsj.com/public/resources/documents.info-optionsscore06-full.html>

returns for this group average 1.93% ($t = 3.52$). Similar to the evidence for the entire sample, the returns following the exercise tend to be negative and insignificant after SOX. The average abnormal returns over the ten days following the exercise for the 109 exercise-and-hold transactions by non-CEO executives in the Wall Street Journal sample is 4.67% ($t = 3.27$). In general, the returns-based evidence for CEO, non-CEO executives, and other officers is consistent with the earlier findings for the full sample, however, the magnitudes of the returns before and after the exercise are substantially larger when the insider is associated with a firm under scrutiny for grant backdating. Interestingly, non-officer directors of Wall Street Journal sample firms do not exercise prior to positive returns before SOX.

Figure 7b plots the frequency of exercise-and-hold transactions on the ten lowest price days of the month for CEOs of firms in the Wall Street Journal sample before and after SOX. Before SOX, 23.5% (47 out of 200) of exercise-and-hold transactions by CEOs from the Wall Street Journal sample occur on the day with the lowest closing stock price of the month. This 23.5% figure is over five times the expected frequency if such exercises occur at random ($p < .001$). The frequency of exercises on the day with the next lowest closing price is only 6.5% (untabulated). Moreover, the frequency of suspect exercises drops from 23.5% before SOX to only 5.08% after SOX ($p < .001$). Before SOX, non-CEO executives in the Wall Street Journal sample exercised at the lowest stock price during the month of exercise 31.19% of the time, while other officers and non-officer directors exercised at the lowest price 17.43% and 13.58% of the time (all percentages are significantly greater than 4.69%). The frequency of suspect exercises for these groups also dropped significantly after SOX. Overall, it appears that firms that were likely to manipulate their *grant* dates were also more likely to manipulate their option *exercise* dates.

Finally, we investigate whether controlling for firms' with alleged grant backdating problems affects the previously reported multivariate results. In panel B of Table 5, we report summary statistics separately for those exercises through firms that are in the Wall Street Journal sample and those that are not. Relative to firms not in the Wall Street Journal sample, exercises by CEOs of firms under scrutiny for grant backdating have greater potential tax savings, and their firms tend to have lower marginal tax rates and larger market values. We therefore re-estimate equation (6) and add an indicator variable equal to one if the firm is in the Wall Street Journal sample, and zero otherwise. As reported in panel C of Table 5, we find that for all groups

of insiders, the likelihood of a suspect exercise is more likely for insiders of firms in the Wall Street Journal sample, controlling for other factors. The marginal effect of 0.079 in the first column indicates that CEOs of firms with alleged grant backdating problems are 7.9% more likely than CEOs of other firms to have exercised at the lowest price of the month before SOX. Similarly, the marginal effect for non-CEO executives in the third column implies a 12.6% greater probability of executing an exercise-and-hold transaction at the lowest price of the month before SOX. Furthermore, the tenor of the results for the other explanatory variables is essentially unchanged after controlling for alleged grant backdating practices.

CONCLUSION

Following the recent scrutiny of option grant backdating by regulators and academics, we investigate the opportunistic timing of stock option exercises by insiders. We focus on a group of exercises where there likely exists both the incentive and the ability to backdate an option exercise: exercise-and-hold transactions. Insiders who plan to hold the acquired stock have an incentive to exercise on the day with the lowest possible market price in order to minimize their income taxes. Unlike exercises in which the acquired shares are sold immediately through a broker, exercise-and-hold transactions are often accomplished in-house. Thus, we expect that opportunistic backdating, to the extent it exists, is most likely to occur in exercise-and-hold transactions.

We find that exercise-and-sell transactions tend to occur at monthly stock price highs, whereas exercise-and-hold transactions tend to occur at monthly stock price lows. Before SOX, we find that 13.84% of exercise-and-hold transactions occurred on the lowest price day of the month (i.e. suspect exercises), which is substantially greater than the predicted frequency if exercises occurred at random throughout the month. After SOX, only 7.25% of exercises occurred on the day the stock was at its lowest price of the month. Following Heron and Lie's (2006a) interpretation of returns surrounding option grants before and after the Sarbanes-Oxley Act, we infer that some of the observed pattern in stock prices around exercise dates in periods prior to SOX is explained by backdating of option exercise dates.

Consistent with the prediction that backdating in exercise-and-hold transactions is driven by tax considerations, we find that the likelihood of a suspect exercise is increasing in the potential taxes saved by the option holder of actually exercising on the day with the lowest

closing price. Finally, suspect exercises are more likely in small firms. To the extent firm size is an appropriate proxy for the strength of the internal control system, this finding is consistent with the conclusion that backdated exercises are more likely when the firm has a relatively weaker internal control environment.

We estimate that certain CEOs saved about \$67 thousand in taxes, on average, by exercising on the day of the month with the lowest closing stock price. These average tax savings account for only about 4% of the total value of the options exercised. Given that filing a false tax return can be a felony, and can result in penalties in excess of \$100 thousand for the CEO as well as significant adverse consequences for the firm, the tax savings realized by CEOs through suspect option exercises seem remarkably small. Results for the other insider groups are qualitatively similar, but in general of smaller magnitude. We also find that the foregone tax benefits to the firm of suspect exercises are of similar magnitude to the taxes saved by the CEO, which is evidence that shareholders bear the cost of exercise backdating. Finally, we find that suspect exercise-and-hold transactions are more likely in firms tracked by the Wall Street Journal for possible option *grant* backdating. For the sample of exercise-and-hold transactions in the Wall Street Journal sample, we find that 23.5% of *exercises* by CEOs and 31.19% of *exercises* by non-CEO executives' occurred at the lowest price of the month, both are more than five times the expected frequency if exercise dates occur at random during the month. In sum, this study provides additional evidence of opportunistic behavior associated with executive stock options.

References

- Aboody, D., Hughes, J., Liu, J., Su, W., 2006. Are executive stock option exercises driven by private information? Working paper, University of California, Los Angeles.
- Aboody, D., Kasznik, R., 2000. CEO stock option awards and the timing of corporate voluntary disclosures. *Journal of Accounting and Economics* 29, 73-100.
- Ashbaugh-Skaife, H., Collins, D., Kinney, W., 2006. The discovery and reporting of internal control deficiencies prior to SOX-mandated audits. *Journal of Accounting and Economics*, forthcoming.
- Bar-Gill, O., Bebchuk, L., 2003. Misreporting corporate performance. Working paper, Harvard Law School.
- Bebchuk, L, Fried, J., Walker, D., 2002. Managerial power and rent extraction in the design of executive compensation. *University of Chicago Law Review* 69, 751-846
- Bebchuk, L, Grinstein, Y., Peyer, U., 2006. Lucky CEOs. Working paper, Harvard Law School.
- Bebchuk, L, Grinstein, Y., Peyer, U., 2006. Lucky Directors. Working paper, Harvard Law School.
- Carpenter, J.N., Remmers, B., 2001. Executive stock option exercises and inside information. *Journal of Business* 74, 513-534.
- Cai, J., 2006. Executive stock option exercises: Good timing or backdating? Working paper, Drexel University.
- Collins, D.W., Gong, G., and Li, H., 2005. The effect of the Sarbanes-Oxley Act on the timing manipulation of CEO stock option awards. Working paper, University of Iowa.
- Collins, D.W., Gong, G., and Li, H., 2006. Corporate governance and backdating of executive stock options. Working paper, University of Iowa
- Dash, Eric. Dodging taxes is a new stock options scheme. *The New York Times*. October 30, 2006.
- Doyle, J., Ge, W., McVay, S.E., 2006. Determinants of weaknesses in internal control over financial reporting. *Journal of Accounting and Economics*, forthcoming.
- Erickson, M., Hanlon, M., Maydew, E., 2006. Is there a link between executive equity incentives and accounting fraud? *Journal of Accounting Research* 44, 113-144.
- Fama, E.F., French, K.R., 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33, 3-56.

- Hanlon, M., Shevlin, T., 2002. Accounting for tax benefits of employee stock options and implications for research. *Accounting Horizons* 16, 1-16.
- Heron, R.A., Lie, E., 2006a. Does backdating explain the stock price pattern around executive stock option grants? *Journal of Financial Economics*, forthcoming.
- Heron, R.A., Lie, E., 2006b. What fraction of stock option grants to top executives have been backdated or manipulated? Working paper, University of Iowa.
- Huddart, S., and Lang, M., 1996. Employee stock option exercises: An empirical analysis. *Journal of Accounting and Economics* 21, 5-43.
- Huddart, S., and Lang, M., 2003. Information distribution within firms: evidence from stock option exercises. *Journal of Accounting and Economics* 34, 3-31.
- Lie, E., 2005. On the timing of CEO stock option awards. *Management Science* 51,802-812.
- McDonald, R., 2003. Is it optimal to accelerate the payment of income tax on share-based compensation? Working paper, Northwestern University.
- Narayanan, M.P., Seyhun, H.N., 2005. The dating game: do managers designate option grant dates to increase their compensation? Working paper, University of Michigan.
- Ofek, E., Yermack, D., 2000. Taking stock: equity based compensation and the evolution of managerial ownership. *Journal of Finance* 55, 1367-1384.
- Scholes, M, Wolfson, M., Erickson, M., Maydew, E., Shevlin, T., 2005. *Taxes and Business Strategy*: Prentice Hall.
- Shevlin, T., 1990. Estimating corporate marginal tax rates with asymmetric tax treatment of gains and losses. *The Journal of the American Taxation Association* 11, 51-67.
- U.S. Senate Committee on Finance, Testimony Concerning Executive Compensation and Options Backdating Practices by Linda Thomsen, 109th Congress, 2nd Session, September 6, 2006.
- Yermack, D., 1997. Good timing: CEO stock option awards and company news announcements. *Journal of Finance* 52, 449-476.

Appendix

Excerpt from Notice of Grant of Stock Options and Option Agreement by Northrop Grumman Corporation to CEO and Chairman Kent Kresa on August 15, 2001³²

5. In order to exercise this Option, the Grantee or such other person as may be entitled to exercise the same shall (i) execute and deliver to the Corporate Secretary of the Company a written notice indicating the number of shares subject to this option to be exercised, and/or (ii) complete such other exercise procedure as may be prescribed by the Corporate Secretary of the Company. The date of exercise of this option shall be the day such notice is received by the Corporate Secretary of the company or the day such exercise procedures are satisfied, as applicable; provided that in no event shall this Option be considered to have been exercised unless the per share exercise price of this option is paid in full (or provided for in accordance with the following sentence) for each of the shares to be acquired on such exercise and all required tax withholding obligations with respect to such exercise have been satisfied or provided for in accordance with paragraph 8 hereof. The purchase price shall be paid in cash or, in the sole discretion of the Committee and on such terms and conditions as the Corporate Secretary of the Company may prescribe, either in whole or in part in Common Stock of the Company (either actually or by attestation and valued at their fair market value on the date of exercise of this Option as defined in paragraph 6 hereof) or pursuant to a cashless exercise arranged through a broker or other third party.
6. The fair market value of the shares of Common Stock of the Company on the date of exercise of this Option shall be the closing price in the composite tape of the Common Stock on the New York Stock Exchange on such date, or, if there was no trading on such date, the closing price on the next preceding date on which there was trading in such shares; provided, however, the Committee in determining such fair market value may utilize such other exchange, market, or listing as it deems appropriate. For purposes of a cashless exercise, the fair market value of the shares shall be the price at which the shares in payment of the exercise price are sold.

³² Document obtained on November 30, 2006 from <http://contracts.corporate.findlaw.com/agreements/northrop/kresa.options.2001.08.15.html>

Figure 1

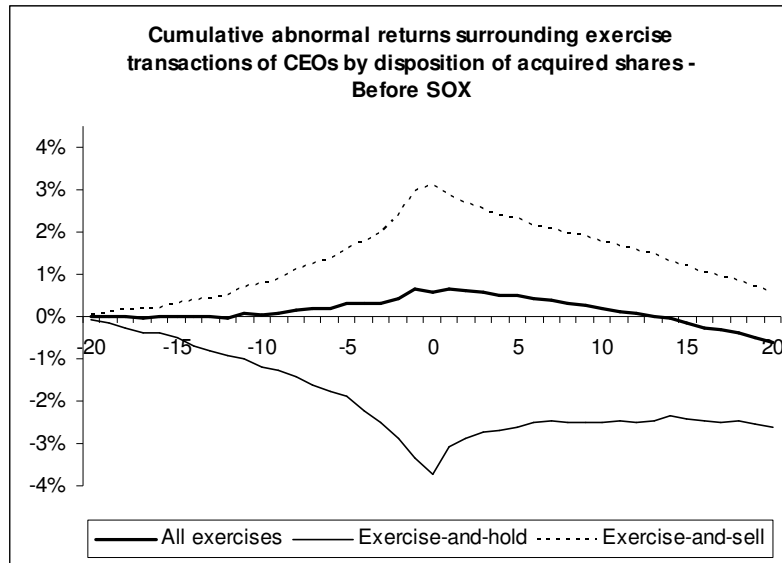
Estimated tax savings by backdating option exercises at different stock prices across various tax regimes

Stock price at the exercise date is (\$25 is the assumed average price during the month) and discount from \$25 in percentage terms

<i>Time period</i>	<i>t_{ord}</i>	<i>t_{cg}</i>	\$24.50	\$23.50	\$22.50	\$21.50	\$20.50	\$19.50
			(2%)	(6%)	(10%)	(14%)	(18%)	(22%)
1998-1991	28.0%	28.0%	\$5,307	\$15,921	\$26,536	\$37,150	\$47,764	\$58,378
1993-1997	39.6%	28.0%	\$11,107	\$33,321	\$55,536	\$77,750	\$99,964	\$122,178
1998-2002	39.6%	20.0%	\$13,591	\$40,772	\$67,954	\$95,136	\$122,317	\$149,499
2003-present	35.0%	15.0%	\$12,843	\$38,529	\$64,215	\$89,902	\$115,588	\$141,274

Estimated tax savings are calculated as: 100,000 options* $[t_{ord} - t_{cg}/(1+r)^n]$ *($\$25 - \text{Stock price at the exercise date}$) and assume $r = 10\%$ and $n = 5$.

Figure 2



This figure plots the cumulative abnormal returns surrounding option exercises by CEOs before SOX. There are 14,812 total exercises, with 5,485 classified as exercise-and-hold transactions and 9,327 classified as exercise-and-sell transactions. Daily abnormal returns are based on the Fama and French (1993) three-factor model estimated over the year ending 50 trading days prior to the exercise date.

Figure 3a

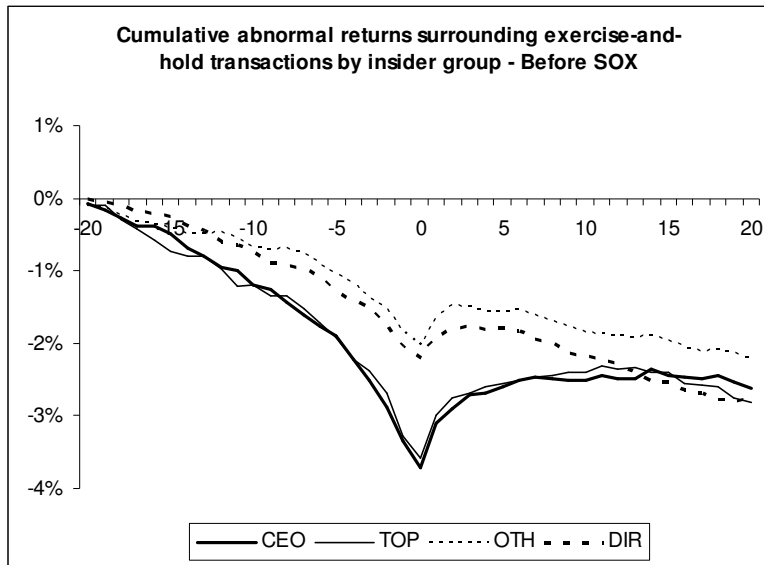
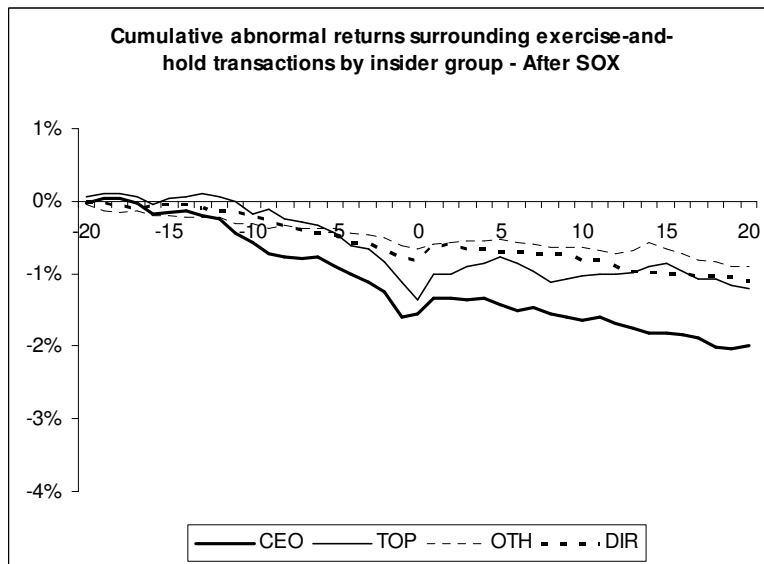


Figure 3b



These figures plot the cumulative abnormal returns surrounding **exercise-and-hold** transactions. Figure 3a includes exercises occurring before SOX. Figure 3b includes exercises after SOX. The CEO classification (CEO) includes all insiders where the primary role code is CEO, President, or Chairman of the Board. Non-CEO executives (TOP) include insiders where the primary and secondary role codes indicate the person is a CFO, COO, or both an officer and director. The other officer category (OTH) includes all other officers who are not also directors. Non-officer directors (DIR) include all other insiders where the primary role code is director. Daily abnormal returns are based on the Fama and French (1993) three factor model estimated over the year ending 50 trading days prior to the exercise date.

Figure 4a

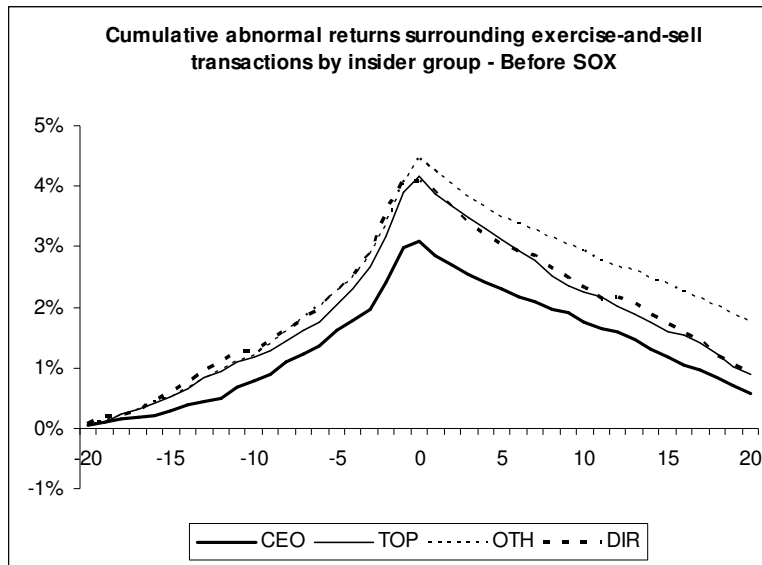
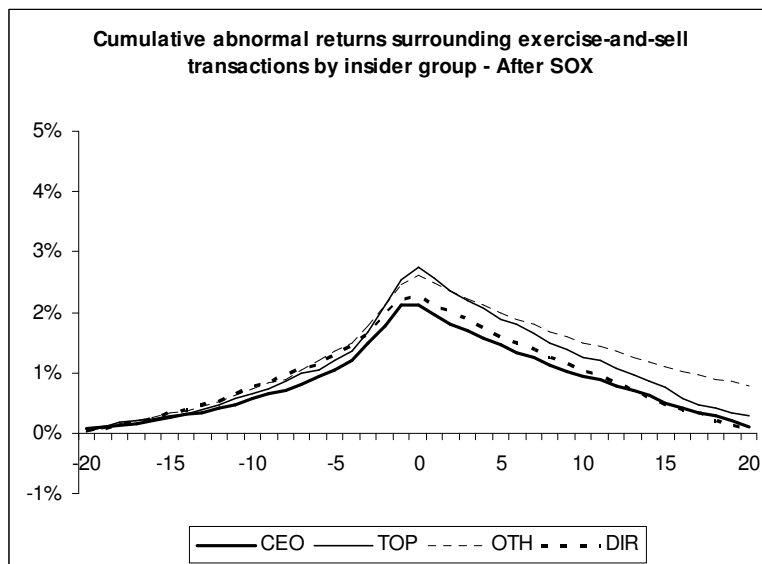
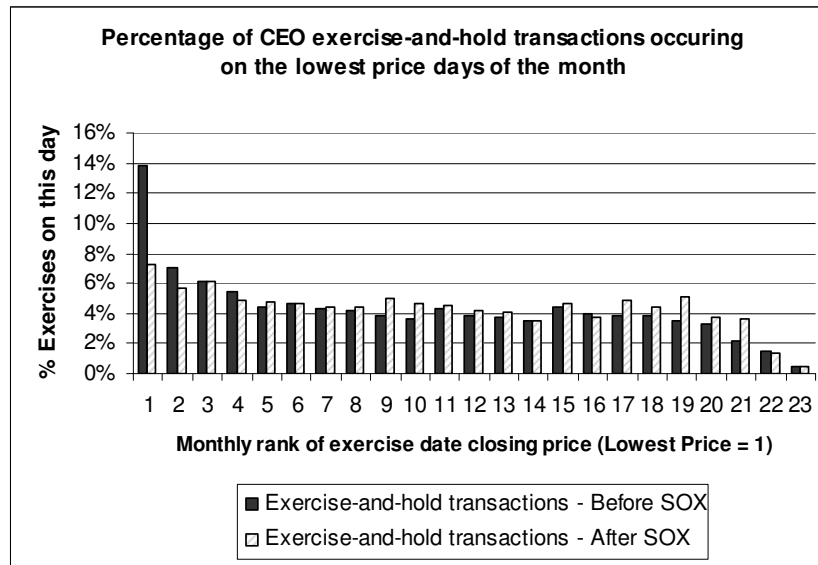


Figure 4b



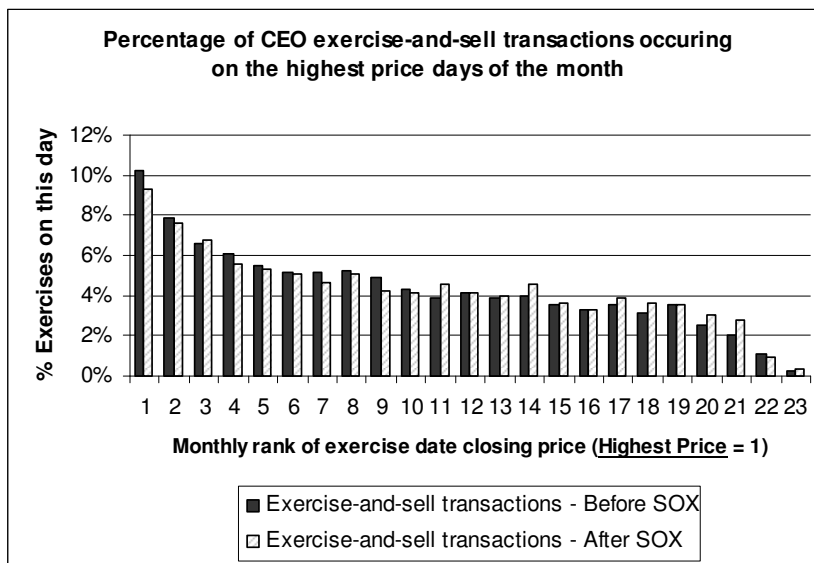
These figures plot the cumulative abnormal returns surrounding **exercise-and-sell** transactions. Figure 4a includes exercises occurring before SOX. Figure 4b includes exercises after SOX. The CEO classification (CEO) includes all insiders where the primary role code is CEO, President, or Chairman of the Board. Non-CEO executives (TOP) include insiders where the primary and secondary role codes indicate the person is a CFO, COO, or both an officer and director. The other officer category (OTH) includes all other officers who are not also directors. Non-officer directors (DIR) include all other insiders where the primary role code is director. Daily abnormal returns are based on the Fama and French (1993) three factor model estimated over the year ending 50 trading days prior to the exercise date.

Figure 5



This figure plots the percentage of all exercise-and-hold transactions occurring on days ranked by **lowest** closing price days of the month, with a value of 1 for the lowest price.

Figure 6



This figure plots the percentage of all exercise-and-hold transactions occurring on days ranked by **highest** closing price days of the month, with a value of 1 for the highest price.

Figure 7a

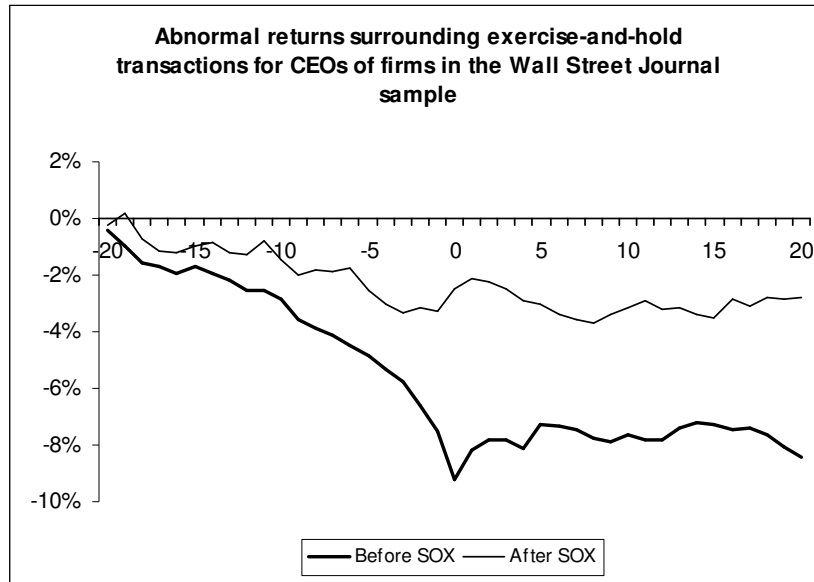
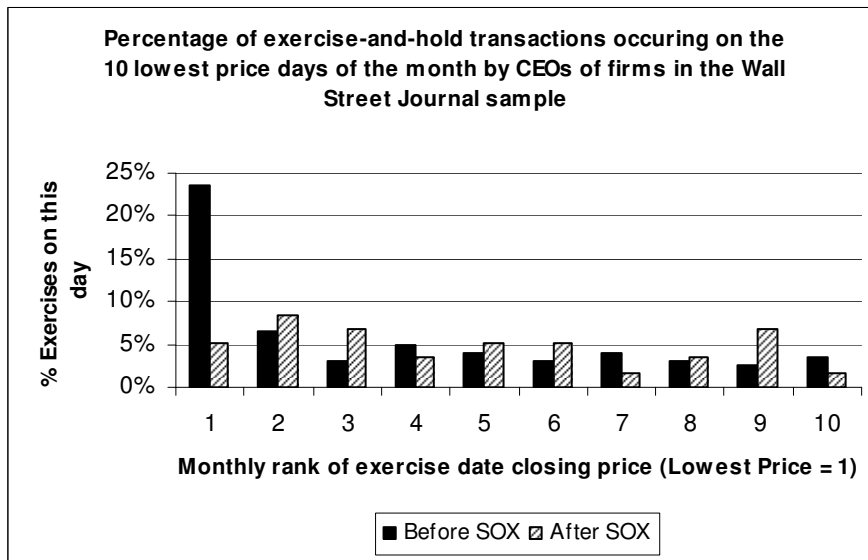


Figure 7b



These figures provide descriptive evidence on the timing of CEO exercise-and-hold transactions for the Wall Street Journal sample of firms under scrutiny for option grant backdating before and after SOX. Figure 7a plots the cumulative abnormal returns based on the Fama and French (1993) three factor model estimated over the year ending 50 trading days prior to the exercise date. Figure 7b reports the frequency of these exercises on the 10 lowest price days of the month.

Table 1 - Summary statistics on stock option exercises by insiders

	<i>N</i>	Number of shares acquired on exercise (K)	Fraction selling acquired shares	Market value of shares acquired (\$M)	Expected taxable income (\$M)
All insiders: By position					
CEO	23,310	71.59 (20.00)	0.67	2.49 (0.56)	1.64 (0.32)
Non-CEO executives	18,683	30.62 (10.20)	0.70	1.07 (0.29)	0.72 (0.17)
Other officers	58,017	21.32 (8.02)	0.77	0.85 (0.25)	0.53 (0.13)
Non-officer director	30,784	20.58 (6.25)	0.55	0.65 (0.16)	0.45 (0.93)
CEO only: By Size of firm					
MVE < \$500M	7,864	42.66 (14.40)	0.55	0.66 (0.22)	0.42 (0.13)
\$500M < MVE < \$2,500M	7,611	53.63 (19.99)	0.70	1.55 (0.55)	1.01 (0.32)
MVE ≥ \$2,500M	7,835	118.07 (35.62)	0.81	5.29 (1.62)	3.50 (0.95)
CEO only: All exercises					
Before SOX	14,812	68.14 (19.45)	0.63	2.55 (0.51)	1.74 (0.30)
After SOX	8,498	77.59 (25.00)	0.73	2.41 (0.64)	1.48 (0.35)
CEO only: Exercise-and-hold					
Before SOX	5,485	55.78 (12.00)	0.00	1.49 (0.25)	1.07 (0.14)
After SOX	2,276	49.05 (14.00)	0.00	1.00 (0.28)	0.65 (0.15)
CEO only: Exercise-and-sell					
Before SOX	9,327	75.42 (23.20)	1.00	3.18 (0.75)	2.12 (0.43)
After SOX	6,222	88.03 (30.00)	1.00	2.93 (0.85)	1.77 (0.47)

This table reports summary statistics for the sample, medians are in parentheses. The number of shares acquired on exercise the sum of all exercises on a given exercise day, reported in thousands. The fraction selling acquired shares is the percentage of insider exercises followed by a disposition of any quantity of shares by the end of the calendar month. The market value of shares acquired is equal to the number of options exercised times the average price during the month. Expected taxable income is equal to market value of shares acquired less the product of the exercise price (when available) and the number of options exercised.

Table 2 – Abnormal stock returns surrounding insider exercise decisions

Panel A: Exercise-and-hold transactions

	<i>CEOs</i>			<i>Non-CEO executives</i>			<i>Other officers</i>			<i>Non-officer directors</i>		
	Before SOX	After SOX	Before - After	Before SOX	After SOX	Before - After	Before SOX	After SOX	Before - After	Before SOX	After SOX	Before - After
AR(-20, 0)	-3.72% (-14.86)	-1.55% (-6.01)	-2.17% (-5.15)	-3.59% (-10.98)	-1.35% (-4.56)	-2.24% (-4.20)	-2.02% (-9.57)	-0.67% (-3.77)	-1.35% (-4.07)	-2.21% (-12.02)	-0.81% (-5.61)	-1.40% (-5.72)
AR(1,20)	1.09 (5.12)	-0.45 (-2.09)	1.54 (4.29)	0.77 (2.68)	0.15 (0.43)	0.62 (1.25)	-0.21 (-1.18)	-0.24 (-1.46)	0.03 (0.11)	-0.56 (-3.56)	-0.29 (-2.32)	-0.27 (-1.27)
AR(-20,-16)	-0.38 (-3.52)	-0.17 (-1.50)	-0.21 (-1.15)	-0.58 (-4.21)	-0.05 (-0.26)	-0.53 (-2.13)	-0.35 (-4.35)	-0.21 (-2.75)	-0.14 (-1.11)	-0.20 (-2.18)	-0.07 (-1.11)	-0.13 (-1.04)
AR(-15,-11)	-0.62 (-5.83)	-0.27 (-2.32)	-0.35 (-1.94)	-0.63 (-4.85)	0.05 (0.32)	-0.68 (-3.05)	-0.21 (-2.44)	-0.10 (-1.20)	-0.11 (-0.80)	-0.45 (-4.97)	-0.07 (-1.13)	-0.38 (-3.18)
AR(-10,-6)	-0.77 (-6.09)	-0.33 (-2.82)	-0.44 (-2.08)	-0.51 (-3.59)	-0.33 (-1.88)	-0.18 (-0.74)	-0.33 (-3.05)	-0.07 (-0.89)	-0.26 (-1.53)	-0.44 (-4.57)	-0.30 (-4.64)	-0.14 (-1.16)
AR(-5,-1)	-1.59 (-12.08)	-0.83 (-5.88)	-0.76 (-3.39)	-1.55 (-8.78)	-0.79 (-5.09)	-0.76 (-2.64)	-0.94 (-8.30)	-0.23 (-2.52)	-0.71 (-3.99)	-0.96 (-10.00)	-0.34 (-4.63)	-0.62 (-4.94)
AR(0)	-0.36 (-6.19)	0.05 (0.80)	-0.41 (-4.15)	-0.31 (-4.08)	-0.22 (-2.80)	-0.11 (-0.72)	-0.18 (-3.81)	-0.05 (-1.37)	-0.13 (-1.70)	-0.17 (-3.79)	-0.03 (-0.86)	-0.14 (-2.32)
AR(1,5)	1.12 (9.89)	0.13 (1.13)	0.99 (5.18)	1.03 (6.87)	0.57 (3.31)	0.46 (1.81)	0.46 (5.05)	0.13 (1.51)	0.33 (2.29)	0.43 (4.79)	0.12 (1.77)	0.31 (2.72)
AR(6,10)	0.09 (0.82)	-0.23 (-2.17)	0.32 (1.80)	0.16 (1.11)	-0.26 (-1.73)	0.42 (1.72)	-0.30 (-3.09)	-0.09 (-1.20)	-0.21 (-1.36)	-0.39 (-4.76)	-0.11 (-1.66)	-0.28 (-2.62)
AR(11,15)	0.08 (0.69)	-0.16 (-1.55)	0.24 (1.27)	-0.01 (-0.06)	0.17 (0.95)	-0.18 (0.74)	-0.10 (-1.13)	-0.03 (-0.36)	-0.07 (-0.47)	-0.36 (-4.18)	-0.20 (-3.27)	-0.16 (-1.43)
AR(16,20)	-0.18 (-1.81)	-0.19 (-1.64)	0.01 (0.03)	-0.42 (-3.11)	-0.33 (-2.20)	-0.09 (-0.37)	-0.27 (-3.22)	-0.24 (-3.09)	-0.03 (-0.22)	-0.24 (-3.00)	-0.10 (-1.66)	-0.14 (-1.33)
% exercises at lowest price day	13.84 (19.62)	7.25 (4.71)	6.59 (8.19)	13.77 (16.49)	8.42 (5.54)	5.35 (5.64)	9.72 (16.10)	7.00 (5.84)	2.72 (5.11)	9.73 (15.12)	5.92 (4.08)	3.81 (8.21)
N	5,485	2,278		3,914	1,687		8,981	4,157		7,890	6,061	

Panel B: Exercise-and-sell transactions

	<i>CEOs</i>			<i>Non-CEO executives</i>			<i>Other officers</i>			<i>Non-officer directors</i>		
	Before SOX	After SOX	Before - After	Before SOX	After SOX	Before - After	Before SOX	After SOX	Before - After	Before SOX	After SOX	Before - After
AR(-20, 0)	3.10% (17.12)	2.11% (14.59)	0.99% (3.92)	4.16% (19.41)	2.74% (17.34)	1.42% (5.08)	4.45% (37.81)	2.63% (34.45)	1.82% (12.59)	4.09% (15.46)	2.27% (16.66)	1.82% (6.09)
AR(1,20)	-2.52 (-17.84)	-2.01 (-16.85)	-0.51 (-2.57)	-3.27 (-18.28)	-2.47 (-18.82)	-0.80 (-3.47)	-2.69 (-27.76)	-1.85 (-31.05)	-0.84 (-7.10)	-3.16 (-15.13)	-2.23 (-21.00)	-0.93 (-3.94)
% exercises at highest price												
All	10.22 (17.66)	9.26 (12.44)	0.96 (1.99)	10.80 (16.79)	9.61 (12.73)	1.19 (2.22)	10.33 (28.67)	9.50 (23.76)	0.83 (2.91)	8.35 (12.17)	8.23 (11.81)	0.33 (0.69)
Open-market sales only	9.60 (12.43)	9.68 (11.37)	-0.08 (0.14)	10.57 (13.63)	9.98 (12.07)	0.59 (0.96)	10.27 (24.68)	9.80 (22.50)	0.47 (1.52)	8.57 (11.32)	8.24 (10.91)	0.33 (0.69)
<i>N</i>	9,327	6,222		7,268	5,804		23,938	20,941		8,439	8,394	

t-statistics in parenthesis. In the case of % exercised on highest or lowest day, *t*-statistic tests whether frequency is significantly different from 4.6875%.

This table reports average cumulative abnormal returns surrounding option exercises by insiders. Panel A contains data for exercise-and-hold transactions and panel B contains data for exercise-and-sell transactions, both by category of insider. The difference between the means and the associated two-tailed *t*-statistic for the difference is also reported. Day 0 is the exercise date. % exercised on lowest (highest) day is the fraction of exercises in the respective group which fall on the day with the lowest (highest) closing price of the month.

Table 3 – Quantification of tax effects and characteristics of exercise-and-hold transactions before SOX

Panel A: Exercise and firm attributes – CEO only

		(1) Suspect exercises	(2) All non- suspect exercises	(3) <i>p</i> -value of difference (1) - (2)
N		759	4,726	
Potential tax savings (\$000)	Mean	\$66.892	\$39.590	0.004
	Median	7.832	4.360	<0.001
Marginal tax rate of the firm (%)	Mean	26.67%	28.13%	0.001
Market value of firm equity (\$B)	Mean	\$2.763	\$4.666	0.007
	Median	0.321	0.470	<0.001

Panel B: Estimated tax effects of suspect option exercises only

		<i>CEO</i>	<i>Non-CEO executive</i>	<i>Other officer</i>	<i>Non-officer director</i>
N		759	539	873	768
Est. tax savings to insider (\$000)	Mean	\$66.892	\$29.121	30.526	14.391
	Median	7.832	3.600	2.568	2.335
	Sum (\$M)	50.771	15.697	26.649	11.052
Est. tax cost to firm (\$000)	Mean	56.018	24.600	27.169	12.149
	Median	5.667	2.764	1.788	1.986
	Sum (\$M)	42.518	13.259	23.719	9.331

Panel A provides univariate comparisons between suspect exercise-and-hold transactions (those occurring on the day with the lowest closing price of the month) and non-suspect exercise-and-hold transactions (all others). The *p*-value of the difference in means (medians) is from a two-tailed t-test (Z-test) of difference in means (medians) between the groups. Potential tax savings is equal to $N[t_{ord} - t_{cg}/(1+r)^n](P_{MAVG} - P_{MLOW})$, where N is the number of options exercised, t_{ord} (t_{cg}) is top federal ordinary (capital gains) income tax rate at the time of exercise, P_{MAVG} is the average closing price during the month, P_{MLOW} is the lowest closing price during the month, r is equal to 0.10 and n is equal to 5. The marginal tax rate is the trichotomous tax rate described in Shevlin (1990). Market value of firm equity is measured at the end of the year. Panel B reports the estimated tax savings achieved by suspect exercises. Estimated tax savings is equal to the potential tax savings for suspect exercises. The estimated tax cost to the firm is equal to the difference between the average stock price during the month and the closing price on the exercise date, multiplied by the number of shares acquired and the marginal tax rate.

Table 4: Determinants of the likelihood of a suspect exercise-and-hold transaction before and after SOX

$$\Pr(\text{Suspect Exercise}) = \alpha_0 + \alpha_1 \ln(\text{Potential tax savings}) + \alpha_2 \text{Marginal tax rate} + \alpha_3 \ln(\text{Market value of firm equity}) + e$$

Variable	<i>CEO</i>		<i>Non-CEO executive</i>		<i>Other officer</i>		<i>Non-officer director</i>	
	Before SOX	After SOX	Before SOX	After SOX	Before SOX	After SOX	Before SOX	After SOX
Intercept	-2.000 (-9.05)	-1.380 (-2.98)	-2.244 (-8.69)	-1.439 (-2.96)	-2.536 (-12.91)	-1.847 (-5.38)	-2.471 (-11.31)	-2.620 (-8.33)
ln(Potential tax savings) (+)	0.160 (7.70) [0.019]	-0.091 (-1.94) [-0.006]	0.115 (4.45) [0.014]	-0.038 (-0.73) [-0.003]	0.118 (5.92) [0.010]	-0.084 (-2.27) [-0.005]	0.147 (6.30) [0.013]	0.050 (1.48) [0.003]
Marginal tax rate of the firm (-)	-0.405 (-1.16) [-0.047]	-1.326 (-1.82) [-0.089]	0.208 (0.50) [0.025]	-1.709 (-2.17) [-0.131]	0.256 (0.78) [0.022]	-0.393 (-0.67) [-0.026]	0.174 (0.50) [0.015]	-0.724 (-1.46) [-0.040]
ln(Market value of firm equity) (-)	-0.150 (-7.52) [-0.021]	-0.011 (-0.22) [-0.001]	-0.093 (-3.32) [-0.011]	-0.030 (-0.55) [-0.002]	-0.102 (-5.12) [-0.009]	-0.006 (-0.18) [-0.000]	-0.150 (-6.56) [-0.013]	-0.046 (-1.46) [-0.003]
N	5,485	2,276	3,913	1,697	8,981	4,157	7,890	6,061
% Suspect exercises	13.84%	7.25%	13.77%	8.43%	9.72%	7.00%	9.73%	5.92%
Likelihood Ratio	100.63	7.23	24.17	5.51	47.50	6.10	63.93	5.95
Veall-Zimmerman pseudo R ²	4.04%	0.93%	1.38%	0.88%	1.35%	0.44%	2.06%	0.32%

This table reports the coefficient estimates, with *t*-statistics in parentheses and marginal effect in brackets, from a binomial logit regression. The dependent variable takes the value one for suspect exercises, zero otherwise. Potential tax savings is equal to $N[t_{\text{ord}} - t_{\text{cg}}/(1+r)^n](P_{\text{MAVG}} - P_{\text{MLOW}})$, where *N* is the number of options exercised, t_{ord} (t_{cg}) is top federal ordinary (capital gains) income tax rate at the time of exercise, P_{MAVG} is the average closing price during the month, P_{MLOW} is the lowest closing price during the month, *r* is equal to 0.10 and *n* is equal to 5. The marginal tax rate is the trichotomous tax rate described in Shevlin (1990). Market value of firm equity is measured at the end of the year.

Table 5 – Evidence from the Wall Street Journal sample of firms under scrutiny for option grant backdating

Panel A: Abnormal returns surrounding exercise-and-hold transactions by insiders in firms under scrutiny for grant backdating as tracked by the Wall Street Journal

	<i>CEO</i>		<i>Non-CEO executive</i>		<i>Other officer</i>		<i>Non-officer director</i>	
	Before SOX	After SOX	Before SOX	After SOX	Before SOX	After SOX	Before SOX	After SOX
AR(-20,0)	-9.24 (-6.10)	-2.48 ^b (-1.06)	-9.96 (-4.70)	-5.19 (-2.28)	-6.37 (-5.58)	0.58 ^a (0.15)	-3.75 (-3.55)	-2.77 (-2.83)
AR(1,5)	1.93 (3.52)	-0.52 ^b (-0.80)	3.52 (3.75)	0.83 (1.21)	1.88 (3.89)	0.78 (0.93)	-0.07 (-0.14)	-0.64 (-1.62)
AR(1,10)	1.62 (2.00)	-0.64 (-0.85)	4.67 (3.27)	-0.82 (-0.86)	1.89 (2.71)	0.91 (1.03)	-0.44 (-0.67)	-1.01 (-1.60)
AR(1,20)	0.81 (0.73)	-0.33 (-0.30)	0.78 (0.45)	-1.69 (-1.04)	0.21 (0.23)	0.27 (0.05)	-1.27 (-1.26)	-0.85 (-1.00)
% exercised on <i>lowest</i> price of month	23.50% (6.26)	5.08% ^a (0.14)	31.19% (5.95)	14.29% ^b (1.59)	17.43% (6.43)	6.73% ^a (0.83)	13.58% (4.04)	5.81% ^a (0.59)
N	200	59	109	35	367	104	243	155
% of exercise-and-sell transactions exercised on <i>highest</i> price of month	11.05% (3.95)	12.20% (3.88)	16.08% (5.72)	11.25% ^c (3.21)	13.99% (9.87)	11.00% ^b (6.11)	10.47% (4.28)	8.16% (2.94)
N exercise-and-sell transactions	380	287	342	240	1,358	918	516	539

Panel B: Descriptive statistics for CEO exercise-and-hold transactions before SOX

		Firms in the Wall Street Journal sample	Firms <u>not</u> in the Wall Street Journal sample	<i>p</i> -value of difference
N		200	5,285	
Potential tax savings (\$,000)	Mean	100.19	41.22	<0.001
	Median	23.48	4.42	<0.001
Marginal tax rate	Mean	24.15%	25.78%	<0.001
Market value of equity (\$B)	Mean	8.26	4.25	0.002
	Median	1.69	0.43	<0.001

Table 5 (cont'd) – Evidence from the Wall Street Journal sample of firms under scrutiny for option grant backdating

Panel C: Grant backdating and the likelihood of a suspect exercise-and-hold transaction

$$\begin{aligned} \text{Pr}(\text{Suspect Exercise}) = & \alpha_0 + \alpha_1 \ln(\text{Potential tax savings}) + \alpha_2 \text{Marginal tax rate} \\ & + \alpha_3 \ln(\text{Market value of firm equity}) \\ & + \alpha_4 \text{Indicator for Wall Street Journal sample} + \varepsilon \end{aligned}$$

	<i>CEO</i>		<i>Non-CEO executive</i>		<i>Other officer</i>		<i>Non-officer director</i>	
	Before SOX	After SOX	Before SOX	After SOX	Before SOX	After SOX	Before SOX	After SOX
Intercept	-1.934 (-8.74)	-1.390 (-3.00)	-2.142 (-8.45)	-1.419 (-2.91)	-2.454 (-12.45)	-1.843 (-5.35)	-2.426 (-11.08)	-2.622 (-8.33)
Ln(Potential tax savings) (+)	0.153 (7.35) [0.018]	-0.089 (-1.89) [-0.006]	0.103 (3.94) [0.012]	-0.040 (-0.76) [-0.003]	0.107 (5.30) [0.009]	-0.085 (-2.28) [-0.006]	0.143 (6.16) [0.013]	0.051 (1.48) [0.003]
Marginal tax rate of the firm (-)	-0.327 (-0.93) [-0.038]	-1.379 (-1.89) [-0.092]	0.363 (0.87) [0.043]	-1.639 (-2.07) [-0.126]	0.327 (1.00) [0.028]	-0.386 (-0.65) [-0.025]	0.207 (0.59) [0.018]	-0.730 (-1.47) [-0.041]
Ln(Market value of firm equity) (-)	-0.189 (-7.83) [-0.022]	-0.008 (-0.17) [-0.001]	-0.107 (-3.76) [-0.013]	-0.037 (-0.67) [-0.003]	-0.110 (-5.45) [-0.010]	-0.007 (-0.19) [-0.000]	-0.158 (-6.80) [-0.014]	-0.045 (-1.43) [-0.003]
Indicator for Wall Street Journal sample (+)	0.672 (3.79) [0.079]	-0.382 (-0.63) [-0.025]	1.077 (4.90) [0.126]	0.602 (1.21) [0.046]	0.677 (4.62) [0.059]	0.076 (0.19) [0.005]	0.492 (2.50) [0.043]	-0.047 (-0.13) [-0.003]
N	5,485	2,276	3,913	1,697	8,981	4,157	7,890	6,061
Likelihood Ratio	113.62	7.68	45.29	6.79	66.41	6.14	69.59	5.97
Veall-Zimmerman pseudo R ²	4.55%	0.98%	2.57%	1.09%	1.89%	0.44%	2.24%	0.32%

t-statistics in parentheses. In the case of % exercised on highest or lowest day, *t*-statistic tests whether frequency is significantly different from 4.6875% (percentage occurring randomly on any day during the month).

^{a,b,c} indicate that the difference between Before and After SOX is statistically significant at the 1%, 5%, and 10% level (two-tailed *t*-test).

This table reports evidence for firms under scrutiny for option grant backdating as tracked by the Wall Street Journal at <http://online.wsj.com/public/resources/documents.info-optionsscore06-full.html> (i.e. the Wall Street Journal sample). Panel A reports average cumulative abnormal returns surrounding exercise-and-hold transactions by insiders of the Wall Street Journal sample. Day 0 is the exercise date. % exercised on lowest (highest) day is the fraction of exercises in the respective group which fall on the day with the lowest (highest) closing price of the month. Panel B reports descriptive statistics for CEO exercise-and-hold transactions in the Wall Street Journal sample. Potential tax savings is equal to $N[t_{\text{ord}} - t_{\text{cg}}/(1+r)^n](P_{\text{MAVG}} - P_{\text{MLOW}})$, where *N* is the number of options exercised, t_{ord} (t_{cg}) is top federal ordinary (capital gains) income tax rate at the time of exercise, P_{MAVG} is the average closing price during the month, P_{MLOW} is the lowest closing price during the month, *r* is equal to 0.10 and *n* is equal to 5. The marginal tax rate is the trichotomous tax rate described in Shevlin (1990). Market value of firm equity is measured at the end of the year. Panel C reports the coefficient estimates, with *t*-statistics in parentheses and marginal effect in brackets, from a binomial logit regression of the probability of an exercise-and-hold transaction occurring on the day with the lowest closing price of the month.